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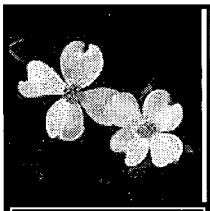

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Flora of the Carolinas, Virginia, and Georgia, and Surrounding Areas

by Alan S. Weakley

UNC Herbarium, North Carolina Botanical Garden, University of North Carolina at Chapel Hill

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Flora of the Carolinas, Virginia, Georgia, northern Florida, and surrounding areas

Working Draft of 7 April 2008

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INTRODUCTION

The Flora

Floras serve as the basic reference of the plant biota of an area; they are critical tools that serve botanists, conservationists, ecologists, foresters, gardeners, agronomists, researchers, and the general public. In the nineteenth and early twentieth centuries, the botanical exploration of an area and writing a flora to summarize that information was seen as a basic societal need leading to the discovery of economically valuable information. Financial support for the research and writing of floras has waned in recent decades, though, as they have been increasingly regarded as "old science" and resources have shifted to areas of plant science seen as more "cutting edge." Even in taxonomic research, the advent of molecular techniques has largely supplanted detailed taxonomic research (at generic levels and below) and the writing of floras, and the great majority of papers in plant systematics now address phylogenetic relationships within a particular group of plants, and mostly at higher taxonomic levels. Traditional monographic taxonomy, with descriptions of taxa, keys to facilitate their identification, distribution maps, and assessments of habitat and relative abundance or rarity, has become increasingly rare.

Yet, paradoxically, the societal uses and needs for the translation of taxonomic information to a useable form, such as floras, have never been greater. Globalization of human societies and economies has meant that plants are regularly introduced far away from their regions of nativity, and many become established and can be either benign or cause economic and conservation damages. Increasing human utilization of land resources has fueled a biodiversity crisis, with many species now considered imperiled. In the United States and elsewhere, this has resulted in considerable governmental and nongovernmental activity focused on biodiversity inventory and conservation, "recovery" of endangered and threatened species, ecological studies and ecological restoration, and assessment and suppression of invasive exotics. All these activities require an accurate and sophisticated understanding of the flora of an area. These activities also generate new information about the taxonomy, distribution, and conservation status of components of a region's flora which then needs to be incorporated into new iterations

In the southeastern United States, the publication thirty-seven years ago of the Manual of the Vascular Flora of the Carolinas, by A.E. Radford, H.E. Ahles, and C.R. Bell (Radford, Ahles, & Bell 1968), was a landmark. In the decades since its publication, it has served as the primary reference for the identification of plants in the Carolinas, and throughout the southeastern United States (since most other states were not covered by comparable, recent references. The effort to research and write the Manual of the Vascular Flora of the Carolinas took about 11 years, and resulted in a series of publications, the Guide to Vascular Flora of the Carolinas (Radford, Ahles, & Bell 1964), the Atlas of the Vascular Flora of the Carolinas (Radford, Ahles, & Bell 1965), and finally the Manual itself (1968). Once published, the existence of "the Manual" helped generate an interest in and further studies of the flora of the region; since then, many additional species have been documented as part of the region's flora, additional alien species have become naturalized, new species have been described, monographs have given new taxonomic insights into groups, nomenclature accepted in 1968 has been found to be invalid, new and more reliable keys have been developed, and systematic treatments have changed and advanced. Increasingly, identification of the flora of our area (and other states of the Southeast and Mid-Atlantic) by academic researchers, agency personnel, and the interested public is hampered by the lack of an up-to-date flora. Without such a flora, identification must involve reference to herbaria and thousands of monographs, papers, and other floras – resources not readily available to many people who need them. The absence in the region of a single-source modern standard for the systematic treatment, nomenclature, and identification of the flora compromises scientific studies, ecological research, and agency inventory, management, and monitoring of ecosystem and species biodiversity.

Chapter 1 consists of a new treatment of the flora of the Carolinas, Virginia, and Georgia, to fill the need for a new standard reference to aid in the consistent identification of the flora of the region. While building on the tradition of the Manual, the Flora is not a revision or second edition; it takes some different approaches, has features the Manual lacks, lacks features the Manual has, and has an expanded geographic scope. The Flora includes treatment of all species in Virginia, North Carolina, South Carolina, and Georgia (the primary flora area), with less detailed treatment of all species occurring in a secondary flora area consisting of the adjoining states of Alabama, Mississippi, Tennessee, Kentucky, West Virginia, the District of Columbia, Maryland, and Delaware, and portions of the additional states of New Jersey (southern New Jersey, south of and including Monmouth and Burlington counties), Louisiana (the Florida Parishes, east of and including West Feliciana, East Baton Rouge, Ascension, St. James, St. John the Baptist, St. Charles, Jefferson, and Plaquemines parishes), and Florida (the Panhandle and northeastern Florida, south to and including Dixie, Gilchrist, Columbia, Union, Bradford, Clay, and Duval counties) (see Figure 1.A.). Approximately 5400 species and infraspecific taxa are recognized for the primary flora area (the Carolinas, Virginia, and Georgia), with an additional 900 taxa from the secondary and tertiary flora areas. Approximately 6500 taxa are keyed and treated, making the Flora a comprehensive resource for understanding the flora of all of the Southeastern United States east of the Mississippi River and south of the Ohio River and Mason-Dixon Line, excluding peninsular Florida.

Sources of information.
This new flora is based on all resources available: herbarium specimens, published literature, grey literature, Natural Heritage databases and rare species lists, and personal communication with a regional network of botanists and taxonomic experts. Herbarium specimens have been consulted at major institutions in the region.

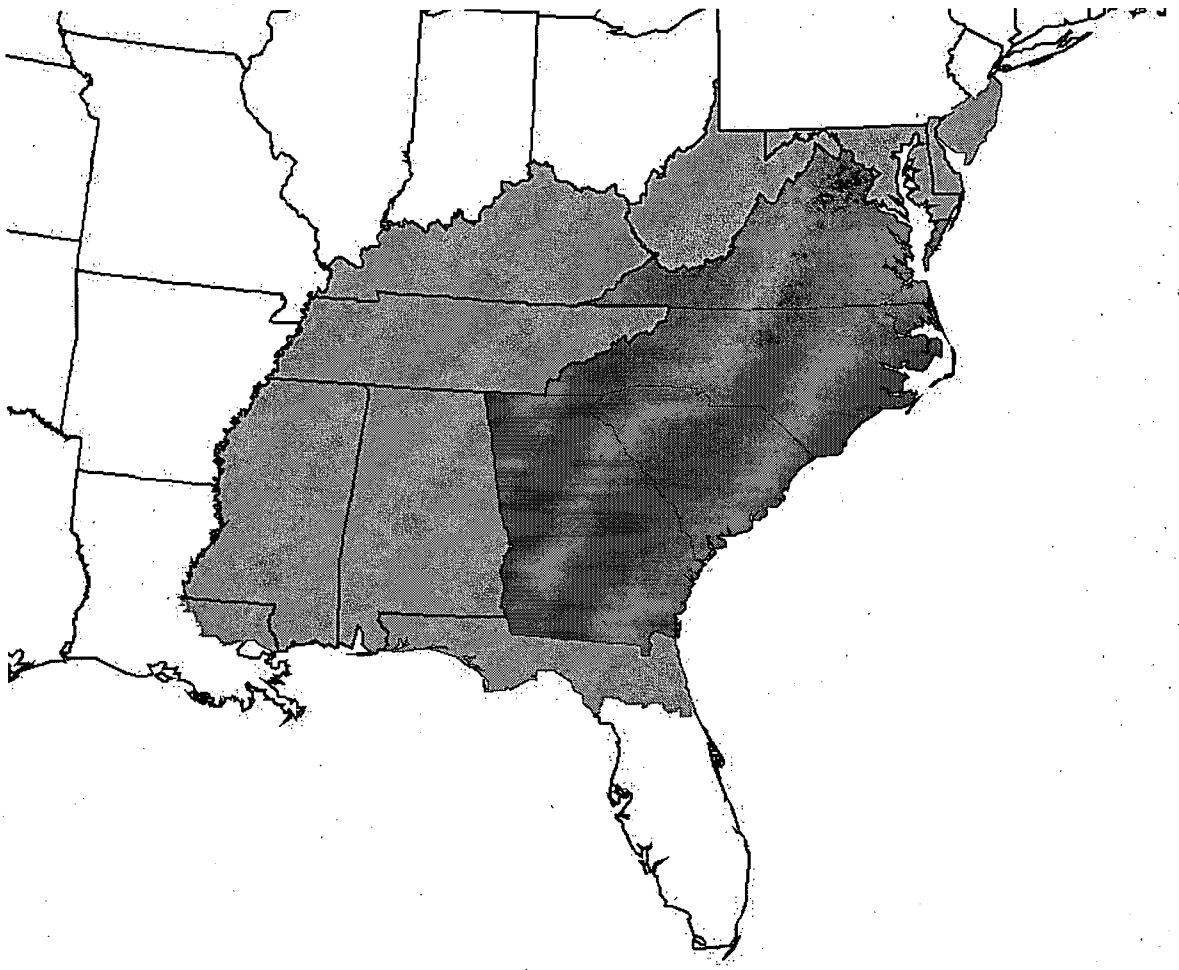

Figure 1.A. Map of the area covered by the Flora (Chapter 1).

Criteria for inclusion of taxa.

One of the first challenges that the author of a flora encounters is to decide the criteria for the inclusion of taxa. The general rule in most floras can be simply summarized as "all native taxa and naturalized alien taxa," but within this simplistic phrase hide many complicated issues, and floras often differ widely in the actual criteria and judgments that they apply (Pyšek et al. 2004; Palmer, Wade, & Neal 1995). In particular, coverage of alien species is very uneven in floras, and the frequent exclusion of many alien species from floras hampers ecological studies, conservation efforts, and efforts to minimize the ecological and economic impacts of invasive aliens.

The following categories of taxa are included and treated fully as "primary" species:

1. Native taxa documented from the primary area (Georgia, South Carolina, North Carolina, and Virginia), whether extant or presumed extinct. Some authors, such as Isely (1990), have "excluded" taxa from a flora if they believed them to be extinct or extirpated. This philosophy seems poorly considered: these taxa may prove not to be extinct or extirpated and their inclusion in the Flora will facilitate possible rediscovery, even if never found again specimens of them in the herbarium need to be identified or confirmed, and their former existence in the region should be documented.
2. Alien taxa introduced by whatever means and demonstrably established and reproducing (sexually or vegetatively) as a component of the flora. Parallel to #1 above, established alien taxa which have been presumably eradicated (such as *Striga asiatica* in the Carolinas) are included, as their eradication may not have been effective, they may be reintroduced, specimens need to be identifiable using the Flora, and their former existence should be documented.
3. Alien taxa substantially cultivated in the flora area as crops, such as *Triticum aestivale*, *Zea mays*, *Vitis vinifera*, and *Pinus clausa*. Such species are variably represented in herbaria, and are often included in floras only if one or more herbarium specimens indicate that the species is persisting, or has been collected around a dump or in the edge of a field "out of cultivation." This seems an arbitrary criterion to apply to species which are among the most commonly seen and economically most important in a region, and may cover many thousands of acres or square miles in the region covered by the flora.

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Additional categories of taxa are included and treated as "secondary" species:
1. Native taxa with uncertain documentation, this varying from literature reports not definitely verifiable with specimens (some of these old and some new), to sight reports regarded as probably correct. Taxa in this category are included as secondarily-treated taxa, and their imperfect documentation is described.
2. Native taxa documented from the secondary flora area, consisting of Alabama, Mississippi, Tennessee, Kentucky, West Virginia, Maryland, District of Columbia, Maryland, Delaware, eastern Louisiana, northern Florida, and southern New Jersey.
3. Alien taxa demonstrably established in the secondary flora area.

Species which have been reported from the Flora area but which are excluded for one reason or another are also listed and the reason for their exclusion mentioned or discussed.

Taxonomic philosophy. Taxonomic treatments generally follow recent monographic and revisionary work, but an effort has been made to provide a certain rough consistency of "splitting" vs. "lumping" across different taxonomic groups. As is generally true in recent treatments, generic and family concepts are often narrower than those used in the Radford, Ahles, and Bell (1968) Manual, based on new evidence, including (but not limited to) cladistic methods applied to morphologic and molecular data. Ironically, these results have often resulted in a validation of earlier, narrower generic (and familial) concepts espoused by J.K. Small, P.A. Rydberg, and others (see Chapter 3 for extensive discussion). Varieties are less frequently recognized than by Fernald (1950), though a considerable number of species and infraspecific taxa "lumped" by Radford, Ahles, and Bell (1968) are recognized (generally following more recent monographic or revisionary work). Some taxa not formally recognized are discussed and characters for their recognition provided in the text, to draw attention to putative taxa that may warrant recognition after further evaluation.

Format and features.

Detailed keys. Keys have been subjected to rigorous testing in the field and herbarium by hundreds of users. To the degree feasible, keys are structured to emphasize characters that are readily observable and available for long parts of the year, such as vegetative characters; this is not feasible for all groups, of course. Multiple characters are provided. Terminology strives to avoid abstruse technical terms which do not significantly add meaning (for some genera, an introduction to morphological characters and terms used is provided as "Identification notes" preceding the key). Geographic distributions and habitats are sometimes included in the keys as pragmatic, useful, secondary "characters," but are placed in brackets to indicate that they are not "true" characters. The keys include all species from the primary and secondary flora areas (North Carolina, South Carolina, Virginia, Georgia, Alabama, Mississippi, Tennessee, Kentucky, West Virginia, Maryland, Delaware, the District of Columbia , and parts of Florida, Louisiana, and New Jersey). The inclusion in the keys of taxa from the broader, secondary area will facilitate the discovery of range extensions, as well as extending the usefulness of the Flora to a broader geographic area. In some cases, several alternate keys are provided. The primary emphasis of the keys is pragmatism – effective and efficient identification. For this reason, a key to a genus sometimes includes closely similar taxa not in the genus that may be mistaken for it. Another example is that the "family key" to ferns and fern allies is actually a key to genera, allowing an emphasis in the key on readily observable characteristics, rather than the technical characters often needed to distinguish fern families. Keys are based on herbarium specimens, though reference is made when characters based on live or fresh plants may differ from those of pressed and dried specimens. Some keys have been adapted from literature cited; where the adaptation is particularly close, credit is given to the source by specific citation.

Habitat. Information is provided about the habitat of the taxon. This information is largely from the field experience of the author, supplemented by information from other botanists, from herbarium labels, and from the literature. For species with wide ecological amplitudes, the habitat may be described simply and broadly ("a wide variety of upland forests"), while the habitat of more localized, specialized, or rare taxa may be described in considerable detail ("moist outcrops of calcareous to semi-calcareous metamorphic rocks, such as mylonite or marble, near waterfalls in humid escarpment gorges with high rainfall, at low elevations").

Native status. The native or alien status is stated. Also, an asterisk prior to the species' name indicates that it is considered alien throughout the primary flora area. Some past floras, including Radford, Ahles, and Bell (1968), were haphazard in their inclusion of this information, which is a very important attribute of each recognized taxon. If there is a question, it is mentioned or discussed. For aliens, an opinion is given as to whether the taxon is naturalized, persistent, waif, etc. in the primary flora area.

Flowering/fruiting dates. Flowering and fruiting dates are provided for the primary flora area. These are derived from herbarium specimens viewed by the author (collected from within the Flora area), from field observations by the author (within the Flora area), and from literature cited.

Distribution of species. A statement of the rangewide distribution of each taxon treated is provided. This is based on published distribution maps and distribution statements in other floras, amended and improved by additional herbarium specimens and published records (such as the "Noteworthy Collections" section in the journal Castanea). The distribution within the primary area is provided by state and physiographic province.

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Literature. Nearly all genera have citations to recent, pertinent systematic literature, as well as more limited citations to literature on ecology and population biology. The intent is to provide the user with access into more detailed literature, and to document the literature basis of the treatment followed in the Flora. About 2100 references have been consulted and are cited.

Synonymy. Cited synonymy is provided to regional floras, monographs, revisions, and other significant floristic treatments. This allows comparison of the treatment in the Flora to other treatments, and convenient access to the other treatments. Synonymy is provided comprehensively for the following floras: Radford, Ahles, and Bell (1968), as RAB; Small (1933, 1938), as S; Fernald (1950), as F; Gleason (1952), as G; Godfrey and Wooten (1979, 1981) as GW; Vascular Flora of the Southeastern States (Cronquist 1980, Isely 1990) as SE; Wofford (1989) as W; Gleason and Cronquist (1991) as C; Kartesz (1999) as K; and Flora of North America (1993b, 1997, 2000, 2002a, 2002b, 2003a, 2004b, 2005, 2006a, 2006b, 2006c) as FNA. Synonymy used in recent monographs and revisions is also cited. All names known to me to be attributed to the ***Flora*** area in other floras, monographs, and revisions are accounted for.

Rarity. Species monitored as rare, threatened, or endangered by the state agencies of Georgia, North Carolina, South Carolina, and Virginia, or by the U.S. Fish and Wildlife Service, are so indicated. While the details of rarity status will change, this will still provide the user a preliminary indication that the taxon is one of conservation concern. This information is derived from Franklin (2004), Townsend (2005), Georgia Natural Heritage Program (2005), and USFWS (2005).

Comments and discussion. Miscellaneous comments and discussion are provided for many species and genera, including discussion of biogeography, more details on distribution of rare species, additional notes on identification not included in the keys, information of particular interest on species biology and ecology, habitat, uses, discovery in the flora area or a state, etc. These "idiosyncratic comments" add to the general usefulness and interest of what is intended to be a rigorous, practical, and interesting flora.

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FERNS AND "FERN ALLIES"

Family circumscriptions follow Smith et al. (2006).

ARTIFICIAL KEY TO THE GENERA OF FERNS AND FERN ALLIES

1 Plant a free-living gametophyte, consisting of filaments or thalli, generally a single cell thick, usually with abundant single-celled gemmae .... **Key A**
1 Plant a sporophyte, consisting of a stem, rhizome, corm, or crown producing well-developed leaves, > 1 cell thick (except in *Trichomanes* and *Hymenophyllum*), generally reproducing by spores.
2 Plant aquatic, either floating and unattached, or rooting and largely submersed .... **Key B**
2 Plant of various habitats, including wetlands, where sometimes growing in soils saturated or intermittently flooded, but not aquatic.
3 Leaves not "fern-like," unlobed, variously awl-shaped, scale-like, or terete .... **Key C**
3 Leaves "fern-like," variously lobed or divided, ranging from pinnatifid to 4-pinnate.
4 Leaf blades (not including the petiole) small, < 30 cm long or wide (some species will key either here or in the next lead).
5 Epipetric or epiphytic, growing on rock, tree bark, walls, or over rock in thin soil mats or in small soil pockets .... **Key D**
5 Terrestrial, growing in soil, not associated with rock outcrops .... **Key E**
4 Leaf blades medium to large, > 30 cm long or wide.
6 Epipetric or epiphytic, growing on rock, walls, over rock in thin soil mats or in small soil pockets, or on tree trunks .... **Key F**
6 Terrestrial, growing in soil, not associated with rock outcrops .... **Key G**

Key A – Pteridophytes reduced to thalloid or filamentous, free-living gametophytes

1 Gametophytes filamentous .... ***Trichomanes*** (HYMENOPHYLLACEAE)
1 Gametophytes thalloid, ribbon-like and branched.
2 Gemmae absent or spathulate (> 1 cell wide) .... ***Hymenophyllum*** (HYMENOPHYLLACEAE)
2 Gemmae uniseriate (1 cell wide) .... ***Vittaria*** (PTERIDACEAE)

Key B – Pteridophytes growing as floating or rooted aquatics

1 Plant a floating aquatic.
2 Leaves < 1 mm long, reddish or green, without hairs on the upper surface .... ***Azolla*** (AZOLLACEAE)
2 Leaves 5-50 mm long, bright green, with obvious hairs on the upper surface .... ***Salvinia*** (SALVINIACEAE)
1 Plant a rooted aquatic.
3 Plant clover-like, with 4 leaf segments borne terminally .... ***Marsilea*** (MARSILEACEAE)
3 Leaves linear.
4 Plants cormose or with short rhizomes; leaves numerous, undivided leaves .... ***Isoetes*** (ISOETACEAE)
4 Plants with creeping rhizomes; leaves few, reduced to a winged petiole .... ***Pilularia americana*** (MARSILEACEAE)

Key C – Pteridophytes with leaves not "fern-like" (unlobed, variously awl-shaped, scale-like, or terete)

1 Stem obviously jointed; leaves scale-like, borne in a whorl at each of the distant joints; spores borne in a terminal strobilus with peltate scales .... ***Equisetum*** (EQUISETACEAE)
1 Stem not jointed; leaves scale-like or larger, but if scale-like not borne in whorls at distant joints; spores borne variously, but if in a terminal strobilus the scales not peltate.
2 Leaves linear, grass-like, 1-50 cm long, 20× or more as long as wide.
3 Leaves solitary (though often the internodes very short from a thin, creeping rhizome); sporangia borne in a spherical (ca. 3 mm in diameter) sporocarp on a separate branch from the rhizome .... ***Pilularia*** (MARSILEACEAE)
3 Leaves numerous from a corm or short rhizome; sporangia either borne in the expanded leaf bases (*Isoetes*) or in 2 rows at the tip of the linear fertile leaves (*Schizaea*).
4 Leaves straight, arching, or flaccid, from a 2-3-lobed corm; sporangia borne in the expanded, hyaline leaf bases .... ***Isoetes*** (ISOETACEAE)
4 Leaves notably spiral-curly, from a short rhizome; sporangia borne in 2 rows at the tip of the linear fertile leaves .... ***Schizaea*** (SCHIZAEACEAE)
2 Leaves various (scale-like, awl-like, moss-like, or flat), but not linear and grass-like, mostly 1-10× as long as wide.
5 Leaves inconspicuous, reduced to a few nerveless scales (< 1.5 mm long), the internodes much longer than the leaves; sporangia yellowish, 3-locular, 1-2 mm in diameter; stems upright, repeatedly branched dichotomously .... ***Psilotum*** (PSILOTACEAE)
5 Leaves either larger or, if scale-like, with nerves and longer than the internodes (the leaves thus overlapping); sporangia yellowish to brownish, 1-locular, < 1 mm in diameter; stems either subterranean or surficial rhizomes or erect or ascending (and sometimes dichotomously branched in whole or in part in *Huperzia*, *Diphasiastrum*, and *Dendrolycopodium*).
6 Plant with leaves very numerous and overlapping along the creeping, ascending, or erect stems, the leaves usually scale-like or awl-like, 0.5-2 (-3) mm wide, typically acute, acuminate, or hair-tipped; sporangia either in terminal strobili (axillary to specialized, smaller leaves) or axillary to normal leaves.
7 Sporangia borne in flattened or quadrangular strobili sessile at the tips of leafy branches; spores and sporangia of two sizes, the megasporangia larger and borne basally in the strobili .... ***Selaginella*** (SELAGINELLACEAE)

7 Sporangia borne either in the axils of normal foliage leaves, or in strobili sessile at the tips of leafy branches or stalked on specialized branches with fewer and smaller leaves; spores and sporangia of one size.
8 Leafy stems erect, simple or dichotomously branched, the ultimate branches vertically oriented; sporophylls like the sterile leaves or only slightly reduced, in annual bands along the stem; vegetative reproduction by leafy gemmae near stem apex..... ***Huperzia*** (LYCOPODIACEAE)
8 Leafy stems prostrate or erect, if erect then generally branched, the ultimate branches spreading (horizontal) or ascending; sporophylls differing from sterile leaves, either broader and shorter, or more spreading, aggregated into terminal cones; lacking vegetative reproduction by gemmae.
9 Leaves herbaceous, pale or yellow-green, dull, deciduous; leafy stems creeping; rhizome dying back annually to an underground vegetative tuber at apex; [of wetlands, mostly on moist or wet sands or peats].
10 Leaves of the prostrate stems 0.5-1.2 mm wide, ciliate-toothed or not toothed; leaves of the erect stem many, overlapping, spirally arranged; leaves of the strobilus resembling leaves of the prostrate and upright stems in size and shape; upright stems 1.5-15 mm in diameter (including the leaves) ..... ***Lycopodiella*** (LYCOPODIACEAE)
10 Leaves of the prostrate stems 1.3-2.1 mm wide, not toothed; leaves of the erect stem few, not overlapping, whorled; leaves of the strobilus much reduced relative to leaves of the prostrate and upright stems; upright stems 1.5-3 mm in diameter (including the leaves) ..... ***Pseudolycopodiella*** (LYCOPODIACEAE)
9 Leaves rigid, bright to dark green, shiny, evergreen; leafy stems mainly erect, treelike, fanlike, or creeping (if creeping, then the leaves with elongate, hyaline hair-tips); rhizome perennial, elongate, surficial or subterranean; [of uplands, mostly in moist to dry soils].
11 Branches 1-5 mm wide (including the leaves), compressed to quadrangular, with 4 ranks of leaves; branching of strobilus stalks dichotomous ..... ***Diphasiastrum*** (LYCOPODIACEAE)
11 Branches 4-12 mm wide, terete (to somewhat compressed in *Dendrolycopodium obscurum*), with 6 or more ranks of leaves; branching of strobilus stalks (when present), pseudomonopodial (falsely appearing to have a main axis from which branches arise).
12 Strobili borne on elongate, sparsely leafy peduncles borne at the tips of leafy, ascending branches; leaves with attenuate, hyaline hair-tips ..... ***Lycopodium*** (LYCOPODIACEAE)
12 Strobili sessile, borne directly above densely leafy portions of upright branches; leaves acuminate to acute.
13 Erect leafy stems 3-8 mm in diameter (including the leaves), treelike or fanlike, with a definite main axis; leaves acute at the apex; horizontal shoots subterranean, without winter bud constrictions ..... ***Dendrolycopodium*** (LYCOPODIACEAE)
13 Erect leafy stems 10 mm or more in diameter (including the leaves), branched 1-4 times sub-dichotomously; leaves with a 0.4-1.0 mm long stiff spinule; horizontal shoots at or near the ground surface, with winter bud constrictions... ***Spinulum*** (LYCOPODIACEAE)
6 Plant with leaves not as above (see below).
14 Plant with 1 (-several) leaves, the sterile leaf blade 0.3-24 cm long, ovate to lanceolate, entire-margined, obtuse, the longer fertile portion with 2 rows of sporangia somewhat imbedded in it..... ***Ophioglossum*** (OPHIOGLOSSACEAE)
14 Plant with many leaves, generally 5 or more, not divided into separate sterile and fertile segments, the leaves either (a) small, 0.3-1.6 cm long, obovate, scattered along a very thin creeping rhizome, or (b) larger, (2-) 8-30 cm long, cordate at base, the tip long-attenuate (often proliferous, bearing a plantlet at the tip).
15 Leaf blades (2-) 8-30 cm long, cordate at the base, the tip long-attenuate, often proliferous (bearing a plantlet at the tip); sporangia in indusiate sori on the undersurface; leaf texture moderately thick; rhizome erect or ascending, 1.0-1.5 mm in diameter, the leaves clustered from its tip..... ***Asplenium rhizophyllum*** (ASPLENIACEAE)
15 Leaf blades 0.3-1.6 cm long, cuneate at the base, rounded to obtuse at the tip, not proliferous; sporangia solitary in a marginal pocket on the leaf; leaf texture very thin; rhizome creeping on the surface of rock or bark, 0.1-0.3 mm in diameter, the leaves scattered along it..... ***Trichomanes petersii*** (HYMENOPHYLLACEAE)

Key D – Small pteridophytes, epipetric or epiphytic, growing on rock, tree bark, walls, or over rock in thin soil mats or in small soil pockets

1 Leaves pinnatifid or bipinnatifid, most of the pinnae not fully divided from one another (the rachis winged by leaf tissue most or all of its length).
2 Leaves bipinnatifid, at least the lowermost pinnae deeply lobed.
3 Leaves of a very delicate texture, 1 cell thick; sori borne in cups on the leaf margins; [of rock outcrops with high air humidity].
4 Indusium ("involucre") bivalvate (deeply divided into 2 flaps); receptacle not exserted from between the 2 flaps of the indusium..... ***Hymenophyllum*** (HYMENOPHYLLACEAE)
4 Indusium ("involucre") tubular or funnelform, sometimes slightly 2-lobed; receptacle long and whiplike, exserted from the mouth of the tubular indusium ..... ***Trichomanes*** (HYMENOPHYLLACEAE)
3 Leaves of an herbaceous, subcoriaceous, or coriaceous texture, > 1 cell thick; sori otherwise; [of various habitats, not strictly of moist sites].
5 Lowermost (and other) pinnae with numerous, rather even lobes..... ***Phegopteris*** (THELYPTERIDACEAE)
5 Lowermost pinnae with a few, irregular lobes (the upper pinnae unlobed) ..... ***Pteris multifida*** (PTERIDACEAE)
2 Leaves pinnatifid, the pinnae not lobed.
6 Leaf blades with a long-attenuate apex, blade unlobed for 1/3 its length; sori elongate ..... ***Asplenium*** (ASPLENIACEAE)
6 Leaves without a long-attenuate apex, blade lobed for most of its length; sori round.
7 Plants dwarf, the leave blades < 5 cm long; [occurring only in permanently moist habitats, as in grottoes behind waterfalls] ..... ***Micropolypodium*** (POLYPODIACEAE)
7 Plants larger, the leave blades 7-30 cm long; [occurring on moist to dry habitats].
8 Leaf blade densely scaly on the lower surface; leaf segment margins entire; rhizome 1-2 mm in diameter ..... ***Pleopeltis*** (POLYPODIACEAE)
8 Leaf blade scale-less on the lower surface; leaf segment margins denticulate; rhizome 3-6 mm in diameter..... ***Polypodium*** (POLYPODIACEAE)

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1 Leaves pinnate, pinnate-pinnatifid, 2-pinnate, or even more divided (the rachis naked for most of its length, often winged in the apical portion).
 9 Leaves pinnate or pinnate-pinnatifid.
  10 Leaves of a very delicate texture, 1 cell thick; sori borne in cups on the leaf margins; [of rock outcrops with high air humidity].
   11 Indusium ("involucre") bivalvate (deeply divided into 2 flaps); receptacle not exserted from between the 2 flaps of the indusium..... ***Hymenophyllum*** (HYMENOPHYLLACEAE)
   11 Indusium ("involucre") tubular or funnelform, sometimes slightly 2-lobed; receptacle long and whiplike, exserted from the mouth of the tubular indusium ..... ***Trichomanes*** (HYMENOPHYLLACEAE)
  10 Leaves of an herbaceous, subcoriaceous, or coriaceous texture, > 1 cell thick; sori otherwise; [of various habitats, not strictly of moist sites].
   12 Pinnae > 1 cm wide; leaves subcoriaceous to coriaceous; veins anastamosing, rejoining to form a netlike pattern..... ***Cyrtomium*** (DRYOPTERIDACEAE)
   12 Pinnae < 1 cm wide; leaves herbaceous to subcoriaceous; veins free, not rejoining.
    13 Sori on the undersurface of the leaf, away from the margins..... ***Asplenium*** (ASPLENIACEAE)
    13 Sori on the undersurface of the leaf, marginal and more-or-less hidden beneath either the unmodified revolute leaf margin or under a modified, reflexed false indusium.
     14 Leaf undersurface densely covered with stellate and ciliate scales ..... ***Astrolepis sinuata*** *ssp.* ***sinuata*** (PTERIDACEAE)
     14 Leaf undersurface glabrous or with non-stellate scales.
      15 Rachis dark-brown or purple; leaf margin unmodified, though often revolute ..... ***Pellaea*** (PTERIDACEAE)
      15 Rachis green or tan; leaf margin modified into a false indusium, reflexed to cover the sori .... ***Pteris vittata*** (PTERIDACEAE)
 9 Leaves bipinnate or more divided.
  16 Leaf blade pentagonal or broadly triangular in outline, ca. 1× as long as wide.
   17 Leaf blade pentagonal in outline, the terminal pinna by far the largest; rhizome 5-8 mm in diameter; indusia present, thick, persistent, and reniform; [introduced species, naturalized in moist ravines in SC] ..... ***Arachniodes*** (DRYOPTERIDACEAE)
   17 Leaf blade broadly triangular in outline, the basal pinnae by far the largest; rhizome ca. 1 mm in diameter; indusia absent; [native species of mountain peaks of n. NC and VA] ..... ***Gymnocarpium*** (WOODSIACEAE)
  16 Leaf blade elongate, mostly lanceolate, generally > 4× as long as wide (except in *Adiantum capillus-veneris*, with leaf blade often only 1.5-3× as long as wide, but not notably triangular or pentagonal in outline).
   18 Sori not marginal, either naked, or slightly to strongly hidden by indusia.
    19 Leaf blades 3-12 cm long; sori elongate, covered by a flap-like, entire indusium ..... ***Asplenium*** (ASPLENIACEAE)
    19 Leaf blades 4-30 (-50) cm long; sori globular, surrounded or covered by an entire, ciliate, or divided indusium.
     20 Veins reaching the margin; indusium attached under one side of the sorus, hoodlike or pocketlike, arching over the sorus; petioles glabrous or sparsely beset with scales, the petiole bases not persistent..... ***Cystopteris*** (WOODSIACEAE)
     20 Veins ending short of the margin; indusium attached under the sorus, cuplike (divided into 3-6 lanceolate to ovate lobes which surround the sorus from below) or of minute numerous septate hairs, which extend out from under the sorus on all sides; petioles often densely beset with scales, the petiole bases persistent..... ***Woodsia*** (WOODSIACEAE)
   18 Sori marginal, usually more-or-less hidden under the revolute margin of the pinnule.
    21 Sori round or oblong, distinct and separate along the pinnule margins; leaves bright-green, glabrous, herbaceous, delicate, and flexible..... ***Adiantum*** (PTERIDACEAE)
    21 Sori continuous along the pinnule margins; leaves mostly dark-green or glaucous, often pubescent, coriaceous, tough, and stiff.
     22 Leaves strongly dimorphic, the fertile leaves obviously longer than the sterile and with narrow elongate ultimate segments..... ***[Cryptogramma]*** (PTERIDACEAE)
     22 Leaves essentially monomorphic.
      23 Lower leaf surfaces covered with whitish powder, otherwise glabrous or sparsely pubescent..... ***Argyrochosma*** (PTERIDACEAE)
      23 Lower leaf surfaces pubescent (or glabrous in *Cheilanthes alabamensis*), never with conspicuous whitish powder ..... ***Cheilanthes*** (PTERIDACEAE)

Key E – Small pteridophytes, terrestrial, growing in soil, not associated with rock outcrops

1 Petiole branched once dichotomously, each branch bearing 3-7 pinnae in one direction only, the outline of the blade fan-shaped, often broader than long..... ***Adiantum pedatum*** (PTERIDACEAE)
1 Petiole not branched dichotomously, the outline of the blade either longer than broad or triangular and about as wide as long.
 2 Leaves pinnatifid or bipinnatifid, most of the pinnae not fully divided from one another (the rachis winged by leaf tissue most or all of its length).
  3 Sporangia borne on an erect stalk that arises at or above ground level from the petiole of the sterile leaf blade (joining the petiole of the sterile leaf above the rhizome)..... ***Botrychium*** (OPHIOGLOSSACEAE)
  3 Sporangia either borne on normal leaf blades or on specialized (fertile) leaves separate from the rhizome.
   4 Leaves monomorphic, the sori borne on normal leaf blades ..... ***Phegopteris*** (THELYPTERIDACEAE)
   4 Leaves dimorphic, the sori borne on leaves significantly different than normal leaves.
    5 Fertile leaf woody, with bead-like segments; pinnae margins entire, often wavy or the lowermost even somewhat lobed; pinnae mostly with obtuse apices, tending to be borne opposite ..... ***Onoclea*** (ONOCLEACEAE)
    5 Fertile leaf stiff but herbaceous, the pinnae linear, not at all bead-like; pinnae margins finely serrulate, otherwise slightly wavy or straight; pinnae mostly with acute apices, tending to be borne alternate..... ***Woodwardia areolata*** (BLECHNACEAE)
 2 Leaves pinnate, pinnate-pinnatifid, 2-pinnate, or even more divided (the rachis naked for most of its length, often winged in the apical portion).
  6 Leaves broadly triangular in outline, about as broad as long; sporangia borne on an erect stalk that arises at or above ground level from the petiole of the sterile leaf blade (joining the petiole of the sterile leaf above the rhizome)..... ***Sceptridium*** (OPHIOGLOSSACEAE)
  6 Leaves lanceolate in outline, much longer than broad; sporangia either borne on normal leaf blades, on slightly dimorphic blades, or on an erect stalk that arises at or above ground level from the petiole of the sterile leaf blade (joining the petiole of the sterile leaf above the rhizome).

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7 Leaf blades 1-8 cm long; sporangia borne on an erect stalk that arises at or above ground level from the petiole of the sterile leaf blade (joining the petiole of the sterile leaf above the rhizome)..... ***Botrychium*** (OPHIOGLOSSACEAE)
7 Leaf blades 10-30 (-100) cm long; sporangia either borne on normal leaf blades or on slightly dimorphic blades.
8 Leaves dark green, subcoriaceous, evergreen..... ***Polystichum*** (DRYOPTERIDACEAE)
8 Leaves light to medium green, herbaceous, deciduous to semi-evergreen.
9 Sori continuous along the midrib of the pinna..... ***Blechnum*** (BLECHNACEAE)
9 Sori distinct.
10 Sori elongate; leaf blades somewhat dimorphic, the fertile larger and erect, the sterile smaller and prostrate, the larger leaf blades 2-4 (-6.5) cm wide..... ***Asplenium platyneuron*** (ASPLENIACEAE)
10 Sori round; leaf blades monomorphic; the larger leaf blades 5-15 cm wide..... ***Thelypteris*** (THELYPTERIDACEAE)

Key F – Medium to large pteridophytes, epipetric, growing on rock, walls, over rock in thin soil mats or in small soil pockets, or on tree trunks

1 Leaves vine-like, 0.3-10 m long, the branching dichotomous, 1 branch of each dichotomy terminating in a pair of pinnae, the pinnae often widely spaced (> 10 cm apart)..... ***Lygodium*** (LYGODIACEAE)
1 Leaves not vine-like, 0.3-3 m long, the branching not as described above, the pinnae regularly and more-or-less closely spaced (mostly < 10 cm apart).
2 Leaves 1-pinnate-pinnatifid or less divided, the pinnae entire, toothed, lobed or pinnatifid.
3 Sori marginal, continuous, covered by a reflexed false indusium along the leaf margin; pinnae usually opposite, linear, not toothed or lobed..... ***Pteris vittata*** (PTERIDACEAE)
3 Sori neither marginal nor continuous, slightly to entirely covered by an elongate or roundish indusium (sometimes ciliate, toothed, or divided into narrow segments); pinnae usually at least in part alternate, mostly lanceolate, toothed, lobed, or pinnatifid.
4 Sori elongate, the indusium flap-like, attached along the side; leaf blades (if > 30 cm long) < 7 cm wide..... ***Asplenium platyneuron*** (ASPLENIACEAE)
4 Sori circular or globular, the indusium peltate, reniform, or cuplike; leaf blades (if > 30 cm long) > 5 cm wide.
5 Leaves pinnatifid.
6 Larger leaves with >25 pairs of segments, each 1.5-5 (-8) mm wide; [of ne. FL southward]..... ***Pecluma*** (POLYPODIACEAE)
6 Larger leaves with < 25 pairs of segments, (3-) 5-40 mm wide; [collectively widespread in our area.
7 Venation highly reticulate, with 3-4 rows of areoles between the midvein and the margin; rhizome 8-15 (-30) mm in diameter; leaf blade 10-50 cm wide..... ***Phlebodium*** (POLYPODIACEAE)
7 Venation free or with a row of areoles between the midvein and the margin; rhizome 3-6 mm in diameter; leaf blade <9 cm wide..... ***Polypodium*** (POLYPODIACEAE)
5 Leaves 1-pinnate or more divided.
8 Leaves 1-pinnate, the pinnae toothed and each with a slight to prominent lobe near the base on the side toward the leaf tip; indusia peltate (*Cyrtomium* and *Polystichum*) or reniform or crescent-shaped (*Nephrolepis*).
9 Leaves pale green, thin in texture; pinnae articulate to rachis, deciduous with age; thin, rhizome bearing elongate, thin, wiry stolons..... ***Nephrolepis*** (LOMARIOPSIDACEAE)
9 Leaves dark-green, subcoriaceous to coriaceous; pinnae not articulate and deciduous with age; rhizome not producing stolons.
10 Veins anastamosing, rejoining to form a netlike pattern; pinnae 4-25 pairs per leaf; [non-native, rarely naturalized]..... ***Cyrtomium*** (DRYOPTERIDACEAE)
10 Veins branching dichotomously, free, not rejoining to form a netlike pattern; pinnae 25-50 pairs on larger leaves; [native, common]..... ***Polystichum*** (DRYOPTERIDACEAE)
8 Leaves 1-pinnate-pinnatifid, the pinnae pinnatifid, generally lacking a prominent basal lobe; indusia either reniform or cuplike.
11 Vascular bundles in the petiole 3-7..... ***Dryopteris*** (DRYOPTERIDACEAE)
11 Vascular bundles in the petiole 2, uniting above.
12 Indusium reniform, arching over the sorus..... ***Thelypteris*** (THELYPTERIDACEAE)
12 Indusium cuplike, attached beneath the sorus and consisting of 3-6 lanceolate to ovate segments..... ***Woodsia obtusa*** (WOODSIACEAE)
2 Leaves 2-pinnate or more divided, the pinnae divided to their midribs.
13 Sori marginal and borne on the underside of the false indusium; petioles and rachis shiny black or reddish-black, glabrous except at the very base of the petiole; pinnules fan-shaped or obliquely elongate..... ***Adiantum*** (PTERIDACEAE)
13 Sori not marginal, borne on the undersurface of the leaf blade (if marginal, as in *Pteridium* and *Dennstaedtia*, borne on the undersurface of the leaf); petioles darkened only basally (if at all), rachis green, tan, or reddish; pinnules not notably fan-shaped or obliquely elongate.
14 Leaf blades pentagonal or broadly triangular in outline, ca. 1× as long as wide.
15 Leaf blade pentagonal in outline, the terminal pinna the largest; sori submarginal, roundish, the indusium reniform; [alien, rarely naturalized]..... ***Arachniodes*** (DRYOPTERIDACEAE)
15 Leaf blade broadly triangular in outline, the basal pinnae the largest; sori marginal, linear, indusium absent, protected by the revolute leaf margin and a minute false indusium; [native, common]..... ***Pteridium*** (DENNSTAEDTIACEAE)
14 Leaf blades elongate, mostly lanceolate, generally 4× or more as long as wide.
16 Outline of leaf blade narrowed to base, the widest point > 7 pinna pairs above the base, the lowermost pinnae < 1/4 as long as the longest pinnae; rhizomes long-creeping, the leaves scattered, forming clonal patches..... ***Thelypteris noveboracensis*** (THELYPTERIDACEAE)
16 Outline of the leaf blade slightly if at all narrowed to the base, the widest point < 5 pinna pairs from the base, the lowermost pinnae > 1/2 as long as the longest pinnae; rhizomes short-creeping, the leaves clustered, not forming clonal patches (or with rhizomes long-creeping, leaves scattered, forming clonal patches in *Dennstaedtia*).
17 Rhizomes long-creeping, leaves scattered, forming clonal patches; vascular bundles in the petiole 1, U-shaped (even in the lower petiole); sori very small, marginal in sinuses, the indusium cuplike, 2-parted, the outer part a modified tooth of the leaf blade; leaf blades conspicuously puberulent with septate hairs..... ***Dennstaedtia*** (DENNSTAEDTIACEAE)

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17 Rhizomes short-creeping, the leaves clustered, not forming clonal patches; vascular bundles in the petiole 2-7 (sometimes uniting to 1 in the upper petiole); sori mostly larger, mostly not marginal, the indusium not as above (though cuplike in *Woodsia obtusa*); leaf blades either glabrous, glabrescent, with flattened scales, or puberulent with glandular trichomes.
18 Vascular bundles (3-) 5 (-7) in the petiole ..... ***Dryopteris*** (DRYOPTERIDACEAE)
18 Vascular bundles 2 in the petiole (or uniting near the leaf blade into 1).
19 Leaves 25-65 cm wide, with whitish, straight, acicular hairs; [species adventive and weedy] ..... ***Macrothelypteris*** (THELYPTERIDACEAE)
19 Leaves 5-25 (-30) cm wide, with scales and minute glands (sometimes also with septate hairs); [native species].
20 Leaves 1-pinnate-pinnatifid; indusium cuplike, attached beneath the sorus and consisting of 3-6 lanceolate to ovate segments ..... ***Woodsia obtusa*** (WOODSIACEAE)
20 Leaves 2-pinnate-pinnatifid; indusium flaplike or pocketlike, attached at one side of the sorus and arching over it.
21 Leaves 10-30 cm wide, the tip acute to acuminate; indusium flaplike ..... ***Athyrium*** (WOODSIACEAE)
21 Leaves 4-9 cm wide, the tip long-attenuate; indusium pocketlike or hoodlike ..... ***Cystopteris bulbifera*** (WOODSIACEAE)

Key G – Medium to large pteridophytes, terrestrial, growing in soil, not associated with rock outcrops

1 Leaves vine-like, 0.3-10 m long, the branching dichotomous, 1 branch of each dichotomy terminating in a pair of pinnae, the pinnae often widely spaced (> 10 cm apart)
2 Vine-like leaves scrambling or trailing; sporangia borne 6-12 per sorus ..... ***Dicranopteris*** (GLEICHENIACEAE)
2 Vine-like leaves twining; sporangia borne singly, each subtended by an indusium-like flap ..... ***Lygodium*** (LYGODIACEAE)
1 Leaves not vine-like, 0.3-3 m long, the branching not as described above, the pinnae regularly and more-or-less closely spaced (mostly < 10 cm apart).
3 Leaf blades broadly (about equilaterally) triangular, pentagonal, or flabellate in outline, 0.7-1.3× as long as wide.
4 Leaf blades flabellate or fan-shaped in outline, the petiole branched once dichotomously, each branch bearing 3-7 pinnae in one direction only ..... ***Adiantum pedatum*** (PTERIDACEAE)
4 Leaf blades pentagonal or broadly triangular in outline, the petiole not branched dichotomously.
5 Leaf blade pentagonal in outline, the terminal pinna the largest; sori submarginal, roundish, the indusium reniform; [alien, rarely naturalized] ..... ***Arachniodes*** (DRYOPTERIDACEAE)
5 Leaf blade broadly triangular in outline, the basal pinnae the largest; sori marginal, linear, indusium absent, protected by the revolute leaf margin and a minute false indusium (*Pteridium*), or sporangia borne in a stalked, specialized, fertile portion of the blade (*Botrychium*); [native, collectively common].
6 Sporangia borne in a stalked, specialized, fertile portion of the blade; texture of mature blades somewhat fleshy; plants solitary from a short underground rhizome with thick, mycorrhizal roots; [primarily of moist forests] .... ***Botrypus*** (OPHIOGLOSSACEAE)
6 Sporangia borne in marginal, linear sori, indusium absent, protected by the revolute leaf margin and a minute false indusium; texture of mature leaf blades hard and stiff; plants colonial from deep-seated rhizomes; [primarily of moist to dry woodlands and savannas] ..... ***Pteridium*** (DENNSTAEDTIACEAE)
3 Leaves elongate in outline, mostly ovate, lanceolate, oblanceolate, or narrowly triangular, 1.5-10× or more as long as wide.
7 Leaves 2-pinnate or more divided, the pinnae divided to their midribs.
8 Leaf blade divided into sterile and fertile portions, the fertile pinnae basal, the sterile pinnules 30-70 mm long and 8-23 mm wide, serrulate, rounded basally, rounded to somewhat acute apically, the fertile pinnae terminal and greatly reduced in size, the fertile pinnules 7-11 mm long and 2-3 mm wide ..... ***Osmunda regalis var. spectabilis*** (OSMUNDACEAE)
8 Leaf blade not divided into sterile and fertile portions (though often not all pinnules on a leaf bearing sporangia), the pinnules bearing sporangia only slightly if at all reduced in size, both fertile and sterile pinnules usually 4-20 mm long and 2-10 mm wide.
9 Rhizomes long-creeping, leaves scattered, forming clonal patches; vascular bundles in the petiole **either** 1, U-shaped (even in the lower petiole) **or** > 3; sori very small, marginal in sinuses, the indusium cuplike, 2-parted, the outer part a modified tooth of the leaf blade; leaf blades conspicuously puberulent with septate hairs (Dennstaedtia) or glabrous to puberulent with glandular trichomes (*Hypolepis*).
10 Leaves 2-pinnate-pinnatifid; indusium tubular or cuplike; leaves generally < 1 m long; petiole and rachis unarmed; [of n. GA and n. AL northward] ..... ***Dennstaedtia*** (DENNSTAEDTIACEAE)
10 Leaves 3-4-pinnate-pinnatifid; indusium flap-like; leaves generally > 1 m long; petiole and rachis with prickles; [of n. FL southward] ..... ***Hypolepis*** (DENNSTAEDTIACEAE
9 Rhizomes short-creeping, the leaves clustered, not forming clonal patches; vascular bundles in the lower petiole 2-7 (sometimes uniting to 1 in the upper petiole); sori mostly larger, mostly not marginal, the indusium not as above (though cuplike in *Woodsia obtusa*); leaf blades either glabrous, glabrescent, with flattened scales, or puberulent with glandular trichomes.
11 Vascular bundles (3-) 5 (-7) in the petiole ..... ***Dryopteris*** (DRYOPTERIDACEAE)
11 Vascular bundles 2 in the petiole (or uniting near the leaf blade into 1).
12 Leaves 25-65 cm wide, with whitish, straight, acicular hairs; [species adventive and weedy] ..... ***Macrothelypteris*** (THELYPTERIDACEAE)
12 Leaves 5-25 (-50) cm wide, with scales and minute glands (sometimes also with septate hairs); [native species, widespread].
13 Leaves 1-pinnate-pinnatifid; indusium cuplike, attached beneath the sorus and consisting of 3-6 lanceolate to ovate segments ..... ***Woodsia obtusa*** (WOODSIACEAE)
13 Leaves 2-pinnate-pinnatifid; indusium flaplike or pocketlike, attached at one side of the sorus and arching over it.
14 Leaves 4-9 cm wide, the tip long-attenuate; indusium pocketlike or hoodlike ***Cystopteris bulbifera*** (WOODSIACEAE)
14 Leaves 10-30 cm wide, the tip acute to acuminate; indusium flaplike
15 Veins free, simple or forked ..... ***Athyrium*** (WOODSIACEAE)
15 Veins anastamosing ..... ***Diplazium*** (WOODSIACEAE)
7 Leaves 1-pinnate-pinnatifid or less divided, the pinnae entire, toothed, lobed or pinnatifid.
15 Leaves 1-pinnatifid, most of the pinnae not fully divided from one another (the rachis winged by leaf tissue most or all of its length); leaves dimorphic, the fertile much modified, stiff and/or woody.
16 Fertile leaf woody, with bead-like segments; pinnae margins entire, often wavy or the lowermost even somewhat lobed; pinnae mostly with obtuse apices, tending to be borne opposite ..... ***Onoclea*** (ONOCLEACEAE)

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16 Fertile leaf stiff but herbaceous, the pinnae linear, not at all bead-like; pinnae margins finely serrulate, otherwise slightly wavy or straight; pinnae mostly with acute apices, tending to be borne alternate ..... ***Woodwardia areolata*** (BLECHNACEAE)

15 Leaves 1-pinnate or 1-pinnate-pinnatifid, the pinnae fully divided from one another (the rachis naked for most of its length, often winged in the terminal portion); leaves dimorphic or not.

17 Rhizomes long-creeping, leaves scattered, forming clonal patches.

18 Sori elongate, borne end to end along either side of the main veins; pinna lobes of sterile leaves with reticulate, chain-like venation along the central vein ..... ***Woodwardia virginica*** (BLECHNACEAE)

18 Sori roundish, borne away from the main veins; pinna lobes of sterile leaves with the lateral veins free and pinnately arranged (the lowermost lateral vein sometimes joining that of the adjacent pinna lobe just below the sinus, but the remainder of the lateral veins all free) ..... ***Thelypteris*** (THELYPTERIDACEAE)

17 Rhizomes short-creeping, the leaves clustered, not forming clonal patches (or rhizomes of both types, but leaves borne only in clusters on the short erect ones, in *Matteucia*)

19 Plants moderately to very robust, the leaves typically 6-50 dm tall; leaves **either** strongly dimorphic, the fertile leaves very unlike the sterile, brown at maturity (*Matteucia* and *Osmundastrum cinnamomeum*), **or** the fertile pinnae very unlike the sterile, brown at maturity, borne as an interruption in the blade, with normal green pinnae above and below (*Osmunda claytoniana*), or the fertile pinnae towards the tip of the leaf and with sporangia entirely covering the lower surface (*Acrostichum*); rachises scaleless, petioles scaleless (except at the base in *Matteucia*).

20 Leaves 1.5-5 m long; fertile pinnae with sporangia covering the lower surface; [of n. FL southward] ..... ***Acrostichum*** (PTERIDACEAE)

20 Leaves 0.6-2.5 m long; fertile portions otherwise.

21 Leaves strongly tapering to the base from the broadest point (well beyond the midpoint of the blade), the basalmost pinnae much < ½ as long as the largest pinnae ..... ***Matteucia struthiopteris*** (ONOCLEACEAE)

21 Leaves slightly if at all tapering to the base, about equally broad through much of their length, the basalmost pinnae much > ½ as long as the largest pinnae.

22 Leaves hemidimorphic (juvenile leaves with only sterile pinnae, leaves bearing sporangia with sterile and fertile pinnae, the fertile pinnae borne medially); photosynthetic pinnae lacking tufts of hairs .. ***Osmunda*** (OSMUNDACEAE)

22 Leaves dimorphic (each leaf normally either completely photosynthetic or completely fertile); photosynthetic pinnae with tufts of reddish hairs near the junction with the rachis ..... ***Osmundastrum*** (OSMUNDACEAE)

19 Plants mostly less robust, the leaves 3-10 dm tall (except *Dryopteris ludoviciana*, *D. celsa*, *D. goldiana*, and *Nephrolepis exaltata* to 15 dm); leaves not at all or only slightly dimorphic, the fertile differing in various ways, such as having narrower pinnae (as in *Dryopteris ludoviciana*, *Polystichum acrostichoides*, *Diplazium*, and *Thelypteris palustris*) or the fertile leaves taller and more deciduous (as in *Asplenium platyneuron* and *Dryopteris cristata*), but not as described in the first lead; rachises and petioles variously scaly or scaleless, but at least the petiole and often also the rachis scaly if the plants over 1 m tall.

23 Sori elongate, the indusium elongate, attached along one side as a flap.

24 Petiole and rachis lustrous brownish-black; fertile leaves 2-8 (-12) cm wide.. ***Asplenium platyneuron*** (ASPLENIACEAE)

24 Petiole and rachis green; fertile leaves 10-20 (-30) cm wide.

25 Leaves 1-pinnate-pinnatifid (the pinnae pinnatifid) ..... ***Deparia*** (WOODSIACEAE)

25 Leaves 1-pinnate (the pinnae entire) ..... ***Diplazium*** (WOODSIACEAE)

23 Sori roundish, the indusium kidney-shaped or roundish, attached by a central stalk.

26 Leaves 1-pinnate, the pinnae toothed and each with a slight to prominent lobe near the base on the side toward the leaf tip (except *Nephrolepis exaltata*); indusia peltate (*Polystichum*) or reniform or crescent-shaped (*Nephrolepis*).

27 Leaves pale green, thin in texture; pinnae articulate to rachis, deciduous with age; thin, rhizome bearing elongate, thin, wiry stolons; [mostly, if not entirely, alien in our area, rare] ..... ***Nephrolepis*** (LOMARIOPSIDACEAE)

27 Leaves dark-green, subcoriaceous to coriaceous; pinnae not articulate and deciduous with age; rhizome not producing stolons; [native, common] ..... ***Polystichum*** (DRYOPTERIDACEAE)

26 Leaves 1-pinnate-pinnatifid, the pinnae pinnatifid, generally lacking a prominent basal lobe; indusia reniform.

28 Vascular bundles in the petiole 4-7 ..... ***Dryopteris*** (DRYOPTERIDACEAE)

28 Vascular bundles in the petiole 2, uniting above ..... ***Thelypteris*** (THELYPTERIDACEAE)

ASPLENIACEAE Frank 1877 (Spleenwort Family)

A family of a single genus and more than 720 species, of nearly cosmopolitan distribution. Murakami et al. (1999) conducted a molecular phylogenetic analysis of the Aspleniaceae, which confirmed that *Camptosorus* should be included in *Asplenium*, but suggested that *Phyllitis* is better separated from *Asplenium*. A later and more comprehensive study shows *Phyllitis* and *Camptosorus* to be deeply embedded in *Asplenium* (Schneider et al. 2004), a conclusion followed here. References: Kramer & Viane in Kramer & Green (1990); Schneider et al. (2004).

Asplenium Linnaeus 1753 (Spleenwort)

Asplenium is a large, nearly cosmopolitan genus of more than 720 species, with centers of diversity in the Appalachians, Central America mountains, Andes, and Himalayas. References: Wagner, Moran, & Werth in FNA (1993b); Moran (1982); Taylor, Mohlenbrock, & Burton (1976); Murakami et al. (1999); Kramer & Viane in Kramer & Green (1990).

Identification notes: Several of the more frequently encountered sterile hybrids are included in the key and treated fully below. Others may be recognized by intermediate morphology and udual co-occurrence with both parents.

1 Leaves simple, unlobed (or sometimes with a few, irregular forkings); veins free or anastamosing-areolate.

2 Leaf blades 0-3 mm wide, linear, forking or with a few toothlike projections ..... ***A. septentrionale***

2 Leaf blades 10-40 mm wide, lanceolate, lance-attenuate, or oblong.

3 Leaf apex long-attenuate and characteristically producing plantlets at the tip; veins anastomosing ..... ***A. rhizophyllum***

3 Leaf apex acute or obtuse, not attenuate, not producing plantlets at the tip; veins free.
4 Longer indusia of each frond avg. 1.2 cm long; leaves (1-) avg. 2.3 (-3.4) dm long; [native in TN, AL, and elsewhere, in natural limestone sinkholes] ..... ***A. scolopendrium var. americanum***
4 Longer indusia of each frond avg. 1.7 cm long; leaves (1-) avg. 3 (-6) dm long; [rarely introduced in North America, typically in artificial settings, such as wells] ..... ***[A. scolopendrium var. scolopendrium]***

1 Leaves pinnatifid (at least in the lower half of the leaf), pinnate, pinnate-pinnatifid, bipinnate, or tripinnate, the apex obtuse, acute, acuminate, or attenuate; veins free.
5 Rachis dull green throughout its length, or at least toward the tip; leaves pinnatifid to tripinnate, the outline of the leaf blade narrowly to broadly triangular, widest at the base.
6 Petiole dark throughout its length (from base to first leaflet).
7 Leaves bipinnate at the base, pinnate-pinnatifid above; spores normal ..... ***A. bradleyi***
7 Leaves pinnate at the base, pinnatifid above; spores abortive (or normal in *A. tutwilerae*, known only from Hale County, AL).
8 Spores abortive ..... ***A. ×ebenoides***
8 Spores normal; [endemic as far as known to Hale County, AL] ..... ***[A. tutwilerae]***
6 Petiole partially or entirely green (darkened or not at its base).
9 Leaves pinnatifid or pinnate through most or all of their lengths.
10 Leaves pinnatifid, sometimes fully pinnate at the base; spores normal ..... ***A. pinnatifidum***
10 Leaves pinnate, sometimes pinnate-pinnatifid at the base; spores abortive ..... ***A. ×trudellii***
9 Leaves bipinnate to tripinnate.
11 Petiole darkened toward the base; pinnules toothed, lacerate, pinnatifid, or pinnate; leaves bipinnate to tripinnate, the leaf blades lanceolate-ovate to lanceolate-oblong; ultimate leaf segments sessile or nearly so; [of acidic rocks] ..... ***A. montanum***
11 Petiole entirely green; pinnules toothed; leaves bipinnate, the leaf blades ovate-triangular; ultimate leaf segments mostly stalked; [of calcareous rocks] ..... ***A. ruta-muraria var. cryptolepis***
5 Rachis shiny black or dark brown throughout its length; leaves pinnate, the outline of the leaf blade linear, lanceolate, or oblanceolate, with more-or-less parallel sides for much of its length.
12 Pinnae orbicular to obovate-oblong, 1-2× as long as wide, the base more-or-less symmetrical (if auriculate, only slightly so and on the side of the pinna toward the base of the leaf); old leaf rachises often with persistent projections left from the disarticulation of the pinnae.
13 Main pinnae deeply lobed into 3-many segments (the leaves therefore pinnate-pinnatifid); [of FL] ..... ***A. verecundum***
13 Main pinnae merely toothed (the leaves therefore pinnate); [widespread in our area].
14 Sori 4-6 (-9) per pinna, up to 2 mm long; rhizome scales up to 3 mm long; petiole relatively thin, shiny, coppery or bronze; pinnae mostly alternate, suborbicular, spaced more distantly, thinner in texture, set at a fairly oblique angle to the rachis, often slightly auriculate on the side of the pinna toward the leaf base; spores mostly 29-36 μ long; stomate guard cells mostly 38-43 μ long; [mostly of noncalcareous rocks] ..... ***A. trichomanes ssp. trichomanes***
14 Sori 4-9 (-12) per pinna, up to 3 mm long; rhizome scales up to 5 mm long; petiole relatively thicker, blackish-brown; pinnae mostly opposite, oblong, spaced more closely, thicker in texture, set at a nearly right angle to the rachis, rarely at all auriculate; spores mostly 34-43 μ long; stomate guard cells mostly 41-49 μ long; [of calcareous rocks] ..... ***A. trichomanes ssp. quadrivalens***
12 Pinnae oblong-rectangular, 2× or more as long as wide, the base asymmetrical or auricled (more prominently auricled on the side of the pinna toward the tip of the leaf); old leaf rachises lacking persistent projections left from the disarticulation of the pinnae.
15 Leaves slightly dimorphic, the fertile upright and larger, the sterile spreading and smaller; pinna auricles prominent, often overlapping the rachis; [terrestrial, often not associated with rock outcrops] ..... ***A. platyneuron***
15 Leaves not dimorphic; pinna auricles less prominent, usually not overlapping the rachis; [epipetric, always growing in crevices of rock outcrops or in thin soil immediately adjacent to exposed rock].
16 Main vein of the pinna running along the basal edge; sori 1 (-3) per pinna, 1.5-3 mm long, borne along the basal edge, the indusium translucent, whitish, opening toward the leaf tip ..... ***A. monanthes***
16 Main vein of the pinna running more-or-less medially; sori 4-10 per pinna (on well-developed pinnae), 1.0-1.5 mm long, borne on both sides of the main vein, the indusium opaque, greenish, opening toward the pinna tip.
17 Pinnae margins subentire; pinnae blue-green, coriaceous, borne at right angles to the rachis or slightly reflexed, usually strictly opposite throughout the entire length of the leaf blade ..... ***A. resiliens***
17 Pinnae margins shallowly crenate or crenate-serrate; pinnae bright-green, subcoriaceous, borne at right angles to the rachis or ascending, opposite below but usually becoming alternate in the apical 1/3-1/2 of the leaf blade
18 Pinna margins crenate to serrate; pinna base lacking an auricle, or the auricle rudimentary; veins evident; spores 64 per sporangium ..... ***A. heterochroum***
18 Pinna margins shallowly crenate; pinna base with auricle; veins obscure; spores 32 per sporangium ..... ***A. heteroresiliens***

Asplenium bradleyi D.C. Eaton, Bradley's Spleenwort. Pd (GA, NC, SC, VA), Mt (GA, KY, NC, VA, WV), Ip (KY), Cp (GA, SC): dry outcrops of felsic sedimentary or metasedimentary rocks, such as sandstone, quartzite, or metaquartzite, at low to moderate elevations; rare (uncommon in KY). April-October. PA, MD, OH, KY, s. IL, and MO south to c. NC, c. GA, AL, TN, and AR, reaching its greatest abundance in the Ozarkian highlands. This species is a fertile allotetraploid derived from hybridization between *A. montanum* and *A. platyneuron*. Its chromosome complement can be symbolized MMPP. The sterile hybrid has also been found in NC; its chromosome complement is MP. [= RAB, C, F, FNA, G, K, S, W, WV; = *A. ×bradleyi*]

Asplenium ×ebenoides R.R. Scott (pro species) [*A. platyneuron* × *rhizophyllum*], Scott's Spleenwort. Mt (GA, NC, VA, WV), Pd, Cp (VA): moist outcrops of calcareous sedimentary rocks, such as limestone, dolostone, and on coquina limestone (shell marl), at low elevations; rare. May-October. VT, NJ, c. PA, OH, s. IL, and MO south to e. VA, w. NC, nw. GA, c. AL, TN, and AR. *A. ×ebenoides* is a sterile hybrid (chromosome complement symbolized PR). In AL, however, one population in Hale County has undergone chromosome doubling and is a fertile allotetraploid (PPRR), now treated as *A. tutwilerae*. Populations of this taxon, especially if consisting of many individuals, should be checked for fertile spores. [= WV; = *×Asplenosorus ebenoides* (R.R. Scott) Wherry – F; = *Asplenosorus ebenoides* (R.R. Scott) Wherry – G; < *Asplenium ×ebenoides* – K; < *Asplenium ebenoides* R.R. Scott – FNA, S]

Asplenium heterochroum Kunze, Bicolored Spleenwort. Cp (FL, GA, SC): fairly moist outcrops of calcareous sedimentary rocks, such as coquina limestone ("marl"); rare. Se. and sc. GA (Jones & Coile 1988) south to n. FL; West Indies; Belize. [= FNA, K, WH; < *A. heterochroum* Kunze – S]

Asplenium heteroresiliens W.H. Wagner, Marl Spleenwort, Carolina Spleenwort, Wagner's Spleenwort, Morzenti's Spleenwort. Cp (FL, GA, NC, SC): fairly moist outcrops of calcareous sedimentary rocks, such as coquina limestone ("marl"), along small blackwater streams or larger rivers, at low elevations, and rarely also on old ruins made of tabby (a cement made from lime, sand, and oyster shells); rare. April-October. Rare and scattered from se. NC to se. GA, sw. GA, and n. FL, on the Coastal Plain. This species is an apogamous (producing viable spores asexually) allopentaploid derived from hybridization of the sexual tetraploid *H. heterochroum* Kunze (of Florida and the West Indies) and the apogamous triploid *A. resiliens*. Its chromosome complement can be symbolized EEEHH. [= RAB; = *A.* ×*heteroresiliens* – FNA, K, WH; < *A. heterochroum* Kunze – S]

Asplenium monanthes Linnaeus, Single-sorus Spleenwort. Mt (AL, NC, SC), Cp (FL): moist calcareous situations, in the mountains in moist grottoes of calcareous to semi-calcareous metamorphic rocks (such as mylonite or marble) near waterfalls in humid escarpment gorges with high rainfall, on limestone talus in collapsed sinkhole mouth, or on moist Coastal Plain limestone outcrops; rare. April-October. Scattered in highly humid (montane or maritime) parts of the tropics, subtropics, and warm temperate areas, known from se. and sw. North America, the West Indies (Hispaniola and Jamaica), n. South America, Central America, Mexico, South Africa, Hawaii, and Sandwich Islands, the Azores, Madeira Islands, Madagascar, and the Philippines. In the continental United States, it is known from widely scattered sites with humid and calcareous microhabitats: humid escarpment gorges in Transylvania County, NC and Oconee County, SC; moist limestone outcrops in n. peninsular and Panhandle FL (Nelson 2000); limestone talus in the collapsed mouth of a sinkhole in Jackson County, AL; and the Huachuca Mountains, Cochise County, AZ. [= RAB, FNA, K, W, WH]

Asplenium montanum Willdenow, Mountain Spleenwort. Mt (GA, KY, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Ip (KY): moist to dry outcrops of metamorphic, sedimentary, or igneous rocks, such as gneiss, schist, amphibolite, quartzite, rhyolite, sandstone, mostly at moderate to high elevations (up to over 2000 m), but in the Piedmont to as low as 150 m; common. May-October. Primarily Appalachian: s. VT, MA, NY, OH, and KY south to c. NC, n. GA and AL; absent from the Ozarkian highlands. *A. montanum* is one of the diploid progenitors of the reticulately evolved Appalachian *Asplenium* complex; its chromosome complement is symbolized MM. It is one parent of *A. bradleyi, A. pinnatifidum*, and *A.* ×*trudellii* (and of other sterile hybrids). [= RAB, C, F, FNA, G, K, S, W, WV]

Asplenium pinnatifidum Nuttall, Lobed Spleenwort. Ip (KY), Mt (GA, KY, NC, SC, VA, WV), Pd (GA, NC, SC, VA): fairly moist to very dry outcrops of felsic sedimentary or (mostly low-grade) metamorphic rocks, such as sandstone, phyllite, and schist, at low to moderate elevations; uncommon (common in KY Mountains and Interior Low Plateau). May-October. NJ, se. PA, wc. PA, s. OH, IN, IL, and MO south to w. NC, c. GA (Jones & Coile 1988), AL, n. MS, AR, and e. OK. This species is a fertile allotetraploid derived from hybridization of *A. montanum* and *A. rhizophyllum*; its chromosome complement is symbolized MMRR. [= RAB, C, F, FNA, S, W, WV; = *A. pinnatifidum* var. *pinnatifidum* – G; = *A.* ×*pinnatifidum* – K]

Asplenium platyneuron (Linnaeus) Britton, Sterns, & Poggenburg, Ebony Spleenwort. Mt (GA, KY, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA), Ip (KY): moist to dry soils of forests, woodlands, old fields; also on outcrops, especially of calcareous rocks and in masonry crevices, at low to moderate elevations; common. April-October. Québec, Ontario, se. MN, IA, and se. CO south to FL, TX, NM, and AZ (and varieties or relatives reported from Central and South America). This species is one of the diploid progenitors involved in the reticulately evolved Appalachian *Asplenium* complex. It is one parent of *A. bradleyi* and *A.* ×*ebenoides* (as well as other sterile hybrids). *A. platyneuron* in general, and var. *platyneuron* specifically, is by far the most common of our *Asplenium* species, and the only one found characteristically away from rock. *A. platyneuron* var. *incisum* does not seem to warrant taxonomic recognition. Strikingly large plants of the outer Atlantic Coastal Plain and Gulf Coastal Plain have been named var. *bacculum-rubrum* (Featherman) Fernald; they are probably not worthy of taxonomic recognition. They can be distinguished as follows: var. *bacculum-rubrum* has the longest pinnae > 3.5-6 cm long, the pinnae often coarsely serrate-incised to pinnatifid and the larger leaves to (30-) 40-70 (-100) cm tall, with 45-70 pairs of pinnae (vs. longest pinnae < 3.5 cm long, pinnae subentire to pinnatifid, larger leaves to 20-45 (-50) cm tall, with 25-50 pairs of pinnae). [= RAB, C, FNA, S, W, WH, WV; > *A. platyneuron* var. *platyneuron* – F, G, K; > *A. platyneuron* var. *bacculum-rubrum* (Featherman) Fernald – F, G, K; > *A. platyneuron* var. *incisum* (Howe ex Peck) B.L. Robinson – F]

Asplenium resiliens Kunze, Blackstem Spleenwort. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, VA), Cp (GA): moist to dry outcrops of calcareous sedimentary or metamorphic rocks, such as limestone, dolostone, or marble, sometimes on narrow seams of calcareous materials in otherwise acidic rocks, rarely on mortar or concrete, mostly at low to moderate elevations, but remarkably on Grandfather Mountain at over 1800 m; common in VA and KY Interior Low Plateau (rare in VA Piedmont, KY Mountains, and GA, NC, SC). April-October. Sc. PA, KY, s. IL, MO, se. KS, OK, TX, CO, and s, NV south to FL, TX, AZ, and Mexico; also in the West Indies, Central America, and South America. This species is a triploid (EEE), unable to produce viable spores by sexual means, but producing spores apogamously. It is a parent species of the rare *A. heteroresiliens*. [= RAB, C, F, FNA, G, K, S, W, WH, WV]

Asplenium rhizophyllum Linnaeus, Walking Fern. Mt (GA, KY, NC, SC, VA, WV), Pd (GA, NC, VA), Ip (KY), Cp (NC, VA): moist outcrops of calcareous sedimentary, calcareous metamorphic, or mafic metamorphic rocks, such as limestone, dolostone, calcareous siltstone, amphibolite, mostly at low to moderate elevations, rarely to 1500 m or higher; common (but local) in VA Mountains (uncommon in VA Piedmont, rare in VA Coastal Plain, uncommon in NC Mountains, rare in NC Piedmont and Coastal Plain). May-October. S. Québec, Ontario and se. MN south to c. GA, AL, MS, AR, OK, and IA. This species, sometimes placed in the genus *Camptosorus* because of its strikingly different morphology from (most) other *Asplenium*, is one of the diploid progenitors of the reticulately evolved Appalachian *Asplenium* complex. It is a parent of *A. pinnatifidum* and *A.* ×*ebenoides* (as well as other sterile hybrids), both of which have inherited a limited ability to produce plantlets at the attenuate leaf-tip. It is closely related to *Asplenium sibiricum* of e. Asia. [= RAB, C, FNA, K, W; = *Camptosorus rhizophyllus* (Linnaeus) Link – F, G, S, WV]

Asplenium ruta-muraria Linnaeus *var.* ***cryptolepis*** (Fernald) Wherry, American Wall-rue. Mt (GA, NC, VA, WV), Ip (KY), Pd (VA): moist to dry outcrops of calcareous sedimentary or metamorphic rocks, such as limestone, dolostone, or marble, at low to moderate elevations; uncommon in VA (rare in Piedmont, rare in NC). May-October. *A. ruta-muraria* is a circumboreal species of Europe, Asia, and North America; in North America it ranges as var. *cryptolepis* from VT, s. Ontario and n. MI south to n. NJ, w. NC, nw. GA (Jones & Coile 1988), n. AL, TN, and AR. Var. *ohionis* is very likely only a form. The relationship of North American *A. ruta-muraria* (here distinguished as var. *cryptolepis*), a tetraploid, to the diploid and tetraploid subspecies of *A. ruta-muraria* present in Europe and e. Asia is uncertain. Given the prevalence of allopolyploidy in *Asplenium* and slight morphologic differences between American and European material, I prefer not to assume its identity to the European plants. In Europe *A. ruta-muraria* is an abundant plant of masonry, such as the defensive walls of towns and cities; it is very rarely seen on walls in North America, presumably because they are not old enough. [= WV; < *A. ruta-muraria* – RAB, C, FNA, W; > *A. cryptolepis* Fernald var. *cryptolepis* – F, S; > *A. cryptolepis* Fernald var. *ohionis* Fernald – F, S; > *A. ruta-muraria* var. *ohionis* (Fernald) Wherry – G; > *A. ruta-muraria* var. *cryptolepis* – G, K; > *A. ruta-muraria* var. *lanceolum* Christ – K]

Asplenium scolopendrium Linnaeus *var.* ***americanum*** (Fernald) Kartesz & Gandhi, American Hart's-tongue Fern. Mt (AL, TN): humid sinkholes; rare. E. TN and n. AL, and in other habitats farther north in c. NY, n. MI, and Ontario; it is also reported as naturalized in MD by Reed (1953). [= FNA, K; = *Phyllitis scolopendrium* (Linnaeus) Newman var. *americana* Fernald – C, F, G]

Asplenium septentrionale (Linnaeus) Hoffmann, Forked Spleenwort. Mt (WV): acidic rocks; rare. Western North America; disjunct in WV (Hardy and Monroe counties). This very inconspicuous species is likely to be found at additional locations. Its chromosome formula is SSSS. [= C, FNA, K]

Asplenium trichomanes Linnaeus *ssp.* ***quadrivalens*** D.E. Meyer emend. Lovis, Maidenhair Spleenwort. Mt (VA): moist outcrops of calcareous sedimentary rocks, such as limestone or dolostone; rare. May-October. Ssp. *quadrivalens* is known from North America and Europe (at least); in North America it is substantially rarer than ssp. *trichomanes* and more limited in range, occurring from New England and s. Ontario south to w. VA, OH, and s. IL, and in British Columbia, WA, and OR. Ssp. *quadrivalens* is a tetraploid of uncertain origin, presumably autotetraploid, but perhaps the result of the hybridization of two ecologically differentiated diploid races of *A. trichomanes*. [= FNA, K, W; < *A. trichomanes* – C, F, G, S]

Asplenium trichomanes Linnaeus *ssp.* ***trichomanes***, Maidenhair Spleenwort. Mt (GA, KY, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Ip (KY): moist outcrops of slightly to strongly calcareous sedimentary or metamorphic rocks and moderately to strongly mafic metamorphic and igneous rocks, such as limestone, dolostone, mafic and intermediate gneisses and schists, amphibolite, most typically in strong shade, as under overhangs; common. May-October. *A. trichomanes* as a whole is a complex species, with diploid, tetraploid, and hexaploid elements, occurring in North America, Europe, Australia, New Zealand, and Asia. Ssp. *trichomanes* is known to occur in Europe and North America (at least); in North America, it ranges from Newfoundland to AK, south to NC, c. GA (Jones & Coile 1988), c. AL, AR, OK, w. TX, se. AZ, and w. OR. Ssp. *trichomanes* is a diploid, probably involved in the origin of ssp. *quadrivalens*. [= FNA, K, W; < *A. trichomanes* – RAB, C, F, G, S, WH, WV]

Asplenium* ×*trudellii Wherry (pro species) [*montanum* × *pinnatifidum*], Trudell's Spleenwort. Pd (GA, VA), Mt (GA, KY, NC, VA, WV), Ip (KY): moist outcrops of felsic sedimentary or metamorphic rocks, such as sandstone, phyllite, schist, at low elevations; rare (uncommon in KY Mountains). May-October. This taxon is a sterile triploid hybrid (MMR) of *A. montanum* and *A. pinnatifidum*. It is considerably more common than most other sterile *Asplenium* hybrids, sometimes occurring without one or either parents. There are some reports that it can sometimes produce fertile spores. [= F, FNA, K, WV; = *Asplenium pinnatifidum* Nuttall var. *trudellii* (Wherry) Clute – G; = *Asplenium trudellii* Wherry – S; = ×*Asplenosorus trudellii* (Wherry) Mickel]

Asplenium verecundum Chapman ex Underwood, Modest Spleenwort, Delicate Spleenwort. Cp (FL): moist limestone outcrops, grottoes, and sinkholes; rare. Endemic to FL, from n. FL (Columbia, Jackson, Liberty, Taylor counties) southwards (Wunderlin & Hansen 2004); or perhaps better treated as the northern component of the West Indian *A. myriophyllum*. Its chromosome formula is VVVV. [= FNA, WH; < *A. myriophyllum* (Swartz) K. Presl – K; > *A. verecundum* – S; > *A. scalifolium* E.P. St. John – S; > *A suave* E.P. St. John – S; > *A. subtile* E.P. St. John – S]

* *Asplenium scolopendrium* Linnaeus var. *scolopendrium*, European Hart's-tongue Fern. Reported as naturalized in a well in MD by Reed (1953). [= FNA, K; = *Phyllitis scolopendrium* (Linnaeus) Newman var. *scolopendrium* – C, F, G]

Asplenium tutwilerae B.R. Keener & L.J. Davenport, Tutwiler's Spleenwort. Cp (AL): crevices of conglomerate; rare. So far as is known, *A. tutwilerae*, the fertile allotetraploid of *A.* ×*ebenoides*, is limited to a single population in Hale County, AL. Its chromosome formula is PPRR. See Keener & Davenport (2007). [< *A.* ×*ebenoides* – K; < *Asplenium ebenoides* R.R. Scott – FNA, S]

AZOLLACEAE Wettstein 1903 (Mosquito Fern Family)

Azollaceae consists of the single genus *Azolla*, with about 6 species. References: Lumpkin in FNA (1993b).

Azolla Lamarck 1783 (Mosquito Fern)

A small genus of about 6 species, floating aquatics, in tropical and warm temperate regions. Very un-fernlike, this floating aquatic looks superficially more like an aquatic liverwort. In some years and some places it occurs in great abundance, covering the surface of the water with a green or red mass of vegetation. *Azolla* has a symbiotic, nitrogen-fixing cyanobacterium, *Anabaena azollae* Strasburger. The nitrogen-fixing capabilities of *Azolla* have resulted in its use as a fertilizer, green manure, and livestock feed, much promoted in recent years, but used historically in Asian rice paddies for centuries (Lumpkin in FNA 1993b). References: Evrard & Van Hove (2004)=Z; Lumpkin in FNA (1993b).

1 Largest hairs on upper leaf lobe with 2 or more cells; megaspores densely covered with tangled filaments ..... ***A. caroliniana***
1 Largest hairs on upper leaf lobe with 1 cell; megaspores with raised angular bumps, visible through a sparse layer of filaments ..... ***A. filiculoides***

Azolla caroliniana Willdenow, Eastern Mosquito Fern, Water fern. Cp (FL, GA, KY, NC, SC, VA), Mt (NC, SC, VA), Pd (NC, SC, VA), Ip (KY): stagnant waters of interdune ponds, limesink ponds, old millponds, beaver ponds, floodplain sloughs; uncommon (though often locally abundant, rare in VA Mountains, VA Piedmont, KY Interior Low Plateau). June-September. Widespread in the se. United States, extending irregularly north (partly from introductions) into s. New England and MN, and south into the tropics. [= RAB, C, F, FNA, G, K, S; < *A. filiculoides* – Z]

* ***Azolla filiculoides*** Lamarck. Cp (GA): freshwater lake; rare, native of w. North America. This species is reported for e. GA from a freshwater lake on Sapelo Island, McIntosh Co. (Bates & Browne 1981), presumably as an accidental introduction. [= FNA, K; < *A. filiculoides* – Z]

BLECHNACEAE (C. Presl) Copeland 1947 (Deer Fern Family)

A family of about 9 genera and 250 species, cosmopolitan in distribution. References: Lellinger (1985); Cranfill in FNA (1993b); Kramer, Chambers, & Hennipman in Kramer & Green (1990).

1 Veins of sterile leaves free; sori continuous ..... ***Blechnum***
1 Veins of sterile leaves anastomosing; sori distinct from one another, in rows ..... ***Woodwardia***

Blechnum Linnaeus 1753 (Deer Fern)

A genus of about 220 species, of nearly cosmopolitan distribution (mostly tropical and especially Southern Hemisphere). References: Kramer, Chambers, & Hennipman in Kramer & Green (1990).

1 Leaf blades usually < 5 dm long; leaves pinnate-pinnatifid in all or part; margins entire (to sparingly and irregularly serrulate) ..... ***B. occidentale* var. *minor***
1 Leaf blades usually > 5 dm long; leaves pinnate throughout; margins serrulate ..... ***B. serrulatum***

Blechnum occidentale Linnaeus *var.* ***minor*** Hooker, Hammock Fern. Cp (FL, GA): moist forests; rare. S. GA south to s. FL; West Indies; Central America, South America. Collected once in LA, on the west bank of the Mississippi River in bottomland hardwoods in Iberville Parish, LA. [= FNA; < *B. occidentale* – K, S]

Blechnum serrulatum, L.C. Richard, Swamp Fern, Marsh Fern. Cp (FL, SC*): vacant lots, bottomlands; rare, native in FL peninsula, introduced northwards. FL peninsula; Central America, South America. Introduced and established in e. SC (Beaufort and Jasper counties) via landscaping plants brought in from FL (P. McMillan, pers. comm. 2005). [= FNA, K, S]

Woodwardia J.E. Smith 1793 (Chain Fern)

A genus of about 13 species of temperate and tropical portions of the Northern Hemisphere, especially e. and se. Asia. References: Kramer, Chambers, & Hennipman in Kramer & Green (1990).

1 Sterile leaves pinnatifid, the pinnae 7-10 pairs per leaf, basally not distinct from one another, the rachis therefore winged by leaf tissue throughout its length, the pinnae merely finely serrulate ..... ***W. areolata***
1 Sterile leaves pinnate-pinnatifid, the pinnae 15-20 pairs per leaf, fully distinct, the rachis therefore not winged by leaf tissue, the pinnae themselves pinnatifid ..... ***W. virginica***

Woodwardia areolata (Linnaeus) T. Moore, Netted Chain Fern. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA, WV), Ip (KY): moist to wet, acid, organic soils, such as bogs, blackwater bottomlands, pocosins; common (rare in VA and KY Mountains and KY Interior Low Plateau). May-September. Nova Scotia west to MI and MO, south to FL and e. TX, primarily on the Coastal Plain. When fruiting structures are not present, sometimes confused with *Onoclea*, but *W. areolata* has the pinnae tending to be alternate (vs. tending to be opposite), the pinnae tending to be acute or acuminate (vs. obtuse), and the pinna margin finely serrulate (vs. entire). See Cranfill (1983) for a discussion of the geography and ecology of *W. areolata*. [= RAB, C, F, FNA, G, K, W; = *Lorinseria areolata* (Linnaeus) K. Presl – S, WV]

Woodwardia virginica (Linnaeus) J.E. Smith, Virginia Chain Fern. Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY): moist to wet, acid, organic soils, such as bogs, blackwater bottomlands, pocosins, sometimes in standing water, as in periodically flooded coastal plain depression ponds; common (rare in KY, rare in VA Mountains and VA Piedmont). June-September. Nova Scotia west to MI and IL, south to FL and TX, and in Bermuda, primarily on the Coastal Plain. Sometimes confused when sterile with *Osmundastrum cinnamomeum* (which see for discussion). [= RAB, C, F, FNA, G, K, W; = *Anchistea virginica* (Linnaeus) K. Presl – S]

DENNSTAEDTIACEAE Pichi Sermolli 1970 (Bracken Family)

A family of about 16 genera and 370 species, of cosmopolitan distribution; the circumscription is very uncertain and controversial, however. References: Lellinger (1985); Cranfill in FNA (1993b); Kramer in Kramer & Green (1990).

1 Leaf blades broadly triangular in outline, about as broad as long, subcoriaceous; sori linear, confluent ..... ***Pteridium***
1 Leaf blades elongate in outline, at least 2× as long as broad, membranaceous; sori globular, separate
  2 Leaves 2-pinnate-pinnatifid; indusium tubular or cuplike; leaves generally < 1 m long; [of n. GA and n. AL northward] ..... ***Dennstaedtia***
  2 Leaves 3-4-pinnate-pinnatifid; indusium flap-like; leaves generally > 1 m long; [of n. FL southward] ..... ***Hypolepis***

Dennstaedtia Bernhardi 1801 (Cuplet Fern)

A genus of about 45 species, of tropical to temperate distribution; *Dennstaedtia* is poorly known and of uncertain circumscription. Only *D. punctilobula* is temperate in distribution; anatomical evidence suggests that it is not closely related to tropical *Dennstaedtia*, and its separation from that genus may be warranted. References: Nauman & Evans in FNA (1993b); Kramer in Kramer & Green (1990).

Identication notes: *Dennstaedtia punctilobula* can be distinguished from other woodland ferns with deciduous fronds of similar size and shape (such as *Athyrium*, *Dryopteris*, and *Thelypteris*) by the following characteristics: leaves yellow-green or pale-green in color, with whitish-gray glandular trichomes, petioles silvery-pilose, leaves borne scattered (as clonal patches), sori tiny (< 0.5 mm in diameter).

Dennstaedtia punctilobula (Michaux) T. Moore, Hay-scented Fern, Pasture Fern, Boulder Fern. Mt (GA, KY, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (NC, SC, VA), Ip (KY): rocky or dry woodlands and forests, rock outcrops, pastures, clearings, roadbanks; common (uncommon in Piedmont and Interior Low Plateau, rare in Coastal Plain). June-September. Nova Scotia and Québec west to MI, south to NC, n. GA, n. AL, and AR, progressively more montane southward. [= RAB, C, F, FNA, G, K, S, W, WV]

* *Dennstaedtia cicutaria* (Sw.) T. Moore. Reported for AL by Kartesz (1999) on the basis of Dean's (1969) mention of an individual plant of *D. rubiginosa* having been planted in Mobile. This report is rejected, as there is no evidence of naturalization. [= K; ? *D. rubiginosa* (Kaulfuss) T. Moore] {not keyed}

Hypolepis Bernhardi 1806 (Bramble Fern)

A genus of about 45 species, pantropical. References: Nauman in FNA (1993b).

Hypolepis repens (Linnaeus) C. Presl, Creeping Bramble Fern. Cp (FL): swamps, wet hammocks; rare. N. FL (Clay County) south to c. FL; West Indies; Mexico, Central America, South America. [= FNA, K, S, WH]

Pteridium Gleditsch ex Scopoli 1760 (Bracken)

A genus of 2-11 species, cosmopolitan in distribution. *Pteridium* is a notorious and nearly worldwide weed (though less consequential in our area than in many parts of the world), nearly impossible to eradicate because of its deeply subterranean rhizomes. Bracken fiddleheads are sometimes eaten, but they are poisonous and highly carcinogenic. Bracken is not favored by grazing animals, and increases its abundance under grazing pressure. In overgrazed pastures, however, cattle will graze on bracken, the carcinogenic compound (shikimic acid) then transmittable to humans through milk. References: Jacobs & Peck in FNA (1993b).

1 Lower surface of rachis and costae shaggy pubescent; segment margins usually pubescent; terminal segments of well-developed pinnules generally 2-4× as long as broad, about 3-7 mm wide ..... ***P. aquilinum*** *var.* ***latiusculum***
1 Lower surface of rachis and costae glabrous or sparsely pilose; segment margins usually glabrous or sparsely pilose; terminal segments of well-developed pinnules generally 6-15× as long as broad, about 2-5 mm wide ..... ***P. aquilinum*** *var.* ***pseudocaudatum***

Pteridium aquilinum (Linnaeus) Kuhn *var.* ***latiusculum*** (Desvaux) Underwood ex Heller, Eastern Bracken. Mt (GA, KY, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Ip (KY), Cp (FL, KY, NC, SC, VA): mainly in dry woodlands, forests, and heath balds, up to 1600 meters in elevation; common (rare in Coastal Plain). July-September. The species is nearly worldwide in distribution; var. *latiusculum* is itself very widely distributed, occurring in most of North America (largely replaced by var. *pseudocaudatum* in the Southeast), in Mexico, and in Eurasia. The relationship of these two varieties is discussed in detail by Speer & Hilu (1999) and Speer, Werth, & Hilu (1999). [= RAB, C, F, FNA, G, K, W, WV; = *P. latiusculum* (Desvaux) Hieronymus var. *latiusculum* – S]

Pteridium aquilinum (Linnaeus) Kuhn *var.* ***pseudocaudatum*** (Clute) Heller, Tailed Bracken, Southern Bracken. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, WV), Ip (KY): mainly in dry sandy woodlands, often locally abundant in sandhills and flatwoods; common (uncommon in Piedmont, rare in Interior Low Plateau). July-September. Var. *pseudocaudatum* is primarily a variety of the Southeastern Coastal Plain (where it is ubiquitous and abundant), but is reported north to MA, OH, IN, s. MI, and MO. [= RAB, C, F, FNA, G, K, W, WV; = *P. latiusculum* (Desvaux) Hieronymus var. *pseudocaudatum* (Clute) Maxon – S]

DRYOPTERIDACEAE Ching 1965 (Wood-fern Family)

A family of about 40-45 genera and 1700 species, cosmopolitan in distribution, but concentrated in temperate and montane areas. Here circumscribed (following Smith et al. 2006) to exclude Onocleaceae and Woodsiaceae. References: Smith in FNA (1993b); Smith et al. (2006); Lellinger (1985); Kramer et al. in Kramer & Green (1990).

1 Leaf blades pentagonal in outline, ca. 1× as long as wide, the terminal pinna by far the largest; [introduced species, naturalized in moist ravines in SC] ..... ***Arachniodes***
1 Leaf blades lanceolate, oblong, or ovate in outline, 2× or more as long as wide.
  2 Leaves 1-pinnate-pinnatifid to more divided, the pinnae pinnatifid or themselves fully divided, generally lacking a prominent basal lobe, light green to dark green, herbaceous to subcoriaceous; indusia reniform ..... ***Dryopteris***
  2 Leaves 1-pinnate, the pinnae toothed and each with a slight to prominent lobe near the base on the side toward the leaf tip, dark green, subcoriaceous to coriaceous; indusia peltate; [subfamily *Dryopteridoideae*, tribe *Dryopterideae*].
    3 Veins anastamosing, rejoining to form a netlike pattern; pinnae 4-25 pairs per leaf; [non-native, rarely naturalized] ..... ***Cyrtomium***
    3 Veins branching dichotomously, free, not rejoining to form a netlike pattern; pinnae 25-50 pairs on larger leaves; [plant a common native species] ..... ***Polystichum***

Arachniodes Blume 1828 (East Indian Holly Fern)

A genus of about 50-60 species, of tropical and warm temperate regions, and especially of Asia and America. References: Smith in FNA (1993b); Kramer et al. in Kramer & Green (1990).

* ***Arachniodes simplicior*** (Makino) Ohwi, Simpler East Indian Holly Fern. Pd (SC): moist banks in forested creek ravine; rare, native of Japan and China. Gordon (1981) discusses this interesting introduced population, apparently established for several decades at the time of its discovery, and likely originating from spores. [= FNA, K]

Cyrtomium K. Presl 1836 (Net-veined Holly Fern)

A genus of about 15 species, of temperate regions of Africa, Asia, and the Pacific Islands. Perhaps better treated as a portion of *Polystichum*; at the least, *Cyrtomium* is closely related to *Polystichum*. Both species in our area are apogamous triploids. References: Yatskievych in FNA (1993b); MacDougal (1976); Kramer et al. in Kramer & Green (1990).

1 Leaf coriaceous, the upper surface dark green and shiny; pinnae 4-10 (-12) pairs per leaf, 1.5-3 cm wide, the margins coarsely toothed or undulate ..... ***C. falcatum***
1 Leaf less coriaceous, the upper surface pale green and dull; pinnae (8-) 10-25 pairs per leaf, 1-2 cm wide, the margins finely denticulate ..... ***C. fortunei* *var. fortunei***

* ***Cyrtomium falcatum*** (Linnaeus f.) K. Presl, Asian Net-veined Holly Fern. Cp (FL, GA, NC, SC), Mt (GA?, VA): ditches, disturbed swamps, moist ravines, old mortar of brick walls; rare, native of e. Asia. [= FNA, K, S; = *Polystichum falcatum* Linnaeus f.]

* ***Cyrtomium fortunei*** J. Smith *var.* ***fortunei***, Fortune's Net-veined Holly Fern. Cp (GA, SC), Pd? (GA?): old mortar of brick walls; rare, native of se. China. Two other varieties are recognized; neither appears to be naturalized in North America. [= FNA; < *C. fortunei* – K]

Dryopteris Adanson 1763 (Wood-fern, Shield-fern)

A genus of about 250 species, nearly cosmopolitan, but concentrated in temperate Asia. References: Montgomery & Wagner in FNA (1993b); Montgomery & Paulton (1981); Montgomery (1982); Kramer et al. in Kramer & Green (1990); Hoshizaki & Wilson (1999).

Identification notes: *Dryopteris* and *Athyrium* are often confused when not fertile; they can be easily distinguished by breaking off a leaf and counting vascular bundles (which will appear as thread-like strands). *Dryopteris* has 5 and *Athyrium* has 2. Many *Dryopteris* species will hybridize with one another to form sterile hybrids. Whenever two or more *Dryopteris* species are found growing together, there is a good chance that hybrids are present. Hybrids generally show intermediacy between the two parents, and have abortive sporangia or spores. For further information on hybrids, see the discussion of hybrids following the species accounts.

1 Leaves bipinnate-pinnatifid to tripinnate-pinnatifid (or to quadripinnate in the lower pinnae).
  2 Leaves evergreen, the blades appearing more-or-less parallel-sided and minutely glandular-pubescent, especially on the indusium, rachis, and pinnae midribs; first basal-pointed pinnule of the basal pinna shorter than or equal to the next outermost basal-pointed pinnule; first basal-pointed pinnule of the basal pinna usually < 2× as long as the first tip-pointed pinnule of the basal pinna ..... ***D. intermedia***
  2 Leaves deciduous, the blades appearing more or less triangular and lacking gland-tipped hairs (except occasionally on the indusium); first basal-pointed pinnule of the basal pinna longer than the next outermost basal-pointed pinnule; first basal-pointed pinnule of the basal pinna > 2× as long as the first tip-pointed pinnule of the basal pinna.

3 Leaf blade ca. 1× as long as the petiole; indusium occasionally glandular; first basal-pointed pinnule of the basal pinna 2.5-5× as long as the first tip-pointed pinnule of the basal pinna ..... ***D. campyloptera***
3 Leaf blade 2× as long as the petiole; indusium glabrous; first basal-pointed pinnule of the basal pinna ca. 2× as long as the first tip-pointed pinnule of the basal pinna ..... ***D. carthusiana***
1 Leaves pinnate-pinnatifid to bipinnate (or to bipinnate-pinnatifid in the lower pinnae).
4 Sori marginal; leaves evergreen, gray-green, leathery in texture..... ***D. marginalis***
4 Sori medial or submedial; leaves evergreen or deciduous, dark- to bright-green, thin to stiff in texture.
5 Leaves dimorphic, the deciduous, fertile leaves erect, 2-3× as long as the spreading, evergreen, sterile leaves, which form a winter "rosette"; fertile leaves linear-lanceolate in outline, generally 4-8× as long as wide; pinnae mostly 1.5-3× as long as wide, triangular; scales at base of petiole tan.
6 Fertile pinnae nearly in plane of the blade (like a closed Venetian blind); fertile leaves 12-20 cm wide ..... ***D. clintoniana***
6 Fertile pinnae usually twisted out of the plane of the leaf axes, often nearly to 90 degrees (like an open Venetian blind); fertile leaves 8-12 cm wide ..... ***D. cristata***
5 Leaves not dimorphic, or only slightly so, deciduous (*D. goldiana*), evergreen (*D. ludoviciana*) , or else with usually deciduous fertile and semi-evergreen sterile fronds (*D. celsa*); fertile leaves lanceolate to ovate in outline, generally 1.5-4× as long as wide; pinnae mostly 3-4× as long as wide; scales at base of petiole dark brown with tan margins.
7 Leaves evergreen, fertile only toward the tip, the fertile pinnae and segments narrower than the sterile and more widely spaced; scales at the petiole base light brown, not shiny ..... ***D. ludoviciana***
7 Leaves deciduous or semi-evergreen, fertile throughout or nearly so, the fertile pinnae and segments not differentiated from sterile ones; scales at petiole base medium to dark brown, shiny or not.
8 Sterile leaves semi-evergreen; fertile leaves deciduous with sori submedial, not touching the costule at maturity; leaf blade lanceolate, usually 2-4× as long as wide, gradually tapering at the apex; scales at the petiole base medium to dark brown, with a narrow black central band ..... ***D. celsa***
8 Leaves deciduous with sori medial, touching the costule at maturity; leaf blade ovate to narrowly ovate, usually 1.5-3× as long as wide; abruptly tapering at the apex; scales at the petiole base dark brown, nearly black, with a narrow pale margin ..... ***D. goldiana***

Dryopteris campyloptera Clarkson, Mountain Wood-fern. Mt (NC, VA): spruce-fir forests, northern hardwood forests; common (rare in VA). July-September. Newfoundland and n. Québec south to extreme n. PA, and from extreme s. PA south through e. WV and w. VA to e. TN and w. NC. This species is a fertile allotetraploid derived from hybridization of *D. intermedia* and the northern and western *D. expansa* (K. Presl) Fraser-Jenkins & Jermy, which does not (now) reach our area. The chromosome complement is symbolized EEII. [= RAB, C, K, S, W, WV; = *D. spinulosa* (O.F. Mueller) Watt var. *americana* (Fischer ex Kunze) Fernald – F; = *D. austriaca* (Jacquin) Woynar ex Schinz & Thellung var. *austriaca* – G]

Dryopteris carthusiana (Villars) H.P. Fuchs, Spinulose Wood-fern, Toothed Wood-fern. Mt (GA, KY, NC, SC, VA), Pd (NC, SC, VA), Cp (KY, NC, SC, VA): acidic, organic-rich bogs, swamps, less frequently in moist rocky ravines, rich forests, and sloping rock outcrops; uncommon (common in VA Mountains, rare in KY). June-September. Irregularly circumboreal, in North America ranging from n. Québec west to Yukon, south to NC, SC, ne. GA, TN, AR, NE, w. MT, and WA. This species is a fertile allotetraploid derived from hybridization of *D. intermedia* and "*D. semicristata*," a hypothetical species which may now be extinct. Its chromosome complement is symbolized IISS. [= C, FNA, K, W; = *D. spinulosa* (O.F. Mueller) Watt – RAB, S, WV; = *D. spinulosa* var. *spinulosa* – F; = *D. austriaca* (Jacquin) Woynar ex Schinz & Thellung var. *spinulosa* (O.F. Mueller) Fiori – G]

Dryopteris celsa (W. Palmer) Knowlton, W. Palmer, & Pollard ex Small, Log Fern. Mt, Cp, Pd (GA, NC, SC, VA): swamps, seepage bogs, and calcareous floodplains, typically associated with calcareous substrates; uncommon. June-September. Ne. NJ and ne. NY west to s. IL, e. MO, and AR, south to SC, GA, n. AL, TN, and n. LA; disjunct in w. NY and w. MI; overall very scattered in its distribution. This species is a fertile allotetraploid derived from hybridization of *D. goldiana* and *D. ludoviciana*; its chromosome complement is symbolized GGLL (Werth 1991). [= RAB, C, F, FNA, K, S, W, WV; = *D. goldiana* (Hooker ex Goldie) ssp. *celsa* W. Palmer – G]

Dryopteris clintoniana (D.C. Eaton) Dowell, Clinton's Wood-fern, Broad Swamp Fern. Pd? (VA?): moist to wet forests; rare. This species is fertile allohexaploid derived from hybridization of *D. cristata* and *D. goldiana*; its chromosome complement is symbolized GGLLSS. This species has a disputed southern distribution; it is sometimes attributed to our area (as by Shetler & Orli 2000). It is definitely known as far south as se. PA, sc. PA, and OH. It is provisionally accepted for our area; additional study is needed. [= FNA, C, G, K; = *D. cristata* (Linnaeus) A. Gray var. *clintoniana* (D.C. Eaton) Underwood – F]

Dryopteris cristata (Linnaeus) A. Gray, Crested Wood-fern. Mt (NC, VA), Pd (GA, NC, VA), Cp (NC, VA): bogs, swamp forests; uncommon. July-September. Circumboreal, in North America from Newfoundland to s. Saskatchewan and se. British Columbia, south to NC, TN, OH, IN, n. IL, IA, NE, and ID; disjunct in c. GA, AL, and LA. This species is a fertile allotetraploid derived from hybridization of *D. ludoviciana* and "*D. semicristata*," a hypothetical species which may be extinct. Its chromosome complement is symbolized LLSS. It has also served as a "parent species" of *D. clintoniana*, a fertile allohexaploid derived from *D. cristata* × *goldiana*. Thus, its genome constitutes two thirds of the genome of *D. clintoniana*. [= RAB, C, FNA, G, K, S, W, WV; = *D. cristata* var. *cristata* – F]

Dryopteris goldiana (Hooker ex Goldie) A. Gray, Goldie's Wood-fern. Mt (GA, KY, NC, SC, VA), Ip (KY), Pd (VA): boulderfield forests, rich cove forests, seepage swamps, especially over calcareous sedimentary or mafic metamorphic or igneous rocks; uncommon. June-September. New Brunswick west to s. Ontario and MN, south to nw. SC, n. GA, n. AL, TN, KY, IL, and IA. This species is one of the diploid "parent species" of the e. North American reticulately-evolved *Dryopteris* complex. Its genome (symbolized GG) forms half of the genome of the tetraploid *D. celsa*, and one third of the hexaploid *D. clintoniana*, which does not occur as far south as our area. [= RAB, C, F, FNA, K, S, W, WV; = *D. goldiana* ssp. *goldiana* – G]

Dryopteris intermedia (Muhlenberg ex Willdenow) A. Gray, Fancy Fern, Evergreen Wood-fern. Mt (GA, NC, SC, VA), Pd (KY, NC, VA), Ip (KY), Cp (NC, VA): cove forests, other moist, rocky forests, over a variety of substrates; common (uncommon in Piedmont and Interior Low Plateau, rare in Coastal Plain). June-September. Newfoundland west to MN, south to n. GA and AR. This species is one of the diploid "parent species" of the e. North American reticulately-evolved *Dryopteris*

complex. Its genome (symbolized II) forms half of the genome of the tetraploids *D. campyloptera* and *D. carthusiana*. [= RAB, C, FNA, K, S, W, WV; = *D. spinulosa* (O.F. Mueller) Watt var. *intermedia* (Muhlenberg ex Willdenow) Underwood – F; = *D. austriaca* (Jacquin) Woynar ex Schinz & Thellung var. *intermedia* (Muhlenberg ex Willdenow) Morton – G]

Dryopteris ludoviciana (Kunze) Small, Southern Wood-fern. Cp (FL, GA, NC, SC), Ip? (KY?): blackwater swamp forests; rare. June-September. A Southeastern Coastal Plain species: e. NC south to s. FL, west to s. AL and s. MS (Sorrie & Leonard 1999); disjunct in the West Gulf Coastal Plain of LA and AR, and possibly disjunct in sc. KY, the report old and somewhat uncertain. This species is one of the diploid "parent species" of the e. North American reticulately-evolved *Dryopteris* complex. Its genome (symbolized LL) forms half of the genome of the tetraploids *D. cristata* and *D. celsa,* as well as contributing one third of the genome of *D. clintoniana* indirectly (via its daughter species *D. cristata*). [= RAB, FNA, K, S]

Dryopteris marginalis (Linnaeus) A. Gray, Marginal Wood-fern. Mt (GA, KY, NC, SC, VA), Ip (KY), Pd (GA, NC, SC, VA), Cp (NC, SC, VA): rock outcrops, boulderfield forests, other rocky forests; common (uncommon in Piedmont, rare in Coastal Plain). June-September. Newfoundland west to s. Ontario and MI, south to SC, c. GA, AL, TN, AR, and e. OK. *D. marginalis* has not participated in the reticulate evolution of *Dryopteris* in e. North America; it does, however, form sterile hybrids with some other species. [= RAB, C, F, FNA, G, K, S, W, WV]

The following hybrids are known between species which occur in our area. If the hybrid has been reported from our area, it is so indicated. In addition, the chromosome formulae are indicated, using the conventions listed at the end. These hybrids all have unbalanced chromosome complements which do not allow pairing. Thus, all produce aborted spores (if they produce spores at all), which can be recognized (at 30-40× magnification) by their irregular size, shape, and color. For further information on these hybrids and a key to them, see Montgomery (1982).

D. campyloptera* × *intermedia. Known from NC. Chromosome formula = EII.
D. campyloptera* × *marginalis. Known from VA. Chromosome formula = EIM.
D. carthusiana* × *cristata [***D.* ×*uliginosa*** (A. Braun ex Dowell) Druce]. Known from VA. Chromosome formula = ILSS.
D. carthusiana* × *intermedia [***D.* ×*triploidea*** Wherry]. Known from NC and VA. Chromosome formula = IIS. This is one of the commonest *Dryopteris* hybrids.
D. carthusiana* × *marginalis [***D.* ×*pittsfordensis*** Slosson]. Chromosome formula = IMS.
D. celsa* × *cristata. Known from NC. Chromosome formula = GLLS.
D. celsa* × *goldiana. Chromosome formula = GGL.
D. celsa* × *intermedia [***D.* ×*separabilis*** (Wm. Palmer) Small]. Known from NC and VA. Chromosome formula = GIL.
D. celsa* × *ludoviciana [***D.* ×*australis*** (Wherry) Small]. Perhaps the largest North American *Dryopteris*; fronds capable of reaching a length of greater than 1.5 m. Known from GA, NC, SC, and VA; in GA this occurs in both the Coastal Plain and Mountains (Ridge & Valley). Chromosome formula = GLL.
D. celsa* × *marginalis [***D.* ×*leedsii*** Wherry]. Chromosome formula = GLM.
D. clintoniana* × *marginalis [***D.* ×*burgessii*** Boivin]. Chromosome formula = GLMS.
D. cristata* × *intermedia [***D.* ×*boottii*** (Tuckerman) Underwood]. Known from VA. Chromosome formula = ILS. This is one of the commonest *Dryopteris* hybrids.
D. cristata* × *marginalis [***D.* ×*slossoniae*** Wherry ex Lellinger]. Known from VA. Chromosome formula = LMS.
D. goldiana* × *intermedia. Known from NC. Chromosome formula = GI
D. goldiana* × *marginalis. [***D.* ×*neowherryi*** W.H. Wagner]. Known from GA, NC, and VA. Chromosome formula = GM.
D. intermedia* × *marginalis. Known from VA. Chromosome formula = IM.

E = *D. expansa*
G = *D. goldiana*
I = *D. intermedia*
L = *D. ludoviciana*
S = *D. "semicristata"* (hypothetical taxon, perhaps extinct)

Polystichum Roth 1799 (Holly Fern)

A genus of about 180 species, nearly cosmopolitan in distribution. References: D.H. Wagner in FNA (1993b); Kramer et al. in Kramer & Green (1990).

Polystichum acrostichoides (Michaux) Schott, Christmas Fern. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY), Cp (FL, GA, KY, NC, SC, VA): moist to dry forests and woodlands; common. June-September. Nova Scotia west to MN, south to s. FL and e. TX; also in Mexico. One of the most familiar ferns in e. North America. Var. *lonchitoides* Brooks, allegedly endemic to WV, is of dubious taxonomic value. [= RAB, C, F, FNA, G, S, W, WV; > *P. acrostichoides* var. *acrostichoides* – K; > *P. acrostichoides* var. *lonchitoides* Brook – K]

EQUISETACEAE L.C. Richard ex de Candolle 1805 (Horsetail Family)

A family with a single genus and about 15 species. References: Hauke in FNA (1993b); Lellinger (1985); Mickel (1979); Hauke in Kramer & Green (1990); Des Marais et al. (2003).

Equisetum Linnaeus 1753 (Horsetail, Scouring Rush)

EQUISETACEAE

A genus of about 15 species, nearly cosmopolitan in distribution. References: Hauke in FNA (1993b); Lellinger (1985); Mickel (1979); Hauke in Kramer & Green (1990); Des Marais et al. (2003); Guillon (2004).

1 Stems perennial, evergreen, stiff; sterile and fertile stems monomorphic and either unbranched or with 2-3 short and unequal branches per node; [subgenus *Hippochaete*].
  2 Main erect stems unbranched (rarely branched as a result of injury); stems 3-18 mm in diameter; stomatal lines 1 on each slope of the stem ridges ..... ***E. hyemale ssp. affine***
  2 Main erect stems usually with 2-3 branches at the nodes; stems 1.5-7 mm in diameter; stomatal lines 1-2 on each slope of the stem ridges .. .. ***E. ramosissimum ssp. ramosissimum***
1 Stems annual, deciduous, the sterile stems flexible; sterile and fertile stems dimorphic or monomorphic, usually branched (often copiously so) but sometimes unbranched or sparsely and irregularly branched; [subgenus *Equisetum*].
  3 Sterile and fertile stems monomorphic; sterile and fertile stems sparsely and irregularly branched; stem ridges 12-24, indistinct; diameter of the central cavity of the stem about 4/5's of the stem diameter ..... ***E. fluviatile***
  3 Sterile and fertile stems dimorphic; sterile stems copiously branched and green, fertile stems unbranched or branched, green, tan, brown, or purplish; stem ridges 4-18, distinct; diameter of the central cavity of the stem usually < 3/4's of the stem diameter.
    4 Sheaths of the sterile stems 3-10 mm long, the teeth dark brown with white margins; sterile stems regularly whorled with simple branches (rarely rebranching) ..... ***E. arvense***
    4 Sheaths of the sterile stems 10-30 mm long, the teeth reddish-brown with brown margins; sterile stems regularly whorled with branches which regularly rebranch ..... ***E. sylvaticum***

Equisetum arvense Linnaeus, Field Horsetail. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (KY, NC, SC, VA), Ip (KY): moist streambanks, bottomlands, moist disturbed sites; common. March-April. A circumboreal species, occurring throughout North America. [= RAB, C, FNA, G, K, S, W, WV; > *E. arvense* var. *arvense* – F]

Equisetum fluviatile Linnaeus, Water Horsetail, Pipes. Mt (VA): open calcareous wetlands; rare (VA Rare). June-August. Circumboreal, south in North America to n. VA, PA, IL, IA, and WA. [= C, F, FNA, G, K, W, WV]

Equisetum hyemale Linnaeus *ssp.* ***affine*** (Engelmann) Calder & R.L. Taylor, Tall Scouring Rush. Mt (GA, KY, NC, SC< VA), Pd (GA, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA), Ip (KY): riverbanks, alluvial floodplains; common (uncommon in NC and SC). May-September. Ssp. *affine* occurs nearly throughout North America and in Mexico and Guatemala; ssp. *hyemale* is Eurasian. [= FNA; = *E. hyemale* var. *affine* (Engelmann) A.A. Eaton – RAB, C, K, W; > *E. hyemale var. affine* – F, WV; > *E. hyemale* var. *robustum* (A. Braun) A.A. Eaton – F; > *E. hyemale* var. *pseudohyemale* (Farwell) Morton – G; > *E. hyemale* var. *elatum* (Engelmann) Morton – G, WV; *E. praealtum* Rafinesque – S; = ***Hippochaete hyemalis*** (Linnaeus) Bruhin ssp. ***affinis*** (Engelmann) W.A. Weber]

* ***Equisetum ramosissimum*** Desfontaines *ssp.* ***ramosissimum***, Branched Scouring Rush. Cp (FL, NC): disturbed areas; rare, native of the Old World, where it is widespread in Europe, Asia, and Africa. This species was apparently introduced long ago on ship's ballast to various old ports, such as Wilmington (New Hanover County, NC), Pensacola (Escambia County, FL) and New Orleans, LA. It is naturalized on the Wilmington waterfront, persisting in disturbed areas, such as in gravel along railroad tracks. Hauke (1979, 1984, 1992) discusses the occurrence of this species in North America. Ssp. *debile* (Roxburgh) Hauke occurs in se. Asia and southern Pacific Islands; it is not known to be naturalized in North America. [= FNA; < *E. ramosissimum* – K; = ***Hippochaete ramosissima*** (Desfontaines) Farwell *ssp.* ***ramosissima***]

Equisetum sylvaticum Linnaeus, Woodland Horsetail. Mt (VA): seepage swamps; rare (VA Rare). Circumboreal, south in North America to MD, n. VA, WV, OH, MI, WI, IA, WY, MT, and WA. [= C, FNA, K; > *E. sylvaticum* var. *sylvaticum* – F, G; > *E. sylvaticum* var. *pauciramosum* Milde – F, G; > *E. sylvaticum* var. *multiramosum* Wherry – WV]

Equisetum ×*ferrissii* Clute (pro sp.) [= *E. hyemale* × *laevigatum*]. There are old reports, repeated in RAB, S, and FNA, of the occurrence of *E.* ×*ferrissii* in our area; documentation of these reports is not known; it is reported for Prince George's County, MD (Shetler & Orli 2000) and for KY (Campbell & Medley 2007). *E.* ×*ferrissii* may be distinguished from *E. hyemale* var. *affine* (to which it will key above) by the failure of its cones to produce spores at all or the production of aborted spores (vs. production of normal spores) and most stem sheaths lacking a blackish band well below the teeth (vs. most stem sheaths with a narrow to broad blackish band well below the teeth). [= C, FNA, K; = *E. ferrissii* Clute – G; = ***Hippochaete*** ×***ferrissii*** (Clute) Škoda & Holub] {not yet keyed}

Equisetum laevigatum A. Braun. Widespread in n. North America, south to CT, NY, PA, KY, AR, and TX. There are old reports, repeated in RAB, and S, of this species in our area; documentation of these reports is not known. It will key to *E. hyemale* ssp. *affine* in the above key, but has the strobilus apex rounded (vs. pointed), and aerial stems annual (vs. perennial). [= C, FNA, G, K; > *E. hyemale* Linnaeus var. *intermedium* A.A. Eaton – F; > *E. kansanum* Schaffner – F; = ***Hippochaete laevigata*** (A. Braun) Farwell]

Equisetum ×*litorale* Kühlewein ex Ruprecht (pro sp.) [*arvense* × *fluviatile*] is reported by FNA for VA. It can be distinguished from *E. arvense* by its white, misshapen spores. [= C, F, FNA, K; = *E. litorale* Kühlewein ex Ruprecht – G]

GLEICHENIACEAE C. Presl 1825 (Forking-fern Family)

A family of about 6 genera and 125-140 species, pan-tropical and –subtropical. References: Nauman in FNA (1993b).

Dicranopteris Bernhardi 1805 (Forking-fern)

A genus of 8-12 speces, pan-tropical and –subtropical. References: Nauman in FNA (1993b).

Dicranopteris flexuosa (Schrader) Underwood, Forked-fern. Cp (AL, FL): wet pine flatwoods, moist disturbed areas; rare. FL Panhandle (Bay and Franklin counties) and FL peninsula, s. AL (Mon Louis Island, Mobile County); West Indies; Mexico, Central America, South America. [= FNA, K, S]

HYMENOPHYLLACEAE Link 1833 (Filmy Fern Family)

A family of 6-10 (or many more) genera and 600-650 species. See Moran (1998) for an interesting discussion and overview of independent fern gametophytes in e. North America. References: Farrar in FNA (1993b); Ebihara et al. (2006); Iwatsuki in Kramer & Green (1990); Morton (1968).

1 Sporophytes present.
  2 Indusium ("involucre") bivalvate (deeply divided into 2 flaps); receptacle not exserted from between the 2 flaps of the indusium ..... ***Hymenophyllum***
  2 Indusium ("involucre") tubular or funnelform, sometimes slightly 2-lobed; receptacle long and whiplike, exserted from the mouth of the tubular indusium ..... ***Trichomanes***
1 Gametophytes only present.
  3 Gametophytes thalloid, flattened ..... ***Hymenophyllum***
  3 Gametophytes filamentous, no portion flattened and planar ..... ***Trichomanes***

Hymenophyllum J.E. Smith 1793 (Filmy Fern)

As here very broadly circumscribed, a genus of about 330 species, almost strictly tropical in distribution. *Sphaerocionium* C. Presl and other segregates are often recognized; these segregates may well be warranted. Iwatsuki in Kramer & Green (1990) takes a broad view of the genus, recognizing only *Sphaerocionium* among the potential segregates. If this distinction is recognized, *H. tunbrigense* is in *Hymenophyllum* and *H. tayloriae* in *Sphaerocionium* (the combination has not been made). References: Ebihara et al. (2006)=Z; Raine, Farrar, & Sheffield (1991); Iwatsuki in Kramer & Green (1990); Morton (1968).

1 Sporophytes present.
  2 Leaf blade with stellate hairs; [subgenus *Sphaerocionium*] ..... ***H. tayloriae***
  2 Leaf blade glabrous; [subgenus *Hymenophyllum*] ..... ***H. tunbrigense***
1 Gametophytes only present.
  3 Gemmae present; margin crenate, composed predominantly of cells with concave outer walls; archegonia and antheridia rare; plant forming sprawling, ribbon-like forms; branches filamentous to broad; proliferations abundant, arising marginally and centrally; [subgenus *Sphaerocionium*] ..... ***H. tayloriae***
  3 Gemmae absent; margin entire, composed predominantly of straight-sided cells; archegonia and antheridia common, often present on the same gametophyte; plant typically forming rosettes; branches always broad; proliferations few, always marginal; [subgenus *Hymenophyllum*] ..... ***H. tunbrigense***

Hymenophyllum tayloriae Farrar & Raine, Gorge Filmy Fern. Mt (GA, NC, SC): spray cliffs near waterfalls, permanently moist ceilings of grottoes in escarpment gorges with high rainfall; rare. This species is endemic to the southern end of the Southern Appalachians (Transylvania, Jackson, and Macon counties, NC, Pickens and Oconee counties, SC, Rabun County, GA (Davison 1997) and sites in e. TN and n. AL. It was recently named (in honor of the first collector), following the demonstration that it represented a gametophyte distinct from the gametophytes of any (sporophytically) known species (Raine, Farrar, & Sheffield 1991), including *H. tunbrigense*, present in the close vicinity. Raine, Farrar, & Sheffield (1991) point out that "*H. tayloriae* is distinguished from the independent gametophytes of *Vittaria appalachiana* Farrar & Mickel by its 2-dimensional spathulate gemmae (those of *V. appalachiana* are uniseriate), rhizoid attachment only to marginal cells, yellow-green color, and glossy texture. Thalloid liverworts of similar size are generally more than one cell thick or have a distinct midrib, have notched apical meristems, and do not produce spathulate gemmae." An immature sporophyte, collected by Taylor in 1936, has stalked stellate hairs on the margins and midrib of the leaf and was the only sporophytic collection of the species until the recent discovery of additional juvenile sporophytes in AL (FNA 1993b). [= FNA, K, Z; = "a branching ribbon-like gametophyte with marginal rhizoids and small, ovate, plate-like gemmae several cells wide, of the genus *Hymenophyllum*" – RAB; = ***Sphaerocionium sp. 1***]

Hymenophyllum tunbrigense (Linnaeus) J.E. Smith, Tunbridge Filmy Fern. Mt (SC): moist rock faces in an escarpment gorge with high rainfall; rare. June-September. The occurrence of this filmy fern in the escarpment gorge of Eastatoe Creek (and its tributaries) is remarkable. Overall, *H. tunbrigense* is a "Gulf Stream plant," found in highly humid, climates in the West Indies, and the maritime west coast of the British Isles. *H. tunbrigense* somewhat resembles *Trichomanes boschianum*. This species may yet be found in NC in similarly rugged and humid escarpment gorges. It differs from *T. boschianum* in having the sporangia not extending beyond the deeply 2-lobed involucre (as opposed to having the sporangia exserted beyond the slightly bilobed, funnelform involucre). [= RAB, FNA, K, W, Z]

Trichomanes Linnaeus 1753 (Filmy Fern)

Depending on circumscription, a genus of 80-300 species, primarily tropical. Dubuisson et al. (2003) and other molecular phylogenetic studies of *Trichomanes* suggest that some of the segregates may warrant recognition at the generic level. References: Ebihara et al. (2006)=Z; Iwatsuki in Kramer & Green (1990); Morton (1968); Dubuisson et al. (2003).

1 Plant a sporophyte (thus with simple, lobed, or pinnate-pinnatifid leaves).
  2 Leaves pinnate-pinnatifid, > 5 cm long; [subgenus *Trichomanes*, section *Lacosteopsis*; or genus *Vandenboschia,* subgenus *Lacosteopsis*]...

..... ***T. boschianum***

2 Leaves simple to slightly lobed, < 2 cm long; [subgenus *Didymoglossum*, section *Didymoglossum*; or genus *Didymoglossum*, subgenus *Didymoglossum*] ..... ***T. petersii***

1 Plant a gametophyte (thus filamentous, forming felt-like mats).

3 Gametophytes free-living, distant from sporophytes of *T. boschianum* or *T. petersii* ..... ***T. intricatum*** (see discussion under *T. intricatum*)

3 Gametophytes growing in association with or in proximity to sporophytes of *T. boschianum* or *T. petersii*..... ***T. boschianum*** or ***T. petersii*** (see discussion under *T. intricatum*)

Trichomanes boschianum Sturm, Appalachian Filmy Fern. Mt (GA, KY, NC, SC, VA), Ip (KY): on rock outcrops, usually vertical or overhanging, usually in deeply shaded grottoes receiving seepage or spray from waterfalls; rare. June-September. W. VA, w. NC and w. SC west to n. GA, AL, MS (Menapace, Davison, & Webb 1998), and AR, and north to s. OH, KY, and s. IL; also disjunct in Chihuahua, Mexico. See Belden et al. (2004) for more details on the first documented Virginia occurrence. [= RAB, C, F, FNA, G, K, S, W, WV; = ***Vandenboschia boschiana*** (Sturm) Ebihara & K. Iwatsuki – Z]

Trichomanes intricatum Farrar, Grotto-felt, Appalachian Trichomanes, Weft Fern. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY): on ceilings or back walls of grottoes, especially in humid gorges or near or behind waterfalls; rare. Rather widespread in e. North America, from VT, MA, CT, IN, and IL south to NC, SC, GA, AL, TN, and KY. *T. intricatum* cannot be morphologically distinguished from gametophytes of *T. boschianum* or *T. petersii*; the electrophoretic and phytogeographic evidence of Farrar (1992) leave little question, however, that it should be considered a distinct species. Although Farrar (1992) found that 30 of 30 populations of *Trichomanes* gametophytes "east of the Mississippi River that were not within or adjacent to sporophyte populations of *T. boschianum* or *T. petersii*" were *T. intricatum*, the key above (based on proximity to sporophytes) should be considered to provide only a presumptive or likely identification of gametophytes. Farrar (1992) also showed that independent gametophytes in AR were those of *T. boschianum* and *T. petersii*. Farrar (1992) points out the "intriguing possibility that somewhere in the Appalachian Mountains sporophytes of this species may yet exist." Probably the most likely area in which to search for the sporophyte generation of *T. intricatum* is the escarpment gorge region of NC, SC, and GA near Highlands, NC, where topography, waterfalls, and the highest rainfall east of the Cascade Mountains combine to create microclimatic conditions that have favored the relict survival of numerous species of mosses, liverworts, and ferns. Any filmy-fern sporophyte which differs from *T. boschianum*, *T. petersii*, or *Hymenophyllum tunbrigense* should be investigated carefully. *Vittaria appalachiana* and *Hymenophyllum tayloriae* gametophytes differ from *Trichomanes intricatum* in being thallose rather than filamentous. [= FNA, K; = "a filamentous gametophyte, with spindle-shaped gemmae one cell wide but with the cells decreasing in size toward the apices, of the genus *Trichomanes*" – RAB; = ***? Vandenboschia sp. 1*** – Z]

Trichomanes petersii A. Gray, Dwarf Filmy Fern. Mt (GA, NC, SC), Pd, Cp (GA): on vertical faces of acidic rock outcrops in humid gorges, primarily of the Savannah River drainage, in the context of the very humid escarpment gorges on relatively dry rocks, not on rocks receiving substantial seepage or spray from waterfalls, also on outcrops of Altamaha Grit in the Coastal Plain; rare. June-August. W. NC and w. SC southwest to FL, AL, MS, and LA, and north to AR and s. IL; also in Mexico and Guatemala. This diminutive species is often overlooked, except by bryologists and hepaticologists; superficially, it does resemble a moss or liverwort more than a fern. It occurs on tree bark in some parts of its range. [= RAB, FNA, K, S, W; = ***Didymoglossum petersii*** (A. Gray) Copeland – Z]

ISOETACEAE Dumortier 1829 (Quillwort Family, Merlin's-grass Family)

A family of a single genus and about 300 species. Isoetaceae, along with Selaginellaceae and Lycopodiaceae, now appear to be only distantly related to other extant pteridophytes and seed plants (Pryer et al. 2001). References: Jermy in Kramer & Green (1990).

Isoetes Linnaeus 1753 (Quillwort, Merlin's-grass)

A genus of about 300 species, cosmopolitan in distribution. References: Taylor et al. in FNA (1993b); Hoot, Napier, & Taylor (2004); Boom (1982); Kott & Britton (1983); Brunton & Britton (1996a, 1996b, 1997, 1998, 1999); Caplen & Werth (2000a, 2000b); Musselman & Knepper (1994); Musselman, Bray, & Knepper (1996, 1997); Musselman et al. (1995); Musselman, Taylor, & Bray (2001); Musselman (2001)=Z; Jermy in Kramer & Green (1990).

Isoetes acadiensis L. Kott, Acadian Quillwort. Cp (VA): freshwater tidal marshes; rare. A tetraploid species (2n=44). [= FNA, K; < *I. tuckermanii* A. Braun – C, F, G]

Isoetes appalachiana Brunton & Britton, Appalachian Quillwort. Cp (FL, NC, SC, VA), Pd (SC), Mt (VA): seepages, small woodland streams, ephemeral wetlands, backwaters; uncommon. A tetraploid species (2n=44), apparently derived from a southern *I. engelmannii* entity and *I. valida* (Hoot, Napier, & Turner 2004), genotype=SSVV. See Brunton & Britton (1997) for additional information. [= K, Z; < *I. engelmannii* – RAB, C, FNA, W, WV; < *I. engelmannii* var. *engelmannii* – F, S; > *I. engelmannii* var. *georgiana* Engelmann]

Isoetes boomii N. Luebke, Boom's Quillwort. Cp (FL, GA): shallow water of slow-moving streams; rare. Known from Laurens County, GA, AL, and FL. A hexaploid species (2n=66). [= FNA, K; < *I. boomii* – Z (also see *I. georgiana*)]

Isoetes butleri Engelmann, Butler's Quillwort. Mt (GA), Ip (KY): seepage areas on calcareous glades; rare. Occurs in calcareous areas of the Midwest, extending east to c. TN, nw. GA (Jones & Coile 1988), and n. AL. A diploid species (2n=22), genotype=BB. [= C, F, FNA, G, K, S, Z]

ISOETACEAE

Isoetes engelmannii A. Braun. Cp (NC, SC, VA), Pd (NC, SC, VA), Mt (KY, NC, SC, VA), Ip (KY): usually in permanent water bodies with active current; common (rare in Interior Low Plateau). A diploid species (2n=22). Apparently there are 2 cryptic taxa currently called *I. engelmannii* (Hoot, Napier, & Taylor 2004), genotype NN and genotype SS. [= K, Z; < *I. engelmannii* – RAB, C, G, FNA, W, WV (also see *I. appalachiana, I. hyemalis,* and *I. valida*); < *I. engelmannii* var. *engelmannii* – F, S]

Isoetes flaccida A. Braun *var. **alata*** Pfeiffer, Winged Florida Quillwort. Cp (FL, GA): springs, stream bottoms, river bottoms, ditches; rare. S. GA and FL. A diploid species (2n=22). [= FNA, K, S; < *I. flaccida* Z]

Isoetes georgiana N. Luebke, Georgia Quillwort. Cp (GA): {}. Known only from GA (Colquitt, Dodge, Irwin, Tift, Tucker, Turner, and Worth counties). A hexaploid species (2n=66). See Brunton & Britton (1996b) for additional information. Musselman (2001) indicates that this may be conspecific with *I. boomii*. [= FNA, K; < *I. boomii* – Z]

Isoetes hyemalis Brunton, Wintergreen Quillwort. Cp (FL, GA, NC, SC, VA), Pd (GA?, NC, VA): blackwater streams and sandy streambanks; rare. Sc. VA south through e. and c. NC to GA, AL, and FL Panhandle (Nelson 2000), in the Coastal Plain and lower Piedmont. A tetraploid species (2n=44), apparently derived from 2 unknown or extinct species, X and Y (Hoot, Napier, & Taylor 2004). See Brunton, Britton, & Taylor (1994) and Brunton & Britton (1996a) for additional information on this species. [= K, Z; < *I. engelmannii* – RAB, C, G; < *I. engelmannii* var. *engelmannii* – F, S]

Isoetes junciformis Brunton & Britton, Rush Quillwort. Cp (GA): ephemeral wetland swales in bottomland hardwood swamps; rare. In sw. GA Coastal Plain (Tift and probably Calhoun counties, GA). A tetraploid species (2n=44). See Brunton & Britton (1999) for additional information. [= Z]

Isoetes lacustris Linnaeus, Lake Quillwort. Mt (VA): (VA Rare). July-September. A decaploid species (2n=110). [= FNA, C, K; > *I. macrospora* Durieu – F, G, W]

Isoetes mattaponica L.J. Musselman & W.C. Taylor, Mattaponi River Quillwort. Cp (VA): tidal rivers; uncommon? Apparently endemic to rivers flowing into the Chesapeake Bay. A diploid relative of *I. acadiensis*. A diploid species (2n=22). See Musselman, Taylor, & Bray (2001) for additional information on this species.

Isoetes melanopoda Gay & Durieu ex Durieu *ssp. **sylvatica*** Brunton & Britton, Eastern Blackfoot Quillwort. Pd (NC, SC, VA), Cp (GA, SC): clay soils in low woods, seeps on sandstone or granitic rocks; rare. S. NJ south (in the Piedmont and Coastal Plain) to sw. GA, s. and n. AL, and s. MS. A diploid species (2n=22), genotype= PP. [< *I. melanopoda* – FNA, K, C, G, Z; < *I. melanopoda* – RAB (also see *I. melanospora, I. virginica, I. piedmontana*)]

Isoetes melanopoda Gay & Durieu ex Durieu *ssp. **melanopoda***, Blackfoot Quillwort. Ip (KY): floodplains; rare. S. IN, IL, and MO south to ne. LA; perhaps represented eastward to c. TN and s. MS (the material ambiguous) (Brunton & Britton 2006). [< *I. melanopoda* – FNA, K, C, G, Z]

Isoetes melanospora Engelmann, Black-spored Quillwort. Pd (GA, SC): in pools on granite flatrocks; rare. A diploid species (2n=22). [= Z, S; < *I. melanospora* – FNA, K; < *I. melanopoda* – RAB]

Isoetes microvela Brunton. Cp (NC): banks of rivers in the outer Coastal Plain; rare. May-July (-September). See Brunton & Britton (1998) for additional information. [= K]

Isoetes piedmontana (N.E. Pfeiffer) C.F. Reed, Piedmont Quillwort. Pd (GA, NC, SC, VA), Cp (GA): in seepage on granitic flatrocks and on Altamaha grit; uncommon. [= K, Z; < *I. melanopoda* – RAB; < *I. virginica* – C, F, FNA, G]

Isoetes riparia Engelmann ex A. Braun, Shore Quillwort. Cp (NC, VA): A tetraploid species (2n=44), apparently derived from the southern *I. engelmannii* entity and *I. echinospora* (Hoot, Napier, & Taylor 2004). [< *I. riparia* – RAB, C, FNA (also see *I. saccharata*); > *I. riparia* var. *riparia* – G, K; > *I. riparia* var. *amesii* (A.A. Eaton) Proctor – G, K; > *I. riparia* var. *robbinsii* (A.A. Eaton) Proctor – G; > *I. riparia* var. *reticulata* (A.A. Eaton) Proctor – G]

Isoetes saccharata Engelmann. Cp (VA): {disentangle from *I. riparia*} [= K; < *I. riparia* – C, FNA; = *I. riparia* var. *palmeri* (A.A. Eaton) Proctor – G]

Isoetes sp. 1. Pd (SC): pools on granite flatrocks; rare. Forty Acre Rock, Lancaster County, SC. Being worked on by W.C. Taylor.

Isoetes sp. 3. Cp (VA): tidal marshes. A diploid relative of *I. melanopoda*. Being worked on by C. Caplen. A diploid species (2n=22).

Isoetes tegetiformans Rury, Merlin's-grass. Pd (GA): in shallow pools on granite flatrocks; rare (US Endangered, GA Endangered). Endemic to a few granite flatrocks in ec. GA, near the SC line. A diploid species (2n=22), genotype=TT. [= FNA, K, Z]

Isoetes valida (Engelmann) Clute, Mountain Quillwort, Carolina Quillwort. Mt (NC, SC, VA): bogs (growing in *Sphagnum*), pools, ponds; common. A diploid species (2n=22). Genotype=VV. [= K, Z; = *I. caroliniana* (A.A. Eaton) N. Luebke – FNA; < *I. engelmannii* – RAB, C, W, WV; = *I. engelmannii* A. Braun var. *caroliniana* A.A. Eaton – F, S]

Isoetes virginica N.E. Pfeiffer, Virginia Quillwort. Mt (VA), Pd (NC, SC?, VA): in woodland streams; rare. July-September. See Brunton, Britton, & Wieboldt (1996) for additional information. [= C, K; < *I. melanopoda* Gay & Durieu ex Durieu – RAB; < *I. virginica* – C, F, FNA, G, W (also see *I. piedmontana*)]

Isoetes louisianensis Thieret, Louisiana Quillwort. S. AL, MS, and LA. [= FNA, K] {add to synonymy}

Isoetes tenella Léman, Spiny-spore Quillwort. South to PA and NJ (Kartesz 1999). [= K; = *I. echinospora* Durieu – FNA; > *I. echinospora* var. *echinospora* – F, G; > *I. echinospora* var. *muricata* (Durieu) Engelmann – C, F, G; > *I. echinospora* var. *braunii* (Durieu) Engelmann – G; > *I. muricata* Durieu] {synonymy incomplete}

Isoetes tennesseensis N.T. Luebke & J.M. Budke. Endemic to Polk County, TN, near the North Carolina-Georgia state line, in the Hiawassee River. An octoploid species. See Luebke & Budke (2003) for additional information. [< *I. lacustris* – FNA, K, formerly misidentified as a southern disjunct population of *I. lacustris*]

Isoetes tuckermanii A. Braun, Tuckerman's Quillwort. South to MD (Kartesz 1999). A tetraploid species (2n-44), apparently derived from hybridization of a northern *I. engelmannii* entity and an unknown or extinct species, Z (Hoot, Napier, & Taylor 2004), genotype=NNZZ. [= FNA, K; < *I. tuckermanii* – C, F, G]

ISOETACEAE

The following hybrids are known from our area, or nearby:

Isoetes ×*altonharvillii* Musselman & Bray [*I. engelmannii* × *valida*]. Known from Mountains, Piedmont, and Coastal Plain of VA. [= K]
Isoetes ×*bruntonii* Knepper & Musselman [*I. engelmannii* × *hyemalis*]. Known from Coastal Plain of VA. [= K]
Isoetes ×*fairbrothersii* Montgomery & Taylor [*I. engelmannii* × *macrospora*]. Known from s. NJ. [= K]
Isoetes ×*carltaylorii* Musselman [*I. engelmannii?* × *riparia*]. Known from Coastal Plain of VA.

LOMARIOPSIDACEAE Alston 1956 (Sword Fern Family)

A family of 4 genera and about 70 species (following the circumscription of Smith et al. 2006).

Nephrolepis Schott 1834 (Sword Fern)

A genus of about 25-30 species, widespread in tropical and subtropical areas.

1 Pinnae 2.5-23 cm long; midleaf pinnae with veins densely pubescent on the upper surface; pinnae not distinctly auricled at base.. ***N. biserrata***
1 Pinnae 1-7.3 cm long; midleaf pinnae with veins glabrous on the upper surface; pinnae auricled at base on the side towards the leaf tip.
  2 Scales on the upper surface of the rachis bicolored (pale but distinctly darker at the base); pinnae attachments spaced 5-12 mm apart; rhizomes bearing spherical tubers (not always present)..... ***N. cordifolia***
  2 Scales on the upper surface of the rachis concolored (pale to reddish brown throughout); pinnae attachments spaced 7-21 mm apart; rhizomes not bearing tubers..... ***N. exaltata***

* ***Nephrolepis biserrata*** (Swartz) Schott, Giant Sword Fern. Cp (LA): disturbed suburban areas; rare, native of the tropics and subtropics of both hemispheres. [= FNA, K]
* ***Nephrolepis cordifolia*** (Linnaeus) K. Presl, Narrow Sword Fern. Cp (FL): moist places; rare, probably not native in FL. Pantropical, the original distribution obscure. [= FNA, K, S]
Nephrolepis exaltata (Linnaeus) Schott, Boston Fern. Cp (FL): epiphytic or terrestrial in a range of open to shaded moist habitats; rare, in our area perhaps only introduced. Panhandle and ne. FL south to s. FL; West Indies; Hawaii and other Pacific islands. [= FNA, S; > *N. exaltata* ssp. *exaltata* – K]

LYCOPODIACEAE Mirbel 1802 (Clubmoss Family)

A family of 10-15 genera and about 400 species. Lycopodiaceae, along with Selaginellaceae and Isoetaceae, now appear to be only distantly related to other extant pteridophytes and seed plants (Pryer et al. 2001). The division of North American *Lycopodium* into three or more genera has been strongly advocated by Wagner & Beitel (1992), Wagner & Beitel in FNA (1993), Haines (2003a), and nearly all other recent authors. The traditionally broad *Lycopodium* appears to include a number of natural groups which are strikingly different from one another and have constituted separate lineages for tens to hundreds of millions of years. These natural groups are separable by numerous morphological, developmental, and anatomical characters, karyotype, and inability to hybridize. Wagner & Beitel divide *Lycopodium* of our area into six genera in three subfamilies, as follows: *Huperzia* in Subfamily Huperzioideae, *Lycopodium* and *Diphasiastrum* in Subfamily Lycopodioideae, and *Lycopodiella, Palhinhaea,* and *Pseudolycopodiella* in Subfamily Lycopodielloideae. Haines (2003a) further divides *Lycopodium* into 3 genera: *Dendrolycopodium*, *Spinulum*, and *Lycopodium* s.s. The reasoning behind this division is very strong, and it is here followed. Profound differences in anatomy, morphology, reproduction, gametophyte morphology, and karyotype support this separation. The chromosome numbers of our genera: *Dendrolycopodium* (x=34), *Diphasiastrum* (x=23), *Huperzia* (x=67, 68), *Lycopodiella* (x=78), *Lycopodium* (x=34), *Palhinhaea* (x=55), *Pseudolycopodiella* (x=35), and *Spinulum* (x=34). Øllgaard in Kramer & Green (1990) and Wikström & Kenrick (2000) follow a somewhat broader coarse, recognizing 3 genera for our species (corresponding to the subfamilies of Wagner & Beitel 1992), and recognizing as sections the genera of Wagner & Beitel (1992). Øllgaard states that the "genera are very distinct, and also the sections within *Lycopodiella* and *Lycopodium* seem to represent ancient, independent evolutionary lines." Wikström & Kenrick (2000, 2001) suggest that the phylogenetic separation of *Lycopodium* (including *Diphasiastrum*) and *Lycopodiella* (including *Pseudolycopodiella* and *Palhinhaea*) occurred at least as long ago as the early Jurassic (208 million years before present), and the divergence of *Huperzia* from *Lycopodium* and *Lycopodiella* still longer ago. References: Lellinger (1985); Mickel (1979); Wagner and Beitel (1992); Beitel (1979); Snyder & Bruce (1986); Wagner & Beitel in FNA (1993b); Øllgaard in Kramer & Green (1990); Wikström & Kenrick (2000, 2001); Øllgaard (1987); Haines (2003a). Key based in part on Haines (2003a).

1 Leafy stems erect, simple or dichotomously branched, the ultimate branches vertically oriented; sporophylls like the sterile leaves or only slightly reduced, in annual bands along the stem; vegetative reproduction by leafy gemmae near the stem apex; [subfamily *Huperzioideae*]***Huperzia***
1 Leafy stems prostrate or erect, if erect then generally branched, the ultimate branches spreading (horizontal) or ascending; sporophylls differing from sterile leaves, either broader and shorter, or more spreading, aggregated into terminal cones; lacking vegetative reproduction by gemmae; [subfamily *Lycopodioideae*].
  2 Leaves herbaceous, pale or yellow-green, dull, deciduous; principal leafy stems creeping (except erect and repeatedly branched in *Palhinhaea*); rhizome dying back annually to an underground vegetative tuber at apex; spores rugulate; [of wetlands, mostly on moist or wet sands or peats]; [subfamily *Lycopodielloideae*].
    3 Upright shoots repeatedly branched; strobili nodding at the ends of the branches; [known to occur from se. SC southward]... ***Palhinhaea***
    3 Upright shoots not branched; strobili erect on upright shoots; [widespread in our area].

4 Leaves of the prostrate stems 0.5-1.2 mm wide, ciliate-toothed or not toothed; leaves of the erect stem many, overlapping, spiral; leaves of the strobilus (sporophylls) resembling leaves of the prostrate and upright stems in size and shape; upright stems 1.5-15 mm in diameter (including the leaves) ..... ***Lycopodiella***

4 Leaves of the prostrate stems 1.3-2.1 mm wide, not toothed; leaves of the erect stem few, not overlapping, whorled; leaves of the strobilus (sporophylls) much reduced relative to leaves of the prostrate and upright stems; upright stems 1.5-3 mm in diameter (including the leaves) ..... ***Pseudolycopodiella***

2 Leaves rigid, bright to dark green, shiny, evergreen; principal leafy stems mainly erect, treelike, fanlike, or creeping (if creeping, then the leaves with elongate, hyaline hair-tips); rhizome perennial, elongate, surficial or subterranean; spores reticulate; [of uplands, mostly in moist to dry soils].

5 Branches 1-5 mm wide (including the leaves), compressed to quadrangular, with 4 ranks of leaves; branching of strobilus stalks dichotomous ..... ***Diphasiastrum***

5 Branches 4-12 mm wide, terete (to somewhat compressed in *Dendrolycopodium obscurum*), with 6 or more ranks of leaves; branching of strobilus stalks (when present), pseudomonopodial (falsely appearing to have a main axis from which branches arise).

6 Strobili borne on elongate, sparsely leafy peduncles borne at the tips of leafy, ascending branches; leaves with attenuate, hyaline hair-tips ..... ***Lycopodium***

6 Strobili sessile, borne directly above densely leafy portions of upright branches; leaves acuminate to acute.

7 Erect leafy stems 3-8 mm in diameter (including the leaves), treelike or fanlike, with a definite main axis; leaves acute at the apex; horizontal shoots subterranean, without winter bud constrictions ..... ***Dendrolycopodium***

7 Erect leafy stems 10 mm or more in diameter (including the leaves), branched 1-4 × sub-dichotomously; leaves with a 0.4-1.0 mm long stiff spinule; horizontal shoots at or near the ground surface, with winter bud constrictions ..... ***Spinulum***

Dendrolycopodium A. Haines 2003 (Tree-clubmoss)

A genus of 4 species, temperate and subarctic. Haines (2003a) makes the case for this genus as distinct from *Lycopodium* s.s. and other relatives. References: Wagner & Beitel in FNA (1993b); Wagner, Beitel, & Moran (1989); Hickey (1977); Øllgaard in Kramer & Green (1990); Haines (2003a)=Z.

1 Leaves of the main vertical axis spreading (30-90 degree angle to stem) in the vicinity of the lower lateral branches, prickly to the touch; branchlets round in cross-section, the 6 ranks of leaves (2 lateral ranks, 2 adaxial ranks, and 2 abaxial ranks) equal in length and spreading to ascending ..... ***D. dendroideum***

1 Leaves of the main vertical axis appressed (15-30 degree angle to stem) in the vicinity of the lower lateral branches, soft to the touch; branchlets slightly to strongly dorsiventrally flattened in cross-section, the 6 ranks of leaves (4 lateral ranks, 1 adaxial rank, 1 abaxial rank) round or slightly to very unequal, the abaxial leaves more appressed and mostly shorter than (to equal to) the spreading lateral leaves.

2 Abaxial leaves of the horizontal branchlets about one half to two thirds as long as the lateral leaves; leaves of the abaxial and adaxial ranks generally appressed to the branchlet, the lateral 4 ranks spreading at a (27-) ca. 40 (-59) degree angle from the branchlet, thus the branchlet and leaves together ca. 6-9 mm wide ..... ***D. obscurum***

2 Abaxial leaves of the horizontal branchlets about the same length as the lateral leaves; leaves of all the ranks spreading at a (21-) ca. 27 (-36) degree angle from the branchlet, thus the branchlet and leaves together 3.5-6 (-7) mm wide ..... ***D. hickeyi***

Dendrolycopodium dendroideum (Michaux) A. Haines, Tree Ground-pine, Round-branch Clubmoss, Prickly Tree-clubmoss. Mt (NC, VA): openings, grassy balds, high elevation spruce-fir and northern hardwood forests; rare. July-September. The northernmost of the *L. obscurum* complex, ranging from n. Québec and Newfoundland west to AK, south to w. NC, MO, MN, SD, CO, MT, ID, and WA; also in Asia. [= Z; < *Lycopodium obscurum* var. *dendroideum* (Michaux) D.C. Eaton – RAB, F, G, WV; = *Lycopodium dendroideum* Michaux – FNA, K, W; < *L. obscurum* – C]

Dendrolycopodium hickeyi (W.H. Wagner, Beitel, & R.C. Moran) A. Haines, Pennsylvania Ground-pine, Hickey's Tree-clubmoss. Mt (KY, NC, VA): grassy balds, bog margins, forest openings; rare. July-September. N. Québec and Newfoundland west to MN, south to NJ, sw. NC, and n. IN. [= Z; < *Lycopodium obscurum* var. *dendroideum* (Michaux) D.C. Eaton – RAB, F, G, WV; = *Lycopodium hickeyi* W.H. Wagner, Beitel, & R.C. Moran – FNA, K; = *Lycopodium obscurum* var. *isophyllum* Hickey – W; < *L. obscurum* – C]

Dendrolycopodium obscurum (Linnaeus) A. Haines, Common Ground-pine, Flat-branched Tree-clubmoss. Mt, Pd (GA, KY, NC, SC, VA), Cp (NC, SC, VA), Ip (KY): acidic forests; common (uncommon in Piedmont, Coastal Plain, and Interior Low Plateau). July-September. The southernmost of the *L. obscurum* complex, ranging from Nova Scotia and New Brunswick west to MI and WI, south to n. GA, n. AL, and IN. [= Z; = *Lycopodium obscurum* Linnaeus – FNA, K; = *Lycopodium obscurum* var. *obscurum* – RAB, F, G, W, WV; < *L. obscurum* – C, S]

Diphasiastrum Holub 1975 (Flat-branched Clubmoss, Running Cedar)

A genus of about 15-20 species, mostly north temperate and subarctic. This group is sometimes treated as *Lycopodium* section *Complanata* (Øllgaard in Kramer & Green 1990, Øllgaard 1987, Wikström & Kenrick 2000). References: Wagner & Beitel in FNA (1993b); Haines (2003a)=Z; Øllgaard in Kramer & Green (1990); Wikström & Kenrick (2000).

1 Foliage dark green, not glaucous; horizontal branchlets 2-4 mm wide (including the leaves); branchlets without conspicuous annual constrictions; rhizomes 0-1 cm deep (which can be determined by pulling up a single upright shoot – the depth to rhizome is approximately the length of the white portion of the vertical stem); abaxial rank of leaves shorter than lateral ranks (thus the branchlets flat in cross-section). ..... ***D. digitatum***

1 Foliage blue-green, glaucous; horizontal branchlets 1-2 mm wide (including the leaves); branchlets with conspicuous annual constrictions; rhizomes (1-) 5-12 cm deep; abaxial rank of leaves as long as lateral ranks (thus the branchlets more-or-less square in cross-section) ..... ***D. tristachyum***

Diphasiastrum digitatum (Dillenius ex A. Braun) Holub, Common Running-cedar, Fan Ground- pine. Mt (GA, KY, NC, SC, VA), Pd, Cp (GA, KY, NC, SC, VA): dry to mesic, usually acid forests and openings, especially common in disturbed sites, such as successional pine forests; common. July-September. Widespread in e. North America. Hickey & Beitel (1979) and Holub (1975a & 1975b) explain the nomenclatural decision to accept the epithet *'digitatum'* over the more familiar *'flabelliforme.'* [= FNA, Z; = *Lycopodium flabelliforme* (Fernald) Blanch – RAB, S, WV; = *Lycopodium digitatum* Dillenius ex A. Braun – C, K, W; = *Lycopodium complanatum* Linnaeus var. *flabelliforme* Fernald – F, G]

Diphasiastrum tristachyum (Pursh) Holub, Blue Running-cedar, Ground-cedar. Mt (GA, KY, NC, SC, VA), Pd (NC, VA), Ip (KY), Cp (VA): dry forests, glades, balds, barrens, forest openings; uncommon (rare in Piedmont, Coastal Plain, and Interior Low Plateau). July-September. Widespread in ne. North America, south in the mountains to nw. SC, ne. GA, and AL. [= FNA, Z; = *Lycopodium tristachyum* Pursh – RAB, C, F, G, K, S, W, WV]

Diphasiastrum ×*habereri* (House) Holub [*D. digitatum* × *tristachyum*; is known from widely scattered localities in our area. [= FNA, Z; = *Lycopodium* × *habereri* House – K; = *L.* ×*haberi* – WV, orthographic error]

Huperzia Bernhardi (Firmoss, Clubmoss)

A genus of about 10-15 species, north temperate and arctic (and tropical mountains of Asia). Within the Lycopodiaceae, *Huperzia* has "an isolated position", basal to the remainder of the family, and is sometimes separated in a separate family, the Huperziaceae (Haines 2003a). References: Wagner & Beitel in FNA (1993b); Haines (2003a)=Z; Øllgaard in Kramer & Green (1990); Wikström & Kenrick (2000).

Identification notes: Several hybrids are known from our area; they usually occur in intermediate habitats (such as in thin soil at the base of cliffs) and generally are found in proximity to both parents, but sometimes occur in the absence of one or both parents. Hybrids can be recognized by their intermediate morphology.

1 Leaves oblanceolate, the apical portion toothed with 1-8 large, irregular teeth; leaves 6-15 mm long, 1.0-2.5 mm wide; stomates on lower leaf surface only (visible at 10× or preferably 20-40× magnification); spores 23-29 µm in diameter; [mainly of forest soils] ..... ***H. lucidula***
1 Leaves lanceolate (awl-shaped), margins not toothed, or minutely toothed in the apical portion only with 1-3 low teeth; leaves 3-9 mm long, 0.6-1.3 mm wide; stomates on both leaf surfaces (visible at 10× or preferably 20-40× magnification); spores 29-38 µm in diameter; [mainly of rock outcrops].
  2 Leaves spreading, (3-) 5-9 mm long, ca. 1 mm wide, usually sparsely toothed; stomates relatively few on the upper leaf surface (1-25 on each side of midrib); [of outcrops at low to medium elevations] ..... ***H. porophila***
  2 Leaves ascending to spreading, 2-7.5 mm long, 0.6-0.8 (-1.0) mm wide, not toothed (though sometimes with minute, single cell bumps); stomates relatively many on the upper leaf surface (30-90 on each side of midrib); [of high to medium elevations].
    3 Leaves dimorphic, those at the base longer and spreading wider from the shoot axis than those from the apical portion of the plant; gemma-bearing branches borne throughout the apical portion of mature shoots; lateral leaves of gemmae 0.5-1.1 mm wide . ***H. appressa***
    3 Leaves relatively monomorphic; gemma-bearing branches, if present at all, borne in 1 pseudowhorl at the apex of seasonal growth; lateral leaves of gemmae 1.3-2.5 mm wide ..... ***[H. selago]***

Huperzia appressa (Desvaux) A. Löve & D. Löve, Appalachian Firmoss. Mt (GA, NC, VA): rock outcrops at high elevations (very rarely at middle elevations), rarely also in seepage or along banks of small streams at high elevations, and in fens (on hummocks); rare. June-August. N. Québec and Newfoundland west to Ontario, MI, and MN and south along the Appalachians to w. NC, e. TN, and ne. GA. This species was named in 1992 as *H. appalachiana* (Beitel & Mickel 1992), but *H. appressa* (Desvaux) A. Löve & D. Löve is an older combination that applies to the same species (Haines 2003a). Though morphologically only subtly differentiated from the circumboreal *H. selago* (for distinctions see Beitel & Mickel 1992; Brunton, Wagner, & Beitel 1992; Haines 2003a), the case for the distinctness of *H. appressa* is confirmed by the production of sterile (abortive-spored) hybrids where it co-occurs with *H. selago*. [= Z; = *H. appalachiana* Beitel & Mickel – FNA, K; < *Lycopodium selago* Linnaeus – RAB, S, W; >< *Lycopodium selago* Linnaeus var. *appressum* (Desvaux) Petrovic – C, F; >< *Lycopodium selago* var. *selago* – C, G]

Huperzia lucidula (Michaux) Trevisan, Shining Firmoss, Shining Clubmoss. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, VA), Ip (KY), Cp (VA): moist forests and ravines; common (uncommon in Piedmont, Coastal Plain, and Interior Low Plateau). June-August. Widespread in ne. North America, south to nw. SC, n. GA, TN, IN, IL, and MO. [= FNA, K, Z; = *Lycopodium lucidulum* Michaux – RAB, C, F, G, S, W, WV]

Huperzia porophila (Lloyd & Underwood) Holub, Rock Clubmoss. Mt (GA, KY, NC, SC, VA), Ip (KY): rock outcrops and cliffs, especially in the spray of waterfalls, at low to medium elevations; rare. June-August. Centered in the sedimentary Central Appalachians, *H. porophila* ranges from ne. PA, WV, OH, and WI south to NC, TN, ne. GA, nw. AL, and e. MO. Waterway (1986) clarified the distinctions between *H. porophila* and *H. lucidula*. [= FNA, K; = *Lycopodium porophilum* Lloyd & Underwood – RAB, C, F, S, W, WV; < *Lycopodium selago* var. *patens* (Palisot de Beauvois) Desvaux – G, misapplied]

Huperzia selago (Linnaeus) Bernhardi ex Martius & Schrank, Northern Firmoss. Circumboreal, ranging south in North America to NY, New England, and the Great Lakes region, and disjunct to OH. It could easily occur as a disjunct in our area, and should be sought in the high mountains. [= FNA, Z; >< *Lycopodium selago* Linnaeus var. *appressum* (Desvaux) Petrovic – C, F; >< *Lycopodium selago* var. *selago* – C, G; > *Huperzia selago* (Linnaeus) Bernhardi ex Martius & Schrank var. *selago* – K]

Huperzia ×*bartleyi* (Cusick) Kartesz & Gandhi [*H. lucidula* × *porophila*]. Reported for NC by Waterway (1986). This hybrid can be told from its parents by the presence of stomates on both surfaces of the leaf (unlike *H. lucidula*), but their marked lower density on the upper surface (unlike *H. porophila*). [= K, Z]

Huperzia ×*protoporophila* A. Haines [*H. appressa* × *lucidula*]. Known from Chimney Rock Park, Rutherford County (the lowest elevation occurrence of *H. appressa* in NC) and from Roan Mountain, Mitchell County, and Grandfather Mountain, Avery County. Expected at other cliff bases where the two parents are in proximity. This hybrid can be told from its parents by the presence of stomates on both surfaces of the leaf (unlike *H. lucidula*), but their marked lower density on the upper surface (unlike *H. appressa*). An additional useful character is the distribution of gemma-bearing branches: those of *Huperzia appressa* are abundantly distributed throughout the apical portion of mature plants, while those of the hybrid are confined to 1 or 2 pseudowhorls at the apex of annual growth (i.e., there are large gaps between the pseudowhorls of gemma-bearing branches). [= Z]

Lycopodiella Holub 1964 (Bog Clubmoss)

A genus of about 15-20 species, temperate and tropical. Additional research on this genus in our area is needed. Two fertile tetraploid species were recently named from MI (Bruce, Wagner, & Beitel 1991), and additional cryptic or semicryptic species may be found in the Southeastern Coastal Plain. This group is variously treated as genus *Lycopodiella*, or as *Lycopodiella* section *Lycopodiella* (Øllgaard in Kramer & Green 1990, Wikström & Kenrick 2000). References: Wagner & Beitel in FNA (1993b); Øllgaard in Kramer & Green (1990); Wikström & Kenrick (2000); Haines (2002, 2003a, 2003b)=Z. [also see *Pseudolycopodiella*]

Identification notes: Species of this genus are difficult to identify. They often grow together; it is not uncommon to find two or more species at a single site in the Coastal Plain. Hybrids occur. Juvenile plants, resprouting in spring or after fire, are especially difficult to identify. In contrast to the other species, *Pseudolycopodiella caroliniana* and, to a lesser degree, *L. prostrata*, are dorsiventrally flattened (or apparently distichous), but it seems that juvenile sprouts of all species are somewhat flattened.

1 Leaves of the horizontal shoots entire (rarely those toward the shoot apex with a few teeth); horizontal shoots, excluding the leaves, 0.5-0.9 (-1.0) mm in diameter; each horizontal shoot segment commonly producing a single upright shoot; [in our area, a plant of the Mountains] ..... ***L. inundata***

1 Leaves of the horizontal shoots toothed (except when inundated); horizontal shoots, excluding the leaves, 1.5-5.0 mm in diameter; each horizontal shoot segment producing 2-6 upright shoots; [collectively primarily of the Coastal Plain, with some disjunctions inland into the Piedmont and Mountains].

2 Fertile leaves (sporophylls) 2.9-5.0 (-5.2) mm long, appressed at maturity, entire or with short teeth < 0.3 mm long; strobili 3-6 mm in diameter at maturity ..... ***L. appressa***

2 Fertile leaves (sporophylls) 5.5-9 mm long, spreading, with 1-8 teeth per margin, some or all of the teeth exceeding 0.3 mm in length; strobili 10-20 mm in diameter at maturity.

3 Prostrate stems arching, not in contact with the ground (and rooting) all along their length, 8-11 mm wide (including leaves), the stem (stripped of leaves) 2-4 mm in diameter; leaves of the prostrate stem of one size and shape, spreading to ascending, 5-7 mm long, 0.5-0.7 mm wide; erect stems many, equally spaced along the prostrate stems, progressively shorter and sterile toward the apex of the prostrate stems ..... ***L. alopecuroides***

3 Prostrate stems creeping, in contact with the ground (and rooting) all along their length, 12-19 mm wide (including leaves), the stem (stripped of leaves) 1-2.2 mm in diameter; leaves of the prostrate stems dimorphic, spreading to reflexed, the upper leaves smaller (4-5 mm long, 0.4-0.6 mm wide) than the lateral leaves (7-8 mm long, 0.7-1.8 mm wide); erect stems few, clustered well behind the apex of the prostrate stems, mostly fertile and subequal in length ..... ***L. prostrata***

Lycopodiella alopecuroides (Linnaeus) Cranfill, Foxtail Clubmoss. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): savannas, seepages, and other wet, sandy sites; common (rare in Mountains and Piedmont). July-September. Primarily Southeastern Coastal Plain: se. MA south to FL and west to se. TX, and disjunct in the Cumberland Plateau of KY, TN, and VA, the Allegheny Mountains of WV (Morton et al. 2004), the e. Highland Rim of TN, and in ME (Haines 2001). [= FNA, K, Z; < *Lycopodium alopecuroides* Linnaeus – RAB (also see *L. prostrata*); = *Lycopodium alopecuroides* Linnaeus – C, G, S, W]

Lycopodiella appressa (Chapman) Cranfill, Southern Bog Clubmoss. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC), Ip (KY): savannas, seepages, bogs; common (rare in Mountains, Piedmont, and Interior Low Plateau). July-September. Primarily Southeastern Coastal Plain: se. Newfoundland and MA, south to FL, west to OK, AR, and TX, and disjunct in the mountains of KY, TN, NC, and in sw. MI. [= FNA, K, Z; = *Lycopodium appressum* (Chapman) Lloyd & Underwood – RAB, C, S, W; = *Lycopodium inundatum* Linnaeus var. *bigelovii* Tuckerman – F, G]

Lycopodiella inundata (Linnaeus) Holub, Northern Bog Clubmoss. Mt (KY, NC, VA): gravelly or sandy seepage areas in bogs at middle to high elevations; rare. July-September. A circumboreal species, ranging south in the Appalachians to NC, where it was first found in 1986 (Weakley, *in prep.*). [= FNA, K, Z; = *Lycopodium inundatum* Linnaeus – C, W, WV; = *Lycopodium inundatum* var. *inundatum* – F, G]

Lycopodiella prostrata (Harper) Cranfill, Featherstem Clubmoss, Prostrate Bog Clubmoss. Cp (FL, GA, NC, SC); Pd (GA): savannas, seepages; uncommon. July-September. A Southeastern Coastal plain endemic: se. NC south to FL and west to TX. [= FNA, K; < *Lycopodium alopecuroides* – RAB; = *Lycopodium prostratum* Harper – C, S]

All pairwise combinations of sympatric species form fertile hybrids (only *L. inundata* and *L. prostrata* are entirely allopatric and not known to hybridize). The following hybrids should be expected where the parents grow together.

Lycopodiella alopecuroides × *appressa.* [= *Lycopodiella* ×*copelandii* (Eiger) Cranfill – K, Z; *Lycopodium* ×*copelandii* Eiger]

Lycopodiella alopecuroides × *inundata.* [= *Lycopodiella* ×*robusta* (R.J. Eaton) A. Haines – Z]. See Haines (2002) for additional information.

Lycopodiella alopecuroides × *prostrata.* [= *Lycopodiella* ×*brucei* Cranfill – K; = *Lycopodium* ×*brucei* (Cranfill) Lellinger]

Lycopodiella appressa × *inundata.* [*Lycopodiella* ×*gilmanii* A. Haines – Z]. Earlier tentative reports of *Lycopodiella margueritiae* J.G. Bruce, W.H. Wagner, & Beitel for the Mountains of Virginia are apparently based on this hybrid. See Haines (2003a, 2003b) for additional information. [= *Lycopodiella margueritiae* J.G. Bruce, W.H. Wagner, & Beitel – K, misapplied; = *Lycopodiella* ×*gilmanii* A. Haines – Z]

Lycopodiella appressa × *prostrata.*

Lycopodium Linnaeus 1753 (Running Clubmoss)

A genus of 5-10 species, mainly temperate and subarctic. The fractionation of *Lycopodium* has resulted in the creation of more natural genera, more comparable to those in other groups of plants. References: Wagner & Beitel in FNA (1993b); Wagner, Beitel, & Moran (1989); Hickey (1977); Øllgaard in Kramer & Green (1990); Haines (2003a)=Z. [also see *Dendrolycopodium, Diphasiastrum, Huperzia, Lycopodiella, Palhinhaea, Pseudolycopodiella,* and *Spinulum*]

1 Strobili 2-5, borne on alternate "pedicels" branching from the central "peduncle"; leaves 4-6 mm, spreading to loosely ascending..... ***L. clavatum***

1 Strobili 1 (rarely 2, if then, the 2 strobili not on separate "pedicels," but sessile at the top of the "peduncle"); leaves 3-5 mm long, ascending to appressed ..... ***L. lagopus***

Lycopodium clavatum Linnaeus, Running Clubmoss. Mt (GA, KY, NC, SC, VA), Pd, Cp (VA): openings, balds, roadbanks, open forests; uncommon (rare in Piedmont and Coastal Plain). July-September. Circumboreal, south in e. North America along the Appalachians to NC and n. GA. [= RAB, FNA, K, W, Z; < *L. clavatum* – C, WV]; = *L. clavatum* var. *clavatum* – F, G, S]

Lycopodium lagopus (C. Hartman) G. Zinserling ex Kuzeneva-Prochorova. Mt (WV): high elevation heathlands; rare. Circumboreal, south in North America to c. PA (Rhoads & Klein 1993) and Tucker County, in e. WV (Gottlieb 2002). [= FNA, K, Z; < *L. clavatum* – C, WV; > *L. clavatum* Linnaeus var. *monostachyon* Greville & Hooker – F, G; > *L. clavatum* var. *megastachyon* Fernald & Bissel – F, G; > *L. clavatum* var. *brevispicatum* Peck – F]

Palhinhaea Vasconcellos & Franco 1967 (Nodding Clubmoss)

A genus of 10-15 species, tropical and subtropical. This group is variously treated as the genus *Palhinhaea* or as *Lycopodiella* section *Campylostachys* (Øllgaard in Kramer & Green 1990, Wikström & Kenrick (2000). References: Wagner & Beitel in FNA (1993b); Øllgaard in Kramer & Green (1990); Wikström & Kenrick (2000).

Palhinhaea cernua (Linnaeus) Vasconcellos & Franco, Nodding Clubmoss, Staghorn Clubmoss. Cp (FL, GA, SC): wet savannas, ditches and other disturbed moist areas; uncommon (rare in SC). This species is pantropical, occurring in the both the Neotropics and the Paleotropics. Its occurrence in our area may be adventive. [= FNA; =? *Lycopodiella cernua* (Linnaeus) Pichi Sermolli var. *cernua* – K; = *Lycopodium cernuum* Linnaeus – S]

Pseudolycopodiella Holub 1983 (Carolina Bog Clubmoss)

A genus of about 12 species, sub-cosmopolitan. This group has often been treated as section of *Lycopodium* (or of *Lycopodiella*); it appears to warrant status as a genus separate from *Lycopodiella*. In addition to the morphologic distinctions, this species has considerable anatomical differences, a different base chromosome number than the four species of *Lycopodiella* (x = 35 vs. x = 78), and does not hybridize with *Lycopodiella* (Wagner & Beitel 1992). Øllgaard in Kramer & Green (1990) and Wikström & Kenrick (2000) retain it as *Lycopodiella* section *Carolinianae*. References: Wagner & Beitel in FNA (1993b); Haines (2003a)=Z; Øllgaard in Kramer & Green (1990); Wikström & Kenrick (2000).

Pseudolycopodiella caroliniana (Linnaeus) Holub, Carolina Bog Clubmoss, Slender Clubmoss. Cp (FL, GA, NC, SC, VA): savannas, seepages; uncommon, rare in VA. July-September. This species occurs in se. North America, the West Indies, and is widespread in the Southern Hemisphere; in North America, it ranges from MA south to FL and west to e. TX. [= FNA, Z; = *Lycopodium carolinianum* Linnaeus – RAB, C, F, G, S; > *Lycopodiella caroliniana* (Linnaeus) Pichi Sermolli var. *caroliniana* – K]

Spinulum A. Haines (Bristly Clubmoss)

A genus of 3 species, north temperate and subarctic. References: Wagner & Beitel in FNA (1993b); Wagner, Beitel, & Moran (1989); Hickey (1977); Øllgaard in Kramer & Green (1990); Haines (2003a)=Z.

Spinulum annotinum (Linnaeus) A. Haines, Stiff Clubmoss, Bristly Clubmoss. Mt (VA): high elevation hardwood or coniferous forests; uncommon (NC Watch List). August-October. A circumboreal species, south in North America to NJ and MN, and in the Appalachians to WV, sw. VA, and e. TN (Blount County). Two varieties have been considered to reach our area in VA: var. *acrifolium* Fernald and var. *annotinum*. They are doubtfully distinct but need further study. This species was reported for NC by Lellinger (1985) and FNA, and is apparently indicated as occurring in NC on the range map in Mickel (1979); there is apparently no documentation for these reports, though the species occurs in Grayson County, VA, a county adjacent to NC. There is also an old collection from the Great Smoky Mountains of TN. Its occurrence in NC is certainly plausible, and it should be sought. [= Z; = *Lycopodium annotinum* Linnaeus – C, FNA, K, W; > *L. annotinum* var. *acrifolium* Fernald – F, G, WV; > *L. annotinum* var. *annotinum* – F, G, WV; > *L. annotinum* var. *pungens* (La Pylaie) Desvaux – WV]

LYGODIACEAE C. Presl 1845 (Climbing Fern Family)

A family with a single genus and about 40 species, of tropical and temperate regions, particularly equatorial and south temperate. Sometimes included in the Schizaeaceae, but the relationship is remote and unclear. References: Nauman in FNA (1993b).

Lygodium Swartz 1800 (Climbing Fern)

A genus of about 40 species, mostly tropical, with a few temperate species.

1 Sterile pinnae palmately lobed into 4-8 smooth to undulate lobes ..... ***L. palmatum***
1 Sterile pinnae pinnately divided into numerous serrate pinnules ..... ***L. japonicum***

* ***Lygodium japonicum*** (Thunberg) Swartz, Japanese Climbing Fern. Cp (FL, GA, NC, SC), Pd (GA, NC, SC): disturbed areas; rare, native of Asia. June-September. Rare in our area, but common and weedy in FL, the leaves (up to 30 m in length!) climbing into the canopy of trees in swamp forests and other wet habitats. [= RAB, FNA, K, S]

Lygodium palmatum (Bernhardi) Swartz, American Climbing Fern, Hartford Fern. Mt (GA, KY, NC, SC, VA), Ip (KY), Pd (NC, SC, VA), Cp (NC, SC, VA): bogs, moist thickets, swamp forests, sandstone outcrops, roadside ditches and roadbanks, in strongly acid soils; uncommon. July-September. Widespread in e. North America, but uncommon or rare in most of its range. The species is perhaps most common in the Cumberland Plateau of KY and TN. Garrison (1992) discusses two forms of the species, "one with long appressed hairs scattered over the lower (abaxial) side of the sterile leaflets and the other relatively hair-free." The two forms appear to be geographically differentiated, the pubescent form predominating south and west of Maryland, the glabrous form occurring primarily in the Northeast. Both forms are present in our area. Further research is needed to determine the taxonomic significance of this variation in pubescence. [= RAB, C, F, FNA, G, K, S, W, WV]

MARSILEACEAE Mirbel 1802 (Water-clover Family)

A family of 3 genera and about 55-75 species, nearly cosmopolitan. References: Johnson in FNA (1993b); Kramer in Kramer & Green (1990).

1 Leaves clover-like, the 4 cuneate, obovate or wedge-shaped leaflets borne at the summit of the petiole; sporocarps ovoid ..... ***Marsilea***
1 Leaves grass-like, linear, the leaf blade absent, the petiole narrowly winged; sporocarps spherical ..... ***Pilularia***

Marsilea Linnaeus 1753 (Water-clover)

A genus of 50-70 species, nearly cosmopolitan. References: Jacono & Johnson (2006)=Z; Johnson in FNA (1993b); Kramer in Kramer & Green (1990); Knepper, Johnson, & Musselman (2002). Key based in part on Z and FNA.

Identification notes: The **raphe** is the portion of the peduncle adnate to the sporocarp. The peduncle ends in a blunt tooth, the **proximal tooth**. Further up on the sporocarp is a second tooth, the **distal tooth**.

1 Leaves strongly bicolored (pale green towards the base of each of the 4 leaflets, darker green towards the tip); aquatic forms with a swollen air bladder just below the leaf ..... ***M. mutica***
1 Leaves unicolored.
  2 Roots present (1-3) between the nodes, as well as at the nodes.
    3 Distal tooth 0.3-0.8 mm long; sporocarps 3.5-5.0 mm long ..... ***M. minuta***
    3 Distal tooth absent or < 0.2 mm long; sporocarps 4.5-6.0 mm long ..... ***M. quadrifolia***
  2 Roots present only at the nodes
    4 Distal tooth absent or a very low bump ..... ***M. macropoda***
    4 Distal tooth 0.4-1.2 mm long, sharply acute to pointed, often hooked ..... ***M. vestita***

* ***Marsilea macropoda*** Engelmann ex A. Braun, Bigfooted Water-clover. Cp (AL): {habitat}; rare, native of s. TX and Mexico. Reported as introduced eastward in AL and c. and s. peninsular FL. [= FNA, K, Z]

* ***Marsilea minuta*** Linnaeus, Small Water-clover. Cp (FL), Pd (GA): lakes and streams; rare, native of the Old World. Known in North America from AL, FL, GA. [= FNA, Z; *M. crenulata* Desv.; *M. crenata* Presl]

* ***Marsilea mutica*** Mettenius, Nardoo, Australian Water-clover. Cp, Mt (VA), Pd (GA, SC, VA): ditches, ponds; rare, native of Australasia. Apparently spreading rapidly in VA. [= Z]

* ***Marsilea quadrifolia*** Linnaeus, European Water-clover. Pd (NC), Ip (KY): shallow water of artificial impoundment; rare; native of Europe. Not seen fertile in NC. First reported for our area in 1992; sold in garden stores as an aquatic to be grown in water gardens, and likely to be encountered more widely in the Ffuture. [= C, F, FNA, G, K]

* ***Marsilea vestita*** Hooker & Greville, Hairy Water-clover. Cp (FL): wet ditches, old fields; rare, native of w. North America. AL?, FL, MS. [= FNA, K, Z]

Pilularia Linnaeus 1753 (Pillwort)

A genus of 3-6 species, nearly cosmopolitan. References: Dennis & Webb (1981); Kramer in Kramer & Green (1990).

Identification notes: It lacks a leaf-blade, the 1-8 cm long petiole being narrowly winged, appearing rather like an *Isoetes* or *Juncus* leaf. In vegetative condition, it may be recognized as a "fern" by the typical coiled ("fiddlehead") development of young leaves. The primary rhizome produces individual "fronds" at nodes, a short rhizome branch at each node also produces "fronds."

Pilularia americana A. Braun, American Pillwort. Pd (GA, SC): vernal pools and seepage areas on granitic flatrocks; rare. This peculiar plant has a puzzling distribution, being known from several disjunct regions: OR to s. CA; NE to TX; AR; TN; and GA to SC. The fragmented distribution may be at least partly explainable by the inconspicuous nature of the plant. First reported for SC in 1993 (J. Allison, pers. comm.). [= FNA, K, S]

ONOCLEACEAE Pichi Sermolli 1970 (Sensitive Fern Family)

A family of 4 genera and 5 species, of north temperate regions. The family as here circumscribed is monophyletic and sister to Blechnaceae (Smith et al. (2006). References: Smith et al. (2006)

1 Sterile leaves pinnate-pinnatifid, 6-25 dm tall, broadest toward the tip; fertile leaves 1-pinnate; veins free; rhizomes of 2 types, the slender, creeping rhizomes leafless, giving rise at intervals to extremely stout, vertical rhizomes which bear a cluster of many leaves ..... ***Matteucia***
1 Sterile leaves pinnatifid, 2-10 dm tall, broadest near the base; fertile leaves 2-pinnate; veins netted; rhizomes all slender and creeping, the leaves borne scattered along the rhizome ..... ***Onoclea***

Matteuccia Todaro 1866 (Ostrich Fern)

A genus of 1 species, north temperate in distribution. Two other species formerly included in *Matteucia* (or sometimes in *Onoclea*) are better treated in the genus *Pentarhizidium* Hayata (Gastony & Ungerer 1997). References: Johnson in FNA (1993b); Kramer et al. in Kramer & Green (1990).

Matteuccia struthiopteris (Linnaeus) Todaro *var.* ***pensylvanica*** (Willdenow) C.V. Morton, Ostrich Fern. Mt, Pd (VA): alluvial forests and calcareous wetlands; rare (VA Rare). The species is circumboreal; the North American var. *pensylvanica* ranges from Newfoundland west to AK, south to VA, MO, SD, and British Columbia. The North American var. *pensylvanica* is separated from the Eurasian var. *struthiopteris* on the basis of its concolorous rhizome scales (vs. bicolorous scales) and less truncate pinna lobes. *Matteuccia* stores starch in its persistent petiole bases. [= FNA, G; < *M. struthiopteris* – C, K; = *Pteretis pensylvanica* (Willdenow) Fernald – F; = *M. pensylvanica* (Willdenow) Raymond – WV]

Onoclea Linnaeus 1753 (Sensitive Fern)

A genus of 1 species, of temperate e. North America and e. Asia. References: Johnson in FNA (1993b); Kramer et al. in Kramer & Green (1990).

Onoclea sensibilis Linnaeus *var.* ***sensibilis***, Sensitive Fern, Bead Fern. Cp (FL, GA, KY, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY): marshes, swamps, wet disturbed places; common. May-June. The species ranges from Newfoundland west to MN and CO, south to FL, TX, and CO; also in e. Asia. Var. *sensibilis* is North American; var. *interrupta* is Asian. The recognition of two varieties is supported by molecular evidence. The genus is monotypic. The specific epithet and common name refer to the fact that the fronds wither at the first touch of frost, not that they respond to touch. The peculiar fertile leaves (with their brown, beadlike, fertile pinnules) are collected for use in dried arrangements. The expanded, persistent petiole bases store starch. [< *O. sensibilis* – RAB, C, F, FNA, G, K, S, W, WV]

OPHIOGLOSSACEAE (R. Brown) Agardh 1822 (Adder's-tongue Family)

A family of 7-8 genera and about 75-115 species. The Ophioglossaceae is only distantly related to the leptosporangiate ferns; Pryer et al. (2004) indicate that it is most closely related to Psilotaceae. References: Wagner & Wagner in FNA (1993b); Wagner in Kramer & Green (1990).

1 Sterile portion of the leaf simple, unlobed; fertile stalks unbranched, the sporangia embedded in a linear spike ..... ***Ophioglossum***
1 Sterile portion of the leaf blade pinnate, pinnatifid, or more divided; fertile stalks branched, the sporangia sessile or stalked.
2 Fertile stalk joined to stalk of sterile leaf blade near the rhizome, far below the base of the leaf blade, and usually at or below the surface of the ground; leaves evergreen ..... ***Sceptridium***
2 Fertile stalk joined to stalk of sterile leaf blade near the base of the leaf blade, far above the rhizome, and usually well above the surface of the ground; leaves deciduous.
3 Sterile portion of the leaf blade 1-2-pinnate; plants usually < 20 cm tall; sterile blade fleshy in texture, 1-8 cm long ..... ***Botrychium***

3 Sterile portion of the leaf blade 3-pinnate or even more finely divided; plants (9-) 30-50 cm tall; sterile blade herbaceous in texture, 10-40 cm long ..... ***Botrypus***

Botrychium Swartz 1801 (Moonwort)

A genus of 25-30 species, nearly cosmopolitan, but primarily temperate and concentrated in North America and e. Asia. *Botrychium* as traditionally circumscribed to include *Botrypus* and *Sceptridium* is very heterogeneous (Hauk, Parks, & Chase 2003); I have here accepted the arguments of Hauk (1996), Hauk, Parks, & Chase (2003), and others recommending recognition of the anciently divergent and molecularly and morphologically distinctive segregates as genera. References: Wagner in Kramer & Green (1990); Hauk, Parks, & Chase (2003). [also see *Botrypus* and *Sceptridium*]

1 Sterile pinnae contracted at the base, thus cuneate or wedge-shaped; leaf blades pinnate to nearly simple, 1-6 cm long, 0.3-2 cm wide; pinna margins entire, the apices round; [section *Simplex*] ..... ***B. simplex* var. *simplex***
1 Sterile pinnae (or pinnules of 2-pinnate blades) not contracted at the base, thus oblong or elongate; leaf blades pinnate, pinnate-pinnatifid, or 2-pinnate, 1-8 cm long, 0.8-6 cm wide; pinna or pinnule margins entire, lobed, or incised, the pinna apices round, obtuse, or acute; [section *Lanceolatum*].
  2 Sterile pinnae apices obtuse to round at the apex, their segments (and undivided pinnae) about as long as wide, round, obtuse, or truncate at the apex; leaf blade mostly short-petioled (rarely sessile), the petiole (0-) 1-3 cm long; leaf blade pinnate to pinnate-pinnatifid ..... ***B. matricariifolium***
  2 Sterile pinnae acute at the apex, their segments (and undivided pinnae) at least twice as long as wide, mostly lanceolate, acute at the apex; leaf blade sessile, leaf blade pinnate-pinnatifid to 2-pinnate ..... ***B. lanceolatum* var. *angustisegmentum***

Botrychium lanceolatum (S.G. Gmelin) Angström *var.* ***angustisegmentum*** Pease & A.H. Moore, Lanceleaf Moonwort, Narrow Triangle Moonwort. Mt (NC, VA), Ip (KY): forests and grassy balds; rare. July-August. Var. *angustisegmentum* ranges from Newfoundland and Ontario south to VA, WV, NC, OH, MI, and MN, and in the Rocky Mountains of Canada and MT. Var. *lanceolatum* is widespread in w. North America. The two varieties are genetically distinct (Farrar & Wendel 1996). [= C, F, G, K, W, WV; = *B. lanceolatum* ssp. *angustisegmentum* (Pease & A.H. Moore) R.T. Clausen – FNA]

Botrychium matricariifolium (A. Braun ex Duwell) A. Braun ex W.D.J. Koch, Daisyleaf Moonwort. Mt (KY, NC, VA): forests (often successional) and old fields; uncommon. June-August. Newfoundland and Alberta south to NC, TN, KY, WV, OH, IL, WI, MN, and ND. [= FNA, K, W; = *B. matricariaefolium* – F, G, WV (orthographic variant); > *B. matricariaefolium* var. *matricariaefolium* – C]

Botrychium simplex E. Hitchcock *var.* ***simplex***, Least Moonwort. Mt (NC, VA): forests; rare. May-June. Widespread in n. North America, from Newfoundland and British Columbia south to NJ, VA, NC, MI, IN, WI, IA, SD, WY, CO, NM, UT, NV, and CA. Wagner & Wagner in FNA (1993b) discuss variation within *B. simplex*. Farrar & Wendel (1996) indicate that 3 varieties of *B. simplex* have strong genetic divergence, comparable to that usually distinguishing species. [= C, F, G; < *B. simplex* – FNA, K, W, WV]

Botrypus Richard 1801 (Rattlesnake Fern)

A genus of 1-2 species, of North America (and depending on circumscription) Asia. References: Hauk, Parks, & Chase (2003).

Botrypus virginianus (Linnaeus) Holub, Rattlesnake Fern, Sang-find. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA): in a wide range of fairly dry, mesic, and wet forests, cove forests; common. April-June. Newfoundland and British Columbia south to FL and CA. [= *Botrychium virginianum* (Linnaeus) Swartz – RAB, C, FNA, G, K, W, WV; = *B. virginianum* var. *virginianum* – F; = *Osmundopteris virginiana* (Linnaeus) Small – S]

Ophioglossum Linnaeus 1753 (Adder's-tongue)

A genus of about 25-30 species, nearly cosmopolitan, primarily tropical. References: Lellinger (1985); Wagner in Kramer & Green (1990).

1 Underground stem globose, nearly spherical, 3-11 mm in diameter; fertile spikes commonly with a conspicuous, acute or attenuate sterile portion (apiculum) at its apex; sterile blade 1-4 cm long, 0.5-2.5 cm wide, borne horizontally near the ground ..... ***O. crotalophoroides***
1 Underground stem narrowly cylindrical or irregularly elongate, 2-4 mm in diameter; fertile spikes without a sterile portion at the apex or the sterile portion inconspicuous; sterile blade 0.5-10 cm long, 0.2-5.5 cm wide, borne horizontally, ascending, or vertically.
  2 Sterile blade 0.2-1 cm wide, the polygonal venation areoles usually lacking both smaller areoles and free included veinlets ..... ***O. nudicaule***
  2 Sterile blade (0.5-) 1.2-5 cm wide, the polygonal venation areoles either with smaller areoles or with free included veinlets.
    3 Large areoles of the of the sterile blade subdivided into smaller areoles, further subdivided into smaller areoles and free veinlets; sterile blade apiculate ..... ***O. engelmannii***
    3 Large areoles of the sterile blade subdivided into smaller areoles, which lack free veinlets; sterile blade obtuse or acute.
      4 Sterile blade ovate-lanceolate, the base obtuse to nearly truncate, broadest < ¼ of the way from the base to the apex; primary areoles mostly > 2 mm wide, without included veinlets ..... ***O. petiolatum***
      4 Sterile blade ovate to elliptic, the base cuneate to obtuse, broadest between one quarter and one half of the way from the base to the tip; primary areoles mostly < 2 mm wide, with included veinlets.
        5 Sterile blade elliptic, broadest near the middle, acute to attenuate at the base, pale green, dull, herbaceous in texture; basal frond sheath membranaceous and ephemeral; spores 50-60 µ in diameter ..... ***O. pusillum***

5 Sterile blade ovate, broadest below the middle, obtuse at the base, dark green, shiny, firm in texture; basal frond sheath leathery and tending to persist; spores 35-45 µ in diameter ..... ***O. pycnostichum***

Ophioglossum crotalophoroides Walter, Bulbous Adder's-tongue. Cp (FL, GA, NC, SC), Pd (GA): moist ditch banks and grassy roadside flats; rare (or overlooked) north of GA. March-September. A Southeastern Coastal Plain species, ranging from e. NC (Dare County) south to FL and west to TX; also in Mexico, the West Indies, Central America, and South America. [= RAB, FNA, S; > *O. crotalophoroides* var. *crotalophoroides* – K; > *O. crotalophoroides* var. *nanum* Osten ex de Lichtenstein – K]

Ophioglossum engelmannii Prantl, Engelmann's Adder's-tongue, Limestone Adder's-tongue. Mt (GA, NC?, VA), Pd (GA), Cp (GA), Ip (KY): dry barrens and glades over calcareous rocks, very rarely on granite; uncommon. March-June. W. VA, IN, IL, KS, and AZ south to FL and TX; also in Mexico and Central America. Ascribed to NC by Wagner & Wagner in FNA (1993b), the documentation unknown. [= C, F, FNA, G, K, S, W]

Ophioglossum nudicaule Linnaeus f., Slender Adder's-tongue. Cp (FL, GA, NC, SC), Pd (GA): lawns and other moist, grassy areas; rare or overlooked. E. NC south to s. FL, west to TX; also in Mexico, the West Indies, Central and South America, Asia, and Africa. First reported from NC by Thomas & Marx (1979). [= RAB, FNA, K; > *O. dendroneuron* E.P. St. John – S; > *O. mononeuron* E.P. St. John – S; *O. tenerum* Mettenius – S]

Ophioglossum petiolatum Hooker, Long-stem Adder's-tongue. Cp (FL, GA, NC, SC, VA): maritime wet grasslands, moist ditch banks, and grassy roadside flats; rare or overlooked north of GA. March-November. Widespread in se. United States, from se. VA south to FL and west to TX and OK; also in the West Indies, Mexico, n. South America, and Asia. First reported for NC by Thomas & Marx (1979). Wagner & Wagner in FNA (1993b) suggest that this species is likely introduced in North America. [= RAB, FNA, K; > *O. floridanum* E. St. John – S]

Ophioglossum pusillum Rafinesque, Northern Adder's-tongue. Mt (NC?, VA): moist streamside meadow; rare. March-July. Nova Scotia west to ND, south to VA (possibly to NC), IN, and NE; and in the Pacific Northwest. [= FNA, K; = *O. vulgatum* Linnaeus var. *pseudopodum* (Blake) Farwell – C, F, WV; < *O. vulgatum* – G]

Ophioglossum pycnostichum (Fernald) A. & D. Löve, Southern Adder's-tongue. Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Cp (KY, NC, SC, VA), Ip (KY): bottomland forests, moist loamy soils of successional forests and old fields; uncommon (or overlooked). March-July. Fairly widespread in e. North America, mostly south of the Wisconsinan glaciation, from s. NJ, IN, IL, and s. MI south to FL, MS, and e. TX. *O. vulgatum* (defined narrowly) is Eurasian. The best treatment of this complex is uncertain. [= W; = *O. vulgatum* Linnaeus var. *pycnostichum* Fernald – RAB, C, F, WV; < *O. vulgatum* Linnaeus – FNA, G, K, S]

Sceptridium Lyon 1905 (Grape Fern)

A genus of ca. 14 species, nearly cosmopolitan. References: Hauk, Parks, & Chase (2003); Hauk (1996).

1 Sterile leaf 4-pinnate-pinnatifid, finely divided, the ultimate segments lacerate and linear, < 3 mm wide ..... ***S. dissectum***
1 Sterile leaf 2-pinnate to 4-pinnate, not finely divided, the ultimate segments ovate or oblong, > 8 mm wide.
 2 Sterile pinnae entirely divided into short, round or acute pinnules; lateral pinnules with an inconspicuous and poorly-developed central vein; plant producing 1 or 2 leaves per season.
  3 Sterile pinna and pinnule apices obtuse to acute (rarely round); ultimate segments mostly rounded at the base, not fan-shaped, ovate or oblong; ultimate segments often crowded and overlapping ..... ***S. multifidum***
  3 Sterile pinna and pinnule apices round to obtuse; ultimate segments cuneate, rounded, or truncate at the base; ultimate segments remote or overlapping.
   4 Stalk of the basal sterile pinnae (10-) 15-70 mm long; roots irregularly ribbed, blackish; ultimate leaf segments fan-shaped, obovate, longer than wide, pinnately veined, the midrib weakly developed; sporulating August-October ..... ***S. jenmanii***
   4 Stalk of the basal sterile pinnae 4-15 (-20) mm long; roots smooth, yellowish; ultimate leaf segments about as long as wide, subflabellately veined, lacking a midrib; sporulating January-April ..... ***S. lunarioides***
 2 Sterile pinnae (or their terminal portion) elongate (the sides often nearly parallel), entire to shallowly lobed, not divided into pinnules; lateral pinnules with a conspicuous and well-developed central vein; plant producing 1 leaf per season.
  5 Sterile pinna and pinnule apices obtuse to rounded (to somewhat acute); ultimate segments mostly ovate, narrowly ovate, or oblong, mostly about 2× as long as broad or less; overwintering leaves green, not bronze ..... ***S. oneidense***
  5 Sterile pinna and pinnule apices acute; ultimate segments mostly oblong or lanceolate-oblong, often > 2× as long as broad; overwintering leaves bronze (or green if covered by leaves).
   6 Sterile blade mostly 2-pinnate, the segments sharply serrulate ..... ***S. biternatum***
   6 Sterile blade mostly 3-pinnate (or more divided, those forms keyed above), the segments entire to obscurely serrulate or crenulate ..... ***S. dissectum***

Sceptridium biternatum (Savigny) Lyon, Southern Grapefern. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA): moist forests, clearings, old fields; common (uncommon in KY). August-October. MD, PA, s. IN, s. IL, and se. MO south to FL and e. TX. [= *Botrychium biternatum* (Savigny) Underwood – RAB, C, FNA, K, S, W; = *B. dissectum* var. *tenuifolium* (Underwood) Farwell – F, G]

Sceptridium dissectum (Sprengel) Lyon, Cut-leaf Grape Fern, Dissected Grapefern. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (GA, KY, NC, SC, VA), Ip (KY): moist forests, clearings, old fields; common (rare in Coastal Plain of NC, SC, and GA). August-October. Nova Scotia and Québec west to Ontario and MI, south to FL and TX; also in the West Indies. The two forms have caused much confusion. In our area, forma *obliquum* is much more common and widely distributed, often confused with *B. biternatum*. Forma *dissectum* is fairly common in our area only in VA (rare in GA, NC, and SC), occurring primarily in the Mountains. The different distributions of the 2 forms suggest that further research is needed. [= *Botrychium*

dissectum Sprengel – RAB, C, FNA, K, W, WV; < *B. dissectum* var. *dissectum* – F (also see *S. oneidense*); > *B. dissectum* var. *obliquum* (Muhlenberg ex Willdenow) Clute – G; > *B. dissectum* var. *dissectum* – G; > *B. dissectum* – S; > *B. obliquum* Muhlenberg ex Willdenow – S]

Sceptridium jenmanii (Underwood) Lyon, Alabama Grapefern. Mt (GA, NC, SC, VA), Pd (GA, NC, SC), Cp (FL, GA): moist to dryish forests and disturbed areas; rare. August-October. VA and TN south to FL, AL, and e. LA; also in the West Indies. This species probably arose as a hybrid between *B. biternatum* and *B. lunarioides* (Michaux) Swartz, followed by polyploidization, resulting in a fertile taxon functioning as a species. [= *Botrychium jenmanii* Underwood – C, FNA, K, W; = *B. alabamense* Maxon – RAB, S]

Sceptridium lunarioides (Michaux) Holub, Winter Grapefern. Cp (FL, GA, SC), Pd (GA, NC): old fields, pastures, young forests, granitic flatrocks; rare. January-April. W. NC and s. SC south to n. FL, and west to e. TX and se. OK. Wagner (1992) proposes that *B. lunarioides* be treated in a new monotypic section, *Hiemobotrychium*, of *Botrychium*, subgenus *Sceptridium*. The species is hard to spot, and all the more difficult to find because of its phenology; the leaves appear in late fall and die by early spring. [= *Botrychium lunarioides* (Michaux) Swartz – RAB, FNA, K; = *Holubiella lunarioides* (Michaux) Škoda]

Sceptridium multifidum (S.G. Gmelin) M. Nishida, Leather Grapefern. Mt (NC, VA): grassy balds and high elevation meadows; rare (NC Rare, VA Rare). August-September. Labrador and Alaska south PA, OH (and in the mountains to VA and NC), IN, IL, IA, NE, CO, NM, and CA. [= *Botrychium multifidum* (S.G. Gmelin) Treviranus – C, FNA, K, W; > *B. multifidum* var. *multifidum* – F, G; > *B. multifidum* var. *intermedium* (D.C. Eaton) Farwell – F, G]

Sceptridium oneidense (Gilbert) Holub, Bluntlobe Grapefern. Mt (KY, NC, VA), Pd (VA): moist or boggy forests, bogs; rare (NC Rare, VA Watch List). July-October. Local in occurrence from New Brunswick, Québec, and Ontario south to NC, TN, KY, IN, and WI. Recent studies by Warren Hauk suggest that *B. oneidense* may not be distinct from *B. dissectum*. [= *Botrychium oneidense* (Gilbert) House – RAB, C, FNA, K, W, WV; < *B. dissectum* var. *dissectum* – F ("forma *oneidense* (Gilbert) Clute – embarrassingly transitional"); = *B. multifidum* var. *oneidense* (Gilbert) Farwell – G]

OSMUNDACEAE Berchtold & J.C. Presl 1820 (Royal Fern Family)

A family of 4 genera and about 15-25 species. References: Metzgar et al. (2008)=Z; Lellinger (1985); Whetstone & Atkinson in FNA (1993b); Kramer in Kramer & Green (1990); Yatabe, Nishida, & Murakami (1999).

1 Leaves hemidimorphic (juvenile leaves with only sterile pinnae, leaves bearing sporangia with sterile and fertile pinnae, the fertile pinnae either borne medially or terminally); photosynthetic pinnae lacking tufts of hairs ..... ***Osmunda***
1 Leaves dimorphic (each leaf normally either completely photosynthetic or completely fertile); photosynthetic pinnae with tufts of reddish hairs near the junction with the rachis..... ***Osmundastrum***

Osmunda Linnaeus (Royal Fern, Cinnamon Fern, Interrupted Fern)

A genus of about 14-23 species (if circumscribed more broadly as suggested by molecular phylogenetic analysis to include *Todea* and *Leptopteris*), tropical and temperate (most diverse in e. and se. Asia and e. North America). References: Metzgar et al. (2008)=Z; Lellinger (1985); Whetstone & Atkinson in FNA (1993b); Kramer in Kramer & Green (1990); Yatabe, Nishida, & Murakami (1999).

1 Leaves pinnate-pinnatifid, each pinna pinnatifid but not divided into distinct pinnules; spores borne on modified pinnae in the middle of the leaf blade; veins mostly 1-forked; [subgenus *Claytosmunda*]..... ***O. claytoniana* var. *claytoniana***
1 Leaves bipinnate, each pinna fully divided into distinct pinnules, the larger pinnules 3-7 cm long and 0.7-2.0 cm wide; spores borne on modified pinnae in the terminal portion of the leaf blade; veins mostly 2-forked; [subgenus *Osmunda*]..... ***O. regalis* var. *spectabilis***

Osmunda claytoniana Linnaeus *var.* ***claytoniana***, Interrupted Fern. Mt (GA, KY, NC, SC, VA), Pd (GA, VA), Cp (VA), Ip (KY): upland forests, woodlands, and balds, moist to rather dry; common (uncommon in Piedmont and Interior Low Plateau, rare in Coastal Plain). March-June. Newfoundland west to MN, south to n. GA, TN, and AR; another variety occurs in e. and sc. Asia. A fossil from the Triassic is seemingly indistinguishable from this species and suggests "that *O. claytoniana* has perhaps been in morphological stasis for at least 200 million years and also that the genus *Osmunda* is at least this old (Metzgar et al. 2008). [= C, F; < *O. claytoniana* – RAB, FNA, G, K, S, W, WV]

Osmunda regalis Linnaeus *var.* ***spectabilis*** (Willdenow) A. Gray, Royal Fern. Cp (FL, GA, KY, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY): bogs, marshes (including tidal), moist forests, floodplains, swamp forests, and other wetlands; common (uncommon in Interior Low Plateau). March-June. Newfoundland west to Saskatchewan, south to FL, TX, and Mexico; var. *regalis* is widespread in Eurasia, var. *japonica* is Japanese. The taxonomy of *O. regalis* and relatives needs reassessment (Metzgar et al. 2008); preliminary results suggested that e. North American *O. regalis* is more closely related to Asian *O. japonica* (=*O. regalis* var. *japonica*) and *O. lancea* than to European (typic) *O. regalis*. [= RAB, C, F, FNA, G, K, W, WV; < *O. regalis* – S]

The hybrid *Osmunda* ×*ruggii* R. Tryon [*O. claytoniana* var. *claytoniana* × *regalis* var. *spectabilis*] is known from Giles County, VA and one other historic population in CT. It has 2-pinnate sterile leaves, with the pinnules sessile. [= K]

Osmundastrum C. Presl (Cinnamon Fern)

OSMUNDACEAE

A monotypic genus, of the Americas and e. Asia. "When the *rbcL* trees, the fossil and morphological evidences are all taken into account, it can be concluded that the extant *Osmunda cinnamomea* has no closely related living species in Osmundaceae, and it has evolutionarily very static morphology with no significant modification for more than 200 million years. Thus we can call extant *Osmunda cinnamomea* a 'living fossil' (Yatabe, Kishima, & Murakami 1999). References: Metzgar et al. (2008)=Z; Lellinger (1985); Whetstone & Atkinson in FNA (1993b); Kramer in Kramer & Green (1990); Yatabe, Nishida, & Murakami (1999).

Identification notes: Sterile plants of *Osmundastrum cinnamomeum* are sometimes confused with *Woodwardia virginica*, which also has rather coarse, pinnate-pinnatifid leaves and grows in similar wet, acid places. *Osmundastrum* is much coarser, has cinnamon tufts of tomentum present in the axils of the pinnae (vs. absent), has the rachis greenish and rather fleshy in texture (vs. brown and wiry), and bears fronds clumped or tufted from a massive, woody, ascending rhizome covered with old petiole bases (vs. fronds borne scattered along a thick, horizontal, creeping rhizome).

Osmundastrum cinnamomeum (Linnaeus) C. Presl, Cinnamon Fern. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): bogs, peatlands, pocosins, wet savannas, floodplains, blackwater stream swamps, and other wetlands; common (uncommon in KY Interior Low Plateau and KY Coastal Plain). March-May. Labrador west to MN, south to FL, TX, NM, Central America, and South America; West Indies. The species also occurs in e. Asia, where generally treated as a separate variety. The taxonomic significance of the densely glandular pubescent *Osmunda cinnamomea* var. *glandulosa* is uncertain; it is reported from scattered locations in e. North America, including SC and VA. [= Z; = *Osmunda cinnamomea* Linnaeus – RAB, FNA, G, S, W, WV; > *Osmunda cinnamomea* var. *cinnamomea* – C, F, K; > *Osmunda cinnamomea* Linnaeus var. *glandulosa* Waters – F, K]

POLYPODIACEAE Berchtold & J.C. Presl 1820 (Polypody Family)

A family of about 35-40 genera and 500-700 species, cosmopolitan, especially tropical. Here circumscribed to include Grammitidaceae (including *Micropolypodium*). References: Smith in FNA (1993b); Smith et al. (2006); Hennipman, Veldhoen, & Kramer in Kramer & Green (1990); Parris in Kramer & Green (1990).

1 Plants dwarf, the leave blades <5 cm long; [occurring only in permanently moist habitats, as in grottoes behind waterfalls] ..... ***Micropolypodium***

1 Plants larger, the leave blades 7-90 cm long; [occurring in moist to dry habitats].
- 2 Leaf blade densely scaly on the lower surface; rhizome 1-2 mm in diameter; leaf segment margins entire ..... ***Pleopeltis***
- 2 Leaf blade scaleless on the lower surface; rhizome 3-15 (-30) mm in diameter; leaf segment margins denticulate (*Polypodium*) or entire (*Phlebodium, Pecluma*).
  - 3 Leaves pectinate, at least the larger with >25 pairs of segments, each 1.5-5 (-8) mm wide; [of ne. FL southward] ..... ***Pecluma***
  - 3 Leaves pinnatifid, even the larger with < 25 pairs of segments, (3-) 5-40 mm wide; [collectively widespread in our area.
    - 4 Venation highly reticulate, with 3-4 rows of areoles between the midvein and the margin; rhizome 8-15 (-30) mm in diameter; leaf blade 10-50 cm wide ..... ***Phlebodium***
    - 4 Venation free or with a row of areoles between the midvein and the margin; rhizome 3-6 mm in diameter; leaf blade <9 cm wide ..... ***Polypodium***

Micropolypodium Hayata (Dwarf Polypody)

A genus of about 30 species, mainly of tropical America and e. and se. Asia. *Micropolypodium* has traditionally been considered a part of a broadly circumscribed *Grammitis*, but has been re-circumscribed at the generic level by Smith (1992). Smith in FNA (1993b) states that our species "probably warrants generic status under the ame *Micropolypodium* Hayata, a primarily neotropical genus with representatives in eastern Asia (Malaysia, China, Sikkim, Taiwan, and Japan)." References: Smith in FNA (1993b); Massey *et al.* (1983); Smith (1992)=Z.

Micropolypodium nimbatum (Jenman) A.R. Smith, Dwarf Polypody. Mt (NC): on ceiling of grotto in spray cliff of waterfall in humid gorge; rare. Sporophytes (juvenile only) have been found at only a single site in North America, in Macon County, NC. Gametophytes (and/or sporophytes) may be present at other spray cliffs in the escarpment gorges of sw. NC or adjacent SC and GA. Other than this disjunct temperate-zone occurrence, the species is known from Cuba, Jamaica, and Hispaniola. See Moran (1998) for an interesting discussion and overview of independent fern gametophytes in e. North America. [= Z; = *Grammitis nimbata* (Jenman) Proctor – RAB, FNA, K]

Pecluma M.G. Price (Rockcap Fern)

A genus of about 30 species, of tropical and subtropical America. References: Evans in FNA (1993b).

1 Veins 1-forked; segments at base of blade abruptly reduced in size; [usually epiphytic] ..... ***P. plumula***

1 Veins 2-4 forked; segements at base of blade gradually reduced to auricles; [usually terrestrial] ..... ***P. ptilodon var. caespitosa***

POLYPODIACEAE

Pecluma plumula (Humboldt & Bonpland ex Willdenow) M.G. Price. Cp (FL): epiphytic on tree branches, less commonly on limestone, in hammocks and swamps; rare. Ne. FL (Duval County) south to s. FL; West Indies, Mexico, Central America, and n. South America. [= FNA, K; = *Polypodium plumula* Humboldt & Bonpland ex Willdenow – S]

Pecluma ptilodon (Kunze) M.G. Price *var.* ***caespitosa*** (Jenman) Lellinger. Cp (FL): terrestrial or on logs or tree bases in hammocks and swamps; rare. Ne. FL (Duval County) south to s. FL; West Indies; Mexico Central America. [= FNA; = *Pecluma ptilodon* (Kunze) M.G. Price ssp. *caespitosum* (Jenman) Windham – K; = *Polypodium pectinatum* Linnaeus – S]

Phlebodium (R. Brown) J. Smith 1841 (Golden Polypody)

A genus of 2-4 species, of tropical and subtropical regions of the Western Hemisphere. References: Nauman in FNA (1993b); Hennipman, Veldhoen, & Kramer in Kramer & Green (1990).

Phlebodium aureum (Linnaeus) J. Smith, Goldfoot Fern, Golden Polypody. Cp (FL, GA, SC): epiphytic on the old leaf bases of *Sabal palmetto* and in crotches and crevices of other trees, particularly *Quercus virginiana*, and rarely terrestrial on calcareous soils or masonry; uncommon (rare n. of FL). E. SC (Beaufort, Jasper, and Charleston counties), e. GA (Camden, Chatham, and Glynn counties), south to FL. Found in Cape Romain National Wildlife Refuge (Charleston County, SC) in the late 1970s by Steve Bowling, where apparently native (S. Bowling, pers. comm. 2007); also introduced and apparently established in SC (Beaufort, Jasper, Charleston counties) via planting of palmettos from further south (P. McMillan, pers. comm. 2005). [= FNA, K, S; = *Polypodium aureum* Linnaeus]

Pleopeltis Humboldt & Bonpland ex Willdenow 1810 (Shielded-Sorus Polypody)

A genus of about 50 species, primarily tropical. Windham (1993) makes a compelling case, based on morphological, chemical, and molecular data, that the "scaly polypodies" should be placed in *Pleopeltis*, rather than in *Polypodium*. References: Windham (1993); Andrews & Windham in FNA (1993b); Hennipman, Veldhoen, & Kramer in Kramer & Green (1990).

Pleopeltis polypodioides (Linnaeus) E.G. Andrews & Windham *ssp.* ***michauxiana*** (Weatherby) E.G. Andrews & Windham, Resurrection Fern, Scaly Polypody. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Ip (KY): on tree limbs and trunks (especially when leaning) and on rocks; common (rare in n. VA). June-October. Ssp. *michauxiana* ranges from se. MD, IL, MO, and se. KS, south to s. FL and TX; also in Mexico and Guatemala. Ssp. *polypodioides* ranges in the West Indies, Central America and South America. Four additional varieties are tropical in Central America, South America, and Africa. [= FNA, K; < *Polypodium polypodioides* (Linnaeus) Watt – RAB; = *Polypodium polypodioides* (Linnaeus) Watt var. *michauxianum* Weatherby – C, F, G, W, WV; <? *Marginaria polypodioides* (Linnaeus) Tidestrøm – S]

Polypodium Linnaeus 1753 (Polypody)

A genus of about 100 species, cosmopolitan. References: Haufler et al. in FNA (1993b); Haufler, Windham, & Rabe (1995)=Z; Haufler & Windham (1991); Bryan & Soltis (1987); Kott & Britton (1982); Hennipman, Veldhoen, & Kramer in Kramer & Green (1990); Cusick (2002). [also see *Pecluma, Phlebodium* and *Pleopeltis*]

Identification notes: The two species are somewhat cryptic, and the relatively frequent triploid backcross makes field identification still more problematic. Individuals not identified to species may be referred to as "*Polypodium virginianum* complex."

[Note: three leads]

1 Leaf blade averaging 5.8 cm wide (range of 3.2-8.2 cm), widest at the base, thus the blade elongate-deltoid in outline; rhizome scales averaging 1.1 mm wide, mostly golden brown throughout; paraphyses (sporangiasters) usually > 40 per sorus (range of 25-120); leaves mostly lobed to apex, without an attenuate, unlobed tip ..... ***P. appalachianum***

1 Leaf blade averaging 4.5 cm wide (range of 3.0-5.8 cm); blade widest near the middle, thus the blade oblong to narrowly lanceolate in outline; rhizome scales averaging 1.5 mm wide, mostly brown, with a dark central stripe; paraphyses (sporangiasters) usually < 40 per sorus (range of 7-69); leaves mostly with an attenuate, unlobed tip ..... ***P. virginianum***

1 Characters intermediate; spores abortive ..... ***P. ×incognitum***

Polypodium appalachianum Haufler & Windham [*P. virginianum* complex], Appalachian Rockcap Fern. Mt (GA, KY, NC, SC, VA), Ip (KY): moist rocks at low to high elevations, especially in ravines, on north-facing outcrops, and in other moist sites; uncommon (rare in KY Interior Low Plateau). June-October. Newfoundland west to e. Ontario, south to n. GA and n. AL; nearly restricted to the Appalachian Mountains. Its chromosome complement can be symbolized as AA. It is one parent of *P. virginianum*. [= FNA, K, Z; < *P. virginianum* – RAB, C, F, S, W, WV; < *P. vulgare* Linnaeus var. *virginianum* (Linnaeus) Eaton – G]

Polypodium virginianum Linnaeus [*P. virginianum* complex], Common Rockcap Fern. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY), Cp (NC, SC, VA): moist rocks; common (rare in Coastal Plain). June-October. Haufler and Windham (1991) indicate that the tetraploid cytotype (*P. virginianum*) of the *P. virginianum* complex is an allotetraploid derivative of the sterile hybrid of the diploid occurring in our area (*P. appalachianum*) and another diploid with a boreal distribution (*P. sibiricum* Siplivinsky). Electrophoretic evidence supports this finding (Bryan & Soltis 1987, Haufler, Windham,

& Rabe 1995). Thus, *Polypodium* in our area is another classic example of the reticulate evolution of pteridophytes, and the cytotypes must be treated as species and given names. Unfortunately, the two species are somewhat cryptic, and the relatively frequent triploid backcross makes field identification still more problematic. Individuals not identified to species may be referred to as "*Polypodium virginianum* complex." The chromosome complement of *P. virginianum* can be symbolized as AASS. [= FNA, K, Z; < *P. virginianum* – RAB, C, F, S, W, WV (also see *P. appalachianum*); < *P. vulgare* Linnaeus var. *virginianum* (Linnaeus) Eaton – G (also see *P. appalachianum*)]

Polypodium ×*incognitum* Cusick is the triploid hybrid [*P. appalachianum* × *virginianum*]. It is rather frequent; there is some evidence that it may reproduce successfully via apogamous spores. It is best recognized by the spores, which are irregular in size and shape. Morphologically, it tends to intermediacy between the two parents, but can closely resemble either. Its chromosome complement can be symbolized AAS.

PSILOTACEAE Kanitz 1887 (Whiskfern Family)

A family of 2 genera and 4-12 species, pantropical and warm temperate. References: Lellinger (1985); Thieret in FNA (1993b); Kramer in Kramer & Green (1990).

Psilotum Swartz 1800 (Whiskfern)

A genus of 2-3 species, tropical and warm temperate. *Psilotum* lacks roots and true leaves. Other than the Australasian genus *Tmesipteris*, *Psilotum* has no close living relatives, and the 2 genera are usually considered to comprise a distinct class (Wagner 1977). The stem is chlorophyllose. Fungal cells interspersed in the outer layers of the rhizome aid in the absorption of nutrients. References: Lellinger (1985); Thieret in FNA (1993b); Kramer in Kramer & Green (1990).

Identification notes: The stiff, dichotomously-branched habit of *Psilotum* is unmistakable.

Psilotum nudum (Linnaeus) Palisot de Beauvois, Whiskfern. Cp (FL, GA, NC, SC), Pd* (NC): in moist bottomland forests, on soil, stumps, and tree bases, along building foundations (where introduced); uncommon (rare n. of FL). April-September. S. SC south to s. FL, west to e. TX, disjunct (and apparently native) in ne. NC (Perry & Musselman 1994), rarely naturalized around buildings in c. NC; also in sw. United States and in the tropics of Central and South America, Africa, and Asia. [= RAB, FNA, K, S]

PTERIDACEAE Reichenbach 1837 (Maidenhair Fern Family)

A family of about 40 genera and about 1000 species. This family may be further subdivided, into families Adiantaceae (*Adiantum*), Cheilanthaceae (*Cheilanthes, Notholaena, Astrolepis, Pellaea, Cryptogramma*), Pteridaceae (*Pteris*), Vittariaceae (*Vittaria*), and Parkeriaceae (*Acrostichum*). Here circumscribed to include Vittariaceae (see Smith et al. 2006). References: Lellinger (1985); Windham in FNA (1993b); Tryon, Tryon, & Kramer in Kramer & Green (1990); Kramer in Kramer & Green (1990); Crane (1997).

1 Gametophytes only present ..... ***Vittaria***
1 Sporophytes present.
  2 Leaves linear, 10-60 cm long and 1-3 mm wide ..... ***Vittaria***
  2 Leaves dissected, not linear, > 20 mm wide.
    3 Sori round or oblong, distinct and separate along the pinnule margins; leaves bright-green, glabrous, herbaceous, delicate, and flexible; [subfamily *Adiantoideae*] ..... ***Adiantum***
    3 Sori continuous along the pinnule margins (or across the blade in *Acrostichum*); leaves mostly dark-green or glaucous, often pubescent, coriaceous, tough, and stiff.
      4 Fertile pinnae with entire lower surface covered by sporangia; leaves 1.5-5 m long; [of wetlands, n. FL southward]; [subfamily *Parkerioideae*] ..... ***Acrostichum***
      4 Fertile pinnae with sori marginal; leaves < 0.5 m long; [of rocky sites, collectively widespread].
        5 Leaves strongly dimorphic, the fertile leaves obviously longer than the sterile and with narrow elongate ultimate segments; [subfamily *Cheilanthoideae*] ..... ***[Cryptogramma]***
        5 Leaves essentially monomorphic.
          6 Leaves 2-5-pinnate, the ultimate leaf-segments 1-4 (-8) mm long, more-or-less densely hairy (glabrous in *Cheilanthes alabamensis*) or covered on the undersurface with a whitish powder; [subfamily *Cheilanthoideae*].
            7 Lower leaf surfaces covered with whitish powder, otherwise glabrous or sparsely pubescent ..... ***Argyrochosma***
            7 Lower leaf surfaces pubescent (or glabrous in *Cheilanthes alabamensis*), never with conspicuous whitish powder ..... ***Cheilanthes***
          6 Leaves 1-2-pinnate, the ultimate leaf-segments 8-100 mm long, glabrous or sparsely and inconspicuously hairy.
            8 Leaf undersurface densely covered with stellate and ciliate scales; [subfamily *Cheilanthoideae*] ..... ***Astrolepis***
            8 Leaf undersurface glabrous or with non-stellate scales.
              9 Rachis dark-brown or purple; [subfamily *Cheilanthoideae*] ..... ***Pellaea***
              9 Rachis green or tan; [subfamily *Pteridoideae*] ..... ***Pteris***

Acrostichum Linnaeus 1753 (Leather Fern)

A genus of 3 species, pantropoical. References:

Acrostichum danaeifolium Langsd. & Fisch., Giant Leather Fern. Cp (FL): freshwater and brackish swamps and marshes; rare. Just reaching the southern extreme of our area, from Dixie County, FL southward. [= FNA, K; = *A. danaeaefolium* – S, orthographic variant]

Adiantum Linnaeus 1753 (Maidenhair Fern)

A genus of 150-200 species, nearly cosmopolitan. References: Paris in FNA (1993b); Tryon, Tryon, & Kramer in Kramer & Green (1990).

1 Petiole and rachises roughly pubescent; [rare introduction] ..... ***A. hispidulum***
1 Petiole and rachises glabrous; [collectively common natives].
  2 Leaves longer than broad, pinnately divided, with a main central axis, not fanlike; ultimate segments rhombic, about as long as broad to slightly longer than broad ..... ***A. capillus-veneris***
  2 Leaves broader than long, dichotomously divided at the summit of the petiole, the two main branches pedately branched, fanlike; ultimate segments oblong, > 2× as long as broad.
    3 Ultimate segments at middle of penultimate divisions usually > 3.2× as long as broad, the apices with sharply denticulate, angular lobes, these lobes separated by deep sinuses 0.6-4 mm deep; segment stalks 0.2-0.9 (-1.3) mm long; [disjunct in se. PA on serpentine from a generally more northern and western distribution] ..... ***[A. aleuticum]***
    3 Ultimate segments at middle of penultimate divisions usually < 3.2× as long as broad, the apices with rounded, crenulate, or crenate-denticulate lobes, these lobes separated by shallow sinuses 0.1-2.0 (-3.7) mm deep; segment stalks 0.5-1.5 (-1.7) mm long ... ***A. pedatum***

Adiantum capillus-veneris Linnaeus, Venus'-hair Fern, Southern Maidenhair. Cp (FL, GA, NC, SC), Mt (GA, VA), Ip (KY): moist calcareous substrates, in the Coastal Plain on "marl" (coquina limestone) (NC and SC), on calcareous clay bluffs (GA), and adventive on lime mortar of old buildings and walls (as in Wilmington and Fayetteville, NC); in the Mountains and Interior Low Plateau on limestone or other calcareous sedimentary rocks; rare. June-July. Widespread on several continents, in e. North America largely southern in distribution, from e. NC, w. VA, MO, CO, UT, and CO south; also disjunct in SD and British Columbia, and in Mexico, the West Indies, tropical and warm temperate portions of Central and South America, Eurasia, and Africa. There is some question whether North American plants are conspecific with those in the Old World (Paris in FNA 1993b). [= RAB, C, F, FNA, G, K, S, W]

* ***Adiantum hispidulum*** Sw., Rough Maidenhair, Garden Maidenhair. Cp (GA): stone walls; rare, native of Asia. Reported for GA (FNA, Kartesz 1999). [= FNA, K, S]

Adiantum pedatum Linnaeus, Northern Maidenhair. Mt (GA, KY, NC, SC, VA), Pd (GA, KY, NC, SC, VA), Cp (GA, KY, NC, VA): moist forests and cliffs, especially over calcareous or mafic rocks, sometimes in seasonal seepage; common (uncommon in Piedmont and Coastal Plain). June-August. Widespread in e. United States, from Nova Scotia and New Brunswick west to Ontario and MN, south to GA, AL, MS, LA, and OK. [= RAB, FNA, G, K, S, W, WV; = *A. pedatum* ssp. *pedatum* – C; = *A. pedatum* var. *pedatum* – F]

Adiantum aleuticum (Ruprecht) Paris is disjunct on serpentine in se. PA and MD (FNA). It occurs as well at scattered locations in ne. and w. North America, from s. AK south to s. CA, AZ, and Mexico (Chihuahua). [= FNA, K; = *A. pedatum* Linnaeus ssp. *calderi* Cody – C; = *A. pedatum* Linnaeus var. *aleuticum* Ruprecht – F]

Argyrochosma (J. Smith) Windham 1987 (Powdery Cloak Fern)

A genus of about 20 species, of s. North America, Central America, South America, and the West Indies. Traditionally treated as a component of *Notholaena* (or sometimes *Pellaea*) (Tryon, Tryon, & Kramer in Kramer & Green 1990), but best recognized as a separate genus (Windham in FNA 1993b, Windham 1987, Gastony & Rollo 1998). Molecular studies show that this group is more closely related to *Pellaea* and *Astrolepis* than to *Notholaena*. References: Windham in FNA (1993b); Windham (1987); Tryon, Tryon, & Kramer in Kramer & Green (1990); Gastony & Rollo (1998).

Argyrochosma dealbata (Pursh) Windham, Powdery Cloak Fern. Ip (KY): limestone cliffs; rare. IL, MO, and KS south to AR and TX; disjunct in sc. KY. [= FNA, K; = *Notholaena dealbata* (Pursh) Kunze – C, F, G; = *Cheilanthes dealbata* Pursh; = *Pellaea dealbata* (Pursh) Prantl]

Astrolepis D.M. Benham & Windham 1992 (Star-scaled Cloak Fern)

A genus of about 8 species, of s. North America, Central America, South America, and the West Indies. This group of species has traditionally been placed either in *Notholaena* or *Cheilanthes*, but is best recognized as a separate genus, more closely related to *Argyrochosma*, *Pellaea*, and *Cheilanthes* than to *Notholaena* (Gastony & Rollo 1998) References: Benham & Windham in FNA (1993b); Tryon, Tryon, & Kramer in Kramer & Green (1990); Gastony & Rollo (1998).

1 Scales of the upper leaf surface dense and usually persistent; largest pinnae asymmetrically lobed or entire; [rare eastern disjunct known from AL]..... ***A. integerrima***
1 Scales of the upper leaf surface sparse and usually deciduous; largest pinnae usually symmetrically lobed; [rare eastern disjunct known from GA]..... ***A. sinuata ssp. sinuata***

Astrolepis integerrima (Hooker) D.M. Benham & Windham. Mt (AL): outcrops of Ketona dolostone; rare. OK, NM, AZ, and NV south into Mexico; disjunct to c. AL (Bibb County). This taxon is apparently an apogamous triploid derived from *Astrolepis cochisensis* (Goodding) D.M. Benham & Windham and an unknown taxon. [= FNA; = *Astrolepis* ×*integerrima* – K; = *Cheilanthes integerrima* (Hooker) Mickel; = *Notholaena integerrima* (Hooker) Hevly]

Astrolepis sinuata (Lagasca ex Swartz) D.M. Benham & Windham *ssp.* ***sinuata***, Wavy Cloak-fern. Pd (GA): granitic outcrops and boulders; rare. OK, TX, NM, and AZ, south into Central and South America; disjunct in GA. Its leaves are pinnate-pinnatifid, with 30-60 pairs of pinnae. [= FNA, K; *Cheilanthes sinuata* (Lagasca ex Swartz) Domin; *Notholaena sinuata* (Lagasca ex Swartz) Kaulfuss]

Cheilanthes Swartz 1806 (Lip-fern)

A genus of about 150 species, primarily in the Western Hemisphere. References: Lellinger (1985)=Z; Windham & Rabe in FNA (1993b); Tryon, Tryon, & Kramer in Kramer & Green (1990); Gastony & Rollo (1998). [also see *Argyrochosma* and *Astrolepis*]

1 Leaf surfaces glabrescent; ["*Cheilanthes alabamensis* group"].
  2 Rhizomes short-creeping, usually 4-7 mm in diameter; pinnule midveins green on the upper surface for most of their length; spores 32 per sporangium..... ***Ch. alabamensis***
  2 Rhizomes long-creeping, usually 1-3 mm in diameter; pinnule midveins black on the upper surface for most of their length; spores 64 per sporangium..... ***Ch. microphylla***
1 Leaf surfaces pubescent (tomentose, villous, or lanose).
  3 Petiole and rachis with a mixture of flattened scales (in *C. tomentosa* these very narrow and superficially mistakable for hairs) and jointed hairs (as seen at 10× magnification); plants tufted, without creeping rhizomes; margins of leaf segments strongly under-rolled, modified into a scarious flap (false indusium) that covers the sori; [subgenus *Physapteris*].
    4 Leaf blade nearly glabrous above, appearing dark green; scales 0.2-1.0 mm wide, lanceolate; tomentum on the leaf under-surface chestnut-brown (at maturity, whitish when young)..... ***Ch. castanea***
    4 Leaf blade villous above, appearing whitish or gray-green; scales ca. 0.1 mm wide, linear, nearly hair-like; tomentum on the leaf under-surface white, tan, or silver-gray..... ***Ch. tomentosa***
  3 Petiole and rachis with hairs only (as seen at 10× magnification); plants mat-forming (with leaves scattered along creeping rhizomes) or tufted (without creeping rhizomes); margins of leaf segments under-rolled but not modified into a scarious flap, the sori more-or-less exposed at maturity; [subgenus *Cheilanthes*].
    5 Petiole and rachis glabrous to sparsely pubescent with rather straight hairs; leaves 3-pinnate, with 7-12 (-15) pairs of pinnae, the lower surface lanose (the hairs curly); leaf blades 2.5-10 (-15) cm long; ultimate segments 1-3 mm long, beadlike ..... ***Ch. feei***
    5 Petiole and rachis rather densely pubescent with long jointed hairs; leaves 2-pinnate-pinnatifid (rarely to 3-pinnate), with 12-20 pairs of pinnae, the lower surface tomentose (the hairs straight or bent); leaf blades (4-) 8-24 cm long; ultimate segments 3-5 mm long, elongate ..... ***Ch. lanosa***

Cheilanthes alabamensis (Buckley) Kunze, Alabama Lip-fern. Mt (GA, NC, VA), Ip (KY): dry outcrops of limestone; rare. June-September. VA, w. NC, s. MO, and OK south and west to n. GA, AL, TX, NM, se. AZ, and Mexico. Considering morphology and chromosome number (sharing x = 29 with *Pellaea*, in contrast to x = 30 in the rest of *Cheilanthes*), it has been suggested that *Ch. alabamensis* and close relatives could be placed equally well in *Pellaea*, as *P. alabamensis* (Buckley) Baker ex Hooker, as done by Cranfill (1980). Windham & Rabe in FNA (1993b) suggest that *Ch. alabamensis* is uncomfortably placed in either *Cheilanthes* and *Pellaea* and that "it may constitute a natural group worthy of consideration as a distinct genus." A molecular analysis suggests that *Ch. alabamensis* and close relatives form a monophyletic group sister to the rest of *Cheilanthes*; this could be the basis for status as a separate genus or for inclusion in *Cheilanthes* (but not for inclusion in *Pellaea*) (Gastony & Rollo 1998). Our plants are apparently apogamous triploids. [= RAB, C, F, FNA, G, K, S, W, Z]

Cheilanthes castanea Maxon, Chestnut Lip-fern. Mt, Pd (VA): dry outcrops of sedimentary or metamorphic rocks (including calcareous shales and siltstones); rare. June-September. Sw. TX to s. AZ, with scattered disjunct occurrences in c. OK, n. AR, e. WV, and c. and w. VA (to be expected elsewhere in our area). The ultimate segments of the pinnules tend to be roundish and closely spaced, so that they overlap the adjacent segments of the pinnule and the segments of the adjacent pinnule. These characters do not match some descriptions (such as in Z). Whether or not *Ch. castanea* is distinct from or merely a form of *Ch. eatonii* is controversial. The complex of the 2 taxa includes apogamous triploids and sexual tetraploids. [= W, WV, Z; < *Ch. eatonii* Baker – C, FNA, K]

Cheilanthes feei T. Moore, Slender Lip-fern. Mt (VA): dry outcrops of calcareous sedimentary rocks (dolostone); rare. June-September. WI, MN SD, MT, Alberta, and British Columbia south to AR, TX, NM, AZ, s. CA, and n. Mexico; disjunct eastward in KY and w. VA. The only known site in our area is on a dolostone cliff in Pulaski County, VA, where disjunct about 450 km east of a population in Bullitt County, KY, and an additional 200 km from other populations in IL (Wieboldt & Bentley 1982, Porter & Wieboldt 1991). The species is an apogamous triploid of unknown parentage. [= C, FNA, G, K, W, Z]

Cheilanthes lanosa (Michaux) D.C. Eaton, Hairy Lip-fern. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY), Cp (GA): dry outcrops of felsic or intermediate metamorphic and igneous rocks; uncommon. June-September. CT, NY, PA, s. IL, MO, and KS south to FL, AL, MS, LA, and e. TX, and disjunct in WI and MN. Much the commonest lip-fern in our area, a sexual diploid, and the most "eastern" of a predominantly western genus. [= RAB, C, FNA, G, K, S, W, WV, Z; = *Ch. vestita* (Sprengel) Swartz – F]

Cheilanthes microphylla (Swartz) Swartz, Southern Lip-fern. Cp (FL): shell hammocks, limestone outcrops; rare. Ne. FL south through FL; West Indies; Mexico through Central America to n. South America. [= FNA, K, S, Z]

Cheilanthes tomentosa Link, Woolly Lip-fern. Mt, Pd (GA, NC, SC, VA), Cp (GA, SC): dry outcrops of intermediate or calcareous metamorphic, igneous, or sedimentary rocks (including sandstone outcrops in the Coastal Plain of GA and SC); uncommon (rare in Coastal Plain). June-September. Primarily Appalachian, from PA south to KY, GA, and AL, also at scattered localities from AR, OK, and KS south and west to NM, AZ, and Mexico. The species is an apogamous triploid. [= RAB, C, FNA, G, K, W, S, Z; = *Ch. lanosa* – F, misapplied]

Cryptogramma R. Brown 1823 (Parsley Fern)

A genus of about 10 species, of temperate Eurasia, North America, and South America. References: Alverson in FNA (1993b); Tryon, Tryon, & Kramer in Kramer & Green (1990).

Cryptogramma stelleri (S.G. Gmelin) Prantl in Engler, Slender Rock-brake, ranges south to c. PA and WV (Randolph County). It is a small fern of calcareous rocks, with dimorphic pinnate-pinnatifid to 2-pinnate leaves to 20 cm long. [= FNA, C, F, G, K, WV]

Pellaea Link 1841 (Cliff-brake)

A genus of about 40 species, mostly in the Western Hemisphere. References: Gastony (1988); Gastony, Yatskievych, & Dixon (1992); Windham in FNA (1993b); Tryon, Tryon, & Kramer in Kramer & Green (1990); Gastony & Rollo (1998); Heafner (2001). Key based in part on Heafner (2001). [also see *Argyrochosma, Astrolepis, Cheilanthes*]

1 Petioles terete, glabrous or pubescent; rhizome scales uniformly orangish-brown, entire.
  2 Petioles and rachises sparsely to densely pubescent, dull; pinnae long-stalked, those toward the base of the leaf on stalks 5-15 mm long; [of a variety of substrates, including non-calcareous] ..... ***P. atropurpurea***
  2 Petioles and rachises glabrous to very sparsely pubescent, shiny; pinnae sessile or short-stalked, those toward the base of the leaf on stalks 0-4 (-6) mm long; [strictly of calcareous substrates] ..... ***P. glabella ssp. glabella***
1 Petioles slightly grooved or flattened, glabrous; rhizome scales with a blackish median stripe and pale brown margins, obscurely toothed.
  3 Ultimate segments thin in texture, not strongly rolled, acute to acuminate at the apex, but lacking a mucro or cusp ..... ***P. viridis***
  3 Ultimate segments leathery, strongly rolled, mucronate at the apex.
    4 Leaves oblong to elliptic in outline; pinnae either ternate toward the base of the leaf and simple toward the tip of the leaf, or all simple; [known from outcrops in the upper Piedmont of SC] ..... ***P. ternifolia ssp. arizonica***
    4 Leaves usually narrowly triangular in outline; pinnae usually pinnate toward the base, becoming ternate to simple toward the tip; [known from outcrops in Piedmont of NC] ..... ***P. wrightiana***

Pellaea atropurpurea (Linnaeus) Link, Purple Cliff-brake. Ip (KY), Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): outcrops of limestone and other rocks (usually either calcareous or mafic), rarely on masonry walls (Wieboldt 1995); common only in the Ridge and Valley of VA and Interior Low Plateau (KY, TN), otherwise uncommon to rare. May-September. This species is an apogamously-reproducing triploid, either an allopolyploid derived from the hybridization of a sexually-reproducing diploid species and sexually-reproducing tetraploid, or an autopolyploid of an undiscovered or extinct species. Gastony, Yatskievych, & Dixon (1992) provide convincing evidence that modern *P. glabella* is not one of the parental taxa, as indicated by Lellinger (1985). *P. atropurpurea* is widespread in e. North America, from VT, NY, MN, SD, Saskatchewan, and Alberta south to FL, AL, TN, AR, TX, NM, AZ, and Mexico; also in Guatemala. [= RAB, C, F, FNA, K, S, W, WV; = *P. atropurpurea* var. *atropurpurea* – G; = *P.* ×*atropurpurea*]

Pellaea glabella Mettenius ex Kuhn *ssp.* ***glabella***, Smooth Cliff-brake. Mt (VA), Ip (KY): dry, exposed outcrops of calcareous rocks (limestone, dolostone), rarely on masonry walls (Wieboldt 1995); rare. May-September. The diploid, sexually-reproducing *P. glabella* ssp. *missouriensis* (Gastony) Windham is (so far as is known) restricted to MO; the apogamously-reproducing autotetraploid derivative, ssp. *glabella*, is more widespread, ranging from VT, ONT, and MN, south to VA, TN, KY, AR, OK, and n. TX. Two additional taxa (both western) have been variously treated as additional subspecies of *P. glabella* or as two subspecies of *P. occidentalis* (E.E. Nelson) Rydberg. [= FNA, K; = *P. glabella* var. *glabella* – C; = *P. atropurpurea* var. *bushii* Mackenzie – G; < *P. glabella* – F, S, W, WV]

Pellaea ternifolia (Cavanilles) Link *ssp.* ***arizonica*** Windham, Arizona Cliff-brake. Pd (SC): on granitic outcrops; rare. A remarkable disjunct from sw. United States and Mexico to w. SC; see Heafner (2001) for additional information. When discovered, it was believed that this was a SC record for *P. wrightiana* (Platt & Townsend 1996), but Heafner (2001) has demonstrated that this actually represents *P. ternifolia* ssp. *arizonica*. [= FNA, K]

* ***Pellaea viridis*** (Forsskål) Prantl, Green Cliffbrake. Cp (GA): outcrop of Altamaha Grit; rare, native of Africa. This species is naturalized on an Altamaha Grit outcrop in Coffee County, GA (J. Allison, pers. comm.). Various infraspecific taxa have been recognized in the native range. [= K; = *Cheilanthes viridis* (Forsskål) Swartz]

Pellaea wrightiana Hooker, Wright's Cliff-brake. Pd (NC): south-facing outcrops of Carolina slate or granitic rock with infrequent nutrient-rich seepage; rare. May-September. OK west to se. CO and sw. UT, south to TX, AZ, and Mexico, with a few, remarkable disjunct occurrences in c. NC. *P. wrightiana* is apparently a sexually-reproducing allotetraploid derivative of hybridization between *P. ternata* (Cavanilles) Link and *P. truncata* Goodding. [= RAB, FNA, K]

Pteris Linnaeus 1753 (Brake)

A genus of about 250-300 species, warm temperate and tropical. References: Nauman in FNA (1993b); Tryon, Tryon, & Kramer in Kramer & Green (1990).

1 Pinnae strictly simple, without lobes or pinnules; outline of leaf blade lanceolate, typically > 3× as long as wide ..... ***Pt. vittata***
1 Pinnae (at least the basal ones) with 1-several lobes or pinnules; outline of leaf blade ovate to orbicular, typically nearly as wide as long
2 Pinnae of mature leaves decurrent in the upper half of the leaf onto the rachis ..... ***Pt. multifida***
2 Pinnae of mature leaves not decurrent or only the terminal pinnae decurrent.
3 Pinnae with a broad white central stripe ..... ***Pt. cretica var. albolineata***
3 Pinnae green ..... ***Pt. cretica var. cretica***

Pteris cretica Linnaeus *var.* ***albolineata*** Hooker, White-lined Cretan Brake. Cp (FL): limy rocks and soils; rare. Pantropical, the original range unclear. [= FNA; < *Pycnodoria cretica* – S] {add synonymy}

* ***Pteris cretica*** Linnaeus *var.* ***cretica***, Common Cretan Brake. Cp (FL): limy rocks and soils; rare. Pantropical, the original range unclear. [= FNA; < *Pycnodoria cretica* – S] {add synonymy}

* ***Pteris multifida*** Poiret, Spider Brake. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): old walls with lime mortar; rare, native of the Tropics. [= RAB, FNA, K; = *Pycnodoria multifida* (Poiret) Small – S]

* ***Pteris vittata*** Linnaeus, Ladder Brake. Cp (FL, GA, SC): old walls with lime mortar; rare, native of China. [= RAB, FNA, K; = *Pycnodoria vittata* (Linnaeus) Small – S]

Vittaria J.E. Smith 1793 (Shoestring Fern)

A genus of about 50 species, tropics and subtropics. References: Farrar in FNA (1993b); Farrar & Mickel (1991); Kramer in Kramer & Green (1990). Key adapted from Farrar in FNA.

1 Sporophytes present, the leaves linear, 10-60 cm long and 1-3 mm wide ..... ***V. lineata***
1 Gametophytes only present.
2 Gemmae with 2-12 body cells (with at least some present with 2-3 body cells); end cells of gemmae often swollen and larger than the medial cells; rhizoid primordia often absent on 1 or both end cells, seldom present on medial cells; sporophytes apparently not produced.... ***V. appalachiana***
2 Gemmae with 4-16 body cells; end cells of gemmae equal to or smaller than the medial cells; rhizoid primordia regularly present on the end cells, as well as on some medial cells; sporophytes frequently produced (and small sporophytes often present in largely gametophytic colonies) ..... ***V. lineata***

Vittaria appalachiana Farrar & Mickel, Appalachian Shoestring Fern, "Appalachian Gametophyte." Mt (GA, KY, NC, SC, VA), Pd (NC, VA), Ip (KY): shaded grottoes, undersides of overhanging rock outcrops, especially in moist gorges or on spray cliffs in the vicinity of waterfalls, usually on felsic metamorphic rocks, such as mica schist, mica gneiss, granite gneiss, or metaquartzite, or on sandstone; rare. This reduced species consists of "a branched, ribbon-like thallus one cell in thickness, usually differentiated into basal and upright branches; basal branches attached to the substrate by numerous short, brown rhizoids emanating from marginal and interior cells; upright branches terminating in the production of gemmae" (Farrar & Mickel 1991). The species is often overlooked or mistaken for a liverwort; it is most often collected by bryologists and hepaticologists, and was first noted in 1824 by von Schweinitz, who considered it a *Jungermannia*. Southern and Central Appalachians, south of the glacial boundary, from se. PA, sw. NY, and ne. OH south through c. TN and c. KY to n. GA, n. AL, and n. MS (Menapace, Davison, & Webb 1998). Although this species has been known for some time (often referred to as the "Appalachian Gametophyte"), it was only recently named formally (Farrar & Mickel 1991). A range of evidence (morphologic, electrophoretic, and developmental) indicates that it is not the gametophyte of any known *Vittaria* sporophyte; instead, it is a distinct taxon, reproducing vegetatively by gemmae, having lost the capability of producing sporophytes. For additional information, see Farrar (1974), Farrar (1978), Gastony (1977), Farrar, Parks, & McAlpin (1983), and Pittillo et al. (1975). [= FNA; = "a branching, ribbon-like gametophyte, with diffuse rhizoids and linear-shaped gemmae only one cell wide, of the genus *Vittaria*" – RAB; = "thalloid, irregularly shaped gametophytes of a species of *Vittaria*" – C; < *V. lineata* (Linnaeus) Smith – WV]

Vittaria lineata (Linnaeus) Smith, Shoestring Fern. Cp (FL, GA, SC*), Pd (GA)): epiphyte on the bark of *Sabal palmetto*, but the northernmost native site (in Lincoln County, GA, adjacent to SC) was on rock; rare. Se. GA and formerly ec. GA south through FL; introduced in e. SC (Beaufort and Jasper counties) on landscaping plants. Sporophytic plants have pendant linear leaves, 1-3 mm wide and up to 60 cm long, hence the common name. [= FNA, K, S]

SALVINIACEAE Dumortier 1829 (Floating Fern Family)

A family of a single genus and about 10 species. References: Nauman in FNA (1993b); Schneller in Kramer & Green (1990).

Salvinia Séguier 1754 (Water Spangles)

A genus of about 10 species, mostly tropical. References: Nauman in FNA (1993b); Lellinger (1985)=Z ; Jacono (1999); Schneller in Kramer & Green (1990).

1 Leaves 5-15 mm long; multicellular hairs of the upper leaf surface with 4 free, spreading branches (use 10× magnification)..... ***S. minima***
1 Leaves to 50 mm long; multicellular hairs of the upper leaf surface with 4 branches joined at their tips, forming a cage-like structure (use 10× magnification)..... ***S. molesta***

* ***Salvinia minima*** Baker, Water Spangles. Cp (FL, GA, SC): quiet waters; rare, probably introduced in our area from further south. [= FNA, K, Z; *S. auriculata* – S, misapplied]

* ***Salvinia molesta*** D.S. Mitchell. Cp (NC, SC), Pd (NC), Mt (VA): still waters of farm ponds, calcareous seepage ponds, and other situations; rare, introduced (potentially a serious weed in our area). *S. molesta* has been found at scattered sites in NC (Brunswick, Carteret, Craven, Cumberland, Duplin, Durham, Johnston, Jones, Lenoir, Mecklenburg, New Hanover, Onslow, Orange, Person, Pitt, Sampson, and Wake counties), SC (Colleton County), and VA (Shenandoah County), where it has been subjected to extermination efforts; it will likely be reintroduced (Anonymous 1999, D. Patterson, pers. comm.). This species is considered a noxious aquatic weed and has been reported from other southeastern states, such as TX and LA (Jacono 1999). Moran & Smith (1999) support the continued use of the name *S. molesta* for this species, as opposed to the ambiguous name *S. adnata* Desvaux. [= FNA, K, Z]

SCHIZAEACEAE Kaulfuss 1827 (Curly-grass Family)

A family of 3-4 genera and about 30 species (depending on circumscription). The Lygodiaceae is often combined with the Schizaeaceae. References: Wagner in FNA (1993b); Kramer in Kramer & Green (1990).

Schizaea J.E. Smith 1793 (Curly-grass Fern)

A genus of about 10 species (excluding *Actinostachys*), mostly tropical. References: Wagner in FNA (1993b); Kramer in Kramer & Green (1990).

* ***Schizaea pusilla*** Pursh, Curly-grass Fern. Cp (NC): moist, peaty soil under *Chamaecyparis thyoides*; rare, apparently introduced. May-July. In acid, boggy sites in DE, NJ, NY, Newfoundland, Nova Scotia, and New Brunswick; a similar or possibly identical plant is known from Peru. The leaves are filiform, 1-12 cm long. Spores of *Schizaea* have been identified in Pleistocene organic sediment from Singletary Lake (Bladen County, NC) and Rockyhock Bay (Chowan County, NC) (Whitehead 1963). Its native occurrence in our area as an extant species is plausible. See LeBlond & Weakley (2002) for further information on this species' occurrence in North Carolina. [= C, F, FNA, G, K]

SELAGINELLACEAE Willkomm 1861 (Spikemoss Family)

A family of a single genus (as currently broadly conceived) and about 700-750 species. References: Valdespino in FNA (1993b); Tryon (1955); Lellinger (1985); Buck (1977); Somers & Buck (1975); Jermy in Kramer & Green (1990). Key adapted in part from Valdespino in FNA (1993b).

Selaginella Palisot de Beauvois 1804 (Spikemoss)

As currently conceived broadly, a genus of about 700-750 species, cosmopolitan, but mostly tropical. It appears likely that *Selaginella* will likely be subdivided, based on morphology and molecular phylogenetic analyses (Soják 1992; Škoda 1997; Korall, Kenrick, & Therrien 1999). Selaginellaceae, along with Lycopodiaceae and Isoetaceae, now appear to be only distantly related to other extant pteridophytes and seed plants (Pryer et al. 2001). References: Valdespino in FNA (1993b); Tryon (1955); Lellinger (1985); Buck (1977); Somers & Buck (1975); Jermy in Kramer & Green (1990). Key adapted in part from Valdespino in FNA (1993b).

1 Sterile leaves dimorphic, in 4 ranks, the ventral pair spreading laterally, the dorsal pair ascending; leaves acute, mucronate, lacking a white or translucent apical hair-tip; fertile branch tips strongly differentiated (into strobili) from the sterile portions of the stem; [subgenus *Stachygynandrum* or genus *Lycopodioides*].
  2 Main stems erect, the plants to 5 dm tall..... ***S. braunii***
  2 Main stems creeping or ascending.
    3 Lateral leaves of the main stems 2.5-4 mm long, elliptic; lateral stems ascending or erect, 2-6 cm long; rhizophores (modified, leafless, root-producing shoots) borne on the upper side of the stem..... ***S. kraussiana***
    3 Lateral leaves of the main stem 1-2.5 (or to 3.6 in *S. uncinata*) mm long, ovate; lateral stems creeping (or the tips sometimes slightly ascending), 0.2-1 cm long; rhizophores axillary.
      4 Margins of lateral leaves entire; lateral branches of the stems further branching 2-3 times..... ***S. uncinata***
      4 Margins of lateral leaves dentate-serrate; lateral branches of the stems further branching 1-2 times.
        5 Leaves with margins undifferentiated or with 1-2 rows of slightly paler cells stomates distributed over entire upper surface..... ***S. apoda***
        5 Leaves with margins of 3-5 rows of transparent (hyaline) cells; stomates of lateral leaves confined to near the midrib on the upper surface..... ***S. ludoviciana***

SELAGINELLACEAE

1 Sterile leaves monomorphic, spirally arranged around the stems; leaves acuminate and with a white or translucent apical hair-tip (the hair-tip rarely lost); fertile branch tip only slightly differentiated from the sterile portions of the stems; [subgenus *Tetragonostachys* or genus *Bryodesma*].
6 Apical hair-tip of the leaves twisted-contorted, 1.2-1.7 mm long (sometimes deciduous); strobili 3-6 mm long, 1.5-2 mm wide; leaves 0.15-0.3 mm wide, the marginal cilia absent, toothlike, or as much as 1/6 as wide as the leaf blade; budlike "arrested" branches present..... ***S. tortipila***
6 Apical hair-tip of the leaves straight, 0.3.-1.4 mm long (sometimes deciduous); strobili (5-) 10-35 mm long, 1-1.5 mm wide; leaves 0.2-0.45 mm wide, the marginal cilia 1/4-1/3 as wide as the leaf blade; budlike "arrested" branches present or absent.
7 Stems mostly creeping or turned up at the apex, forming mats 1.5-4 cm high; rhizome or rhizomatous stem absent; aerial roots present all along the stems; budlike "arrested" branches absent..... ***S. rupestris***
7 Stems mostly erect or ascending, forming compact clumps usually > 4 cm high; rhizome or rhizomatous stem present; aerial roots present only at or near the base of the erect stems; budlike "arrested" branches present.
8 Leaves of the underground (rhizomatous) stems not scalelike; rhizophores mostly aerial; sporophyll base pubescent; leaf and sporophyll apices often pubescent..... ***S. acanthonota***
8 Leaves of the underground (rhizomatous) stems scalelike; rhizophores mostly subterranean; sporophyll base glabrous; leaf and sporophyll apices glabrous.
9 Leaves mostly tightly appressed; base conspicuously pubescent; strobili distinctly larger in diameter than the subtending stem; sporophyll apex often recurved..... ***S. arenicola***
9 Leaves mostly loosely appressed; base usually glabrescent; strobili not distinctly larger in diameter than the subtending stem; sporophyll apex usually straight..... ***S. corallina***

Selaginella acanthonota Underwood, Spiny Spikemoss, Sand Spikemoss. Cp (FL, GA, NC, SC): sandhills, Altamaha Grit glades; uncommon. June-August. *S. acanthonota* ranges from se. NC south to s. FL, west to panhandle FL. The complex comprising *S. acanthonota*, *S. arenicola*, and *S. riddellii* has been controversial. The complex ranges from se. NC south to s. FL and west to c. TX. *S. arenicola* Underwood ssp. *arenicola* is more southern, from n. GA south to s. FL and west to e. panhandle FL. *S. arenicola* ssp. *riddellii* (Van Eseltine) R. Tryon occurs in TX, OK, AR, LA, AL, and GA. See Tryon (1955) and Valdespino in FNA (1993b) for additional information on the complex. [= FNA, K; < *S. arenicola* – RAB; = *S. arenicola* Underwood ssp. *acanthonota* (Underwood) R. Tryon; = ***Bryodesma acanthonota*** (Underwood) Škoda]

Selaginella apoda (Linnaeus) Spring, Meadow Spikemoss. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (FL, GA, KY, NC, SC, VA): seepages, bogs, spray cliffs, stream margins, other moist habitats; common (rare in KY Coastal Plain). June-October. S. ME, NY, OH, s. IN, AR, and e. OK south to FL, GA, AL, MS, LA, and e. TX. Often overlooked by vascular plant botanists as a moss or liverwort. *S. ludoviciana* of the Gulf Coast east to GA, and *S. eclipes*, more northern, are superficially very similar. [= RAB, C, F, FNA, G, K, W, WV; = *Diplostachyum apodum* (Linnaeus) Beauvois – S; = ***Lycopodioides apodum*** (Linnaeus) Kuntze]

Selaginella arenicola Underwood, Sand Spikemoss. Cp (FL, GA): dry sands; rare. E. GA south to s. FL, se. GA, and Panhandle FL. [= *S. arenicola* Underwood ssp. *arenicola* – FNA, K; = *S. arenicola* – S; = ***Bryodesma arenicola*** (Underwood) Soják]

* ***Selaginella braunii*** Baker, Treelet Spikemoss, Braun's Spikemoss. Cp (NC): naturalized around graveyards or gardens; rare, introduced, native of China. [= FNA, K; ***Lycopodioides***]

Selaginella corallina (Riddell) Wilbur & Whitson, Riddell's Spikemoss. Pd, Cp (GA): dry sands, granite outcrops; uncommon? E. and c. GA west to TX and OK. See Wilbur & Whitson (2005) for an explanation of the nomenclatural change. [= *S. arenicola* Underwood ssp. *riddellii* (Van Eseltine) R.M. Tryon – FNA, K; = ***Bryodesma arenicola*** (Underwood) Soják *ssp.* ***riddellii*** (Van Eseltine) Škoda]

* ***Selaginella kraussiana*** (Kunze) A. Braun, Krauss's Spikemoss, Mat Spikemoss. Cp (GA, NC, SC, VA?): naturalized around gardens or lawns; rare, introduced. [= FNA, K; ***Lycopodioides***]

Selaginella ludoviciana (A. Braun) A. Braun, Gulf Spikemoss, Louisiana Spikemoss. Cp (FL, GA): swamp margins, wet meadows; rare. Gulf Coastal Plain from n. FL and sw. GA west to e. LA. [= FNA, K; = *Diplostachyon ludovicianum* (A. Braun) Small – S; = ***Lycopodioides ludovicianum*** (A. Braun) Kuntze]

Selaginella rupestris (Linnaeus) Spring, Rock Spikemoss. Pd, Mt (GA, NC, SC, VA): granite flatrocks, other, mostly acidic, rock outcrops, occasionally on greenstone or calcareous shales; common. June-September. S. Greenland and Nova Scotia west to Alberta, south to GA, AL, AR, OK, and NE. Valdespino in FNA (1993b) suggests that two or more cryptic or semicryptic species are present within what is currently called *S. rupestris*. Additional study is needed. [= RAB, C, F, FNA, G, K, S, W, WV; = ***Bryodesma rupestre*** (Linnaeus) J. Soják]

Selaginella tortipila A. Braun, Twisted-hair Spikemoss. Mt, Pd (GA, NC, SC): rock outcrops, mostly at high elevations; common. July-September. Endemic to the Southern Appalachians (rarely into the Piedmont) of NC, TN, SC, and GA. Occurring close to the VA border; it should be sought there. [= RAB, FNA, K, S, W; = ***Bryodesma tortipila*** (A. Braun) J. Soják]

* ***Selaginella uncinata*** (Desvaux ex Poiret) Baker, Blue Spikemoss. Cp, Mt (GA): moist forests; rare, native of China. Introduced in sw. GA and other places in the Southeastern United States. [= FNA, K; ***Lycopodioides***] {not yet keyed}

Selaginella eclipes W.R. Buck, Hidden Meadow Spikemoss. Québec and Ontario south to NY, OH, KY, AR, and OK. Separable from *S. apoda* in having the dorsal leaves with long attenuate apices with a well-developed midrib (vs. with acute apices, or if attenuate, then usually keeled and without a well-developed midrib), and the mature megaspores shiny, the reticulation lax (observed at 40× magnification) (vs. dull and closely reticulate). Given its semi-cryptic separation from *S. apoda*, it could easily be present in our area. [= FNA, K; = *S. apoda* (Linnaeus) Spring ssp. *eclipes* (W.R. Buck) Škoda; ***Lycopodioides***] {not yet keyed}

THELYPTERIDACEAE Pichi Sermolli 1970 (Marsh Fern Family)

THELYPTERIDACEAE

A family of 6-30 genera (generic circumscription especially controversial and problematic) and about 900 species. References: Smith in FNA (1993b); Smith & Cranfill (2002); Lellinger (1985); Mickel (1979); Smith in Kramer & Green (1990).

1 Leaf blades 7-25 (-30) cm long, triangular, < 2× as long as wide; rachis with adnate wings between the pinnae; sori without indusia; midribs of pinnae lacking an adaxial groove ..... ***Phegopteris***
1 Leaf blades (15-) 20-100 cm long, lanceolate, oblong-lanceolate, or triangular, > 2× as long as wide; rachis without adnate wings between the pinnae; sori with reniform indusia; midribs of pinnae with an adaxial groove (adaxial groove lacking in *Macrothelypteris*).
2 Midribs of the pinnae lacking an adaxial groove; leaf bipinnate to tripinnate ..... ***Macrothelypteris***
2 Midribs of the pinnae with an adaxial groove; leaf pinnate to pinnate-pinnatifid ..... ***Thelypteris***

Macrothelypteris (H. Itô) Ching 1963 (Maiden Fern)

A genus of about 10 species, tropical and subtropical. References: Smith in Kramer & Green (1990).

* ***Macrothelypteris torresiana*** (Gaudichaud-Beaupré) Ching, Mariana Maiden Fern. Cp (FL, GA, SC), Pd (GA, SC), Mt (GA, VA): disturbed areas, and increasingly invasive in natural habitats (especially in the southern parts of our area); uncommon, native of the Asian and African tropics. Leonard (1972) discusses the history of this species in the southeastern United States. [= FNA, K, WH; = *Dryopteris setigera* Blume – S, misapplied; = *Thelypteris torresiana* (Gaudichaud-Beaupré) Alston]

Phegopteris (C. Presl) Fée 1852 (Beech Fern)

A genus of 3 species, north temperate and boreal. References: Smith in Kramer & Green (1990).

1 Rachis wings absent between the two basal pinna pairs; rachis bearing on its lower surface numerous tan to brown, lanceolate scales (these mostly 6-12 cells wide at the base) and acicular hairs 0.3-1.0 mm long ..... ***Ph. connectilis***
1 Rachis wings present between the two basal pinna pairs; rachis bearing on its lower surface relatively few, white to pale tan, narrowly lanceolate scales (these mostly 3-5 cells wide at the base) and hairs 0.1-0.25 mm long ..... ***Ph. hexagonoptera***

Phegopteris connectilis (Michaux) Watt, Northern Beech Fern. Mt (NC): moist cliffs where wet by spray from waterfalls (at medium elevations), also on high elevation cliffs wet by seepage and in spruce-fir forests; rare. April-August. A circumboreal species, at its southern limit in North America in NC, TN, IA, MT, and OR. Most of the occurrences in NC are at waterfalls in the escarpment gorges of Transylvania, Macon, and Jackson counties, near Highlands. The Southern Appalachian occurrences are disjunct; the species ranges south to WV, and is apparently absent from VA, n. NC, and n. TN. The species is a triploid, reproducing apogamously. [= FNA, K, WV; = *Thelypteris phegopteris* (Linnaeus) Slosson – RAB, C, G, W; = *Dryopteris phegopteris* (Linnaeus) C. Christensen – F; = *Phegopteris phegopteris* (Linnaeus) Keyserling – S]

Phegopteris hexagonoptera (Michaux) Fée, Broad Beech Fern. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA): mesic to submesic forests; common (uncommon in the Coastal Plain, rare in FL). April-August. Widespread in eastern North America, from Québec west to Ontario, WI, and MN, south to Panhandle FL and e. TX. [= FNA, K, S, WH, WV; = *Thelypteris hexagonoptera* (Michaux) Weatherby – RAB, C, G, W; = *Dryopteris hexagonoptera* (Michaux) C. Christensen – F]

Thelypteris Schmidel 1763 (Maiden Fern, Shield Fern, Marsh Fern)

A genus of about 875 species, cosmopolitan, perhaps warranting separation into various segregates. *Thelypteris* is a large and rather heterogeneous group, even with the removal of *Phegopteris* and *Macrothelypteris*. Our species fall into several subgenera, sometimes treated as genera: subgenus or genus *Thelypteris* (*Th. palustris* var. *pubescens*), subgenus or genus *Parathelypteris* (*Th. noveboracensis*, *Th. simulata*), subgenus *Cyclosorus* or genus *Christella* (*Th. dentata*, *Th. hispidula* var. *versicolor*, *Th. interrupta*, *Th. kunthii*, *Th. ovata* var. *ovata*), and subgenus or genus *Stegnogramma* (*Th. burksiorum*). The appropriate names, should the additional segregate genera be adopted, are listed in synonymy. References: Smith (1981); Smith in Kramer & Green (1990). [also see *Macrothelypteris* and *Phegoteris*]

1 Sori elongate; sporangia with hairs 0.1-0.2 mm long; [endemic to nc. AL]; [subgenus or genus *Stegnogramma*] ..... ***Th. burksiorum***
1 Sori round or slightly longer than wide; sporangia glabrous; [collectively widespread]
2 Leaves 5-15 (-20) cm wide; rhizome scales 1-4 mm long, lanceolate to ovate, glabrous, pale brown to golden brown, flexible and very thin.
3 Leaf blade broadest near the middle, gradually reduced to the base, the petiole < 1/3 the length of the blade; [of upland and wetland habitats]; [subgenus or genus *Parathelypteris*] ..... ***Th. noveboracensis***
3 Leaf blade broadest near the base, the pinnae stopping abruptly, the petiole 2/3 to fully as long as the blade; [of wetland habitats].
4 Undersurface of blades without glands; lateral veins of sterile lobes forked once between the pinnule midvein and the margin; lower surface of costae with tan, ovate scales; lobes of fertile leaves revolute; indusia ciliate (rarely glabrous); [subgenus or genus *Thelypteris*] ..... ***Th. palustris*** *var.* ***pubescens***
4 Undersurface of blades with minute, sessile, globular, golden to reddish glands; lateral veins of sterile lobes simple, not forked between the pinnule midvein and the margin; lower surface of costae lacking scales; lobes of fertile leaves plane to slightly revolute; indusia with minute glands along the margins; [subgenus or genus *Parathelypteris*] ..... ***Th. simulata***

THELYPTERIDACEAE

2 Leaves (6-) 10-35 cm wide; rhizome scales 2-6 mm long, linear-lanceolate, usually minutely pilose, yellowish-brown to brown, stiff and rather thick; [subgenus *Cyclosorus* or genus *Christella*].
5 Basal veins from adjacent lobes of the pinna uniting below the sinus (between the sinus and the costa), with a united vein continuing to the sinus.
6 Lower surface of costae with tan scales; upper surface of costae glabrous or sparsely pubescent with hairs < 0.2 mm long; rhizomes long-creeping ..... ***Th. interrupta***
6 Lower surface of costae lacking scales; upper surface of costae moderately to densely hairy with hairs > 0.3 mm long; rhizomes short-creeping.
7 Rachises and petioles usually purplish; costae densely short-hairy on the lower surface, the hairs 0-0.1 (-0.2) mm long (about half as long as the costa width); widest point of the leaf usually 3-5 pairs of pinnae up from the base ..... ***Th. dentata***
7 Rachises and petioles usually tan; costae sparsely hairy on the lower surface, the hairs variable in length, most of them > 0.3 mm long and at least some > 0.5 mm long (the longer as long as or longer than the costa width); widest point of the leaf usually 1-3 pairs of pinnae up from the base ..... ***Th. hispidula var. versicolor***
5 Basal veins from adjacent lobes of the pinna not meeting at all, or reaching the sinus at the same point, thus without a united vein to the sinus.
8 Upper surface of the costae and costules glabrous above (rarely minutely hairy, the hairs never > 0.2 mm long), eglandular ..... ***Th. ovata var. ovata***
8 Upper surface of the costae and costules with at least a few stout hairs > 0.3 mm long; upper leaf surface pubescent to nearly glabrous, also glandular with stipitate glands.
9 Lowermost 1-2 pairs of pinnae distinctly shorter than the pair above (ca. ¾ as long); basal veins from adjacent lobes of the pinna always meeting ..... ***Th. hispidula var. versicolor***
9 Lowermost pair of pinnae equal to or very slightly shorter than the next pair above; basal veins from adjacent lobes of the pinna not meeting at all, or reaching the sinus at the same point ..... ***Th. kunthii***

Thelypteris burksiorum J.E. Watkins & D.R. Farrar. Mt (AL): moist sandstone grottoes; rare. A narrow endemic of nc. AL. Watkins & Farrar (2002, 2005) present evidence for its recognition as a species distinct from *Thelypteris pilosa* and discuss its likely evolution as an ancient relictual taxon. The appropriate combination for its recognition at the species level in *Stegnogramma* has not been made. [= *Thelypteris pilosa* (M. Martens & Galeotti) Crawford var. *alabamensis* Crawford – FNA, K; = ***Stegnogramma pilosa* (M. Martens & Galeotti) K. Iwatsuki var. *alabamensis* (Crawford) K. Iwatsuki**]

* ***Thelypteris dentata*** (Forsskål) E. P. St. John, Downy Maiden Fern. Cp (FL, GA, SC), Pd (GA), Ip (KY), Mt (KY): disturbed areas; rare, native of tropical and subtropical Asia and Africa. [= FNA, K, S, WH; = ***Christella dentata* (Forsskål) Brownsey & Jermy**]

* ***Thelypteris hispidula*** (Decaisne) C.F. Reed *var.* ***versicolor*** (R. St. John) Lellinger, Hairy Maiden Fern. Cp (FL, GA, SC): on soil in disturbed areas; rare. In our area, probably only adventive from further south. [= FNA, K, WH; = *Th. versicolor* R. St. John – S; < ***Christella hispidula* (Decaisne) Holttum**; = *Th. quadrangularis* (Fee) Schelpe var. *versicolor* (R. St. John) A.R. Smith]

Thelypteris interrupta (Willdenow) K. Iwatsuki, Hottentot Fern. Cp (FL): marshes, swamps, ditches; rare. Pantropical. [= FNA, K, WH; ? *Th. gongylodes* (Schkuhr) Small -- S; > *Th. totta* (Thunberg) Schelpe; ***Christella***]

Thelypteris kunthii (Desvaux) C.V. Morton, Kunth's Maiden Fern, Southern Shield Fern. Cp (FL, GA, NC*?, SC), Pd* (GA, NC): coquina limestone ('marl') outcrops, calcareous bluffs and sinkhole slopes, also adventive on and around coquina limestone (marl) riprap around small bridges and ditches and in suburban forests; rare (in NC, perhaps only recently adventive from further south). May-August. In North America, ranging from se. NC south to FL and west to TX. [= RAB, FNA, K, WH; < *Th. normalis* (C. Christensen) Moxley – S; < ***Christella normalis* (C. Christensen) Holttum**]

Thelypteris noveboracensis (Linnaeus) Nieuwland, New York Fern. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (NC, SC, VA), Ip (KY): mesic forests, bottomland forests, bogs, submesic forests; common (rare in KY Interior Low Plateau). May-August. Newfoundland and WI south to GA, AL, and AR. Distinctive in the leaves tapering about equally both to tip and base. [= RAB, C, FNA, G, K, S, W, WV; = *Dryopteris noveboracensis* (Linnaeus) A. Gray – F; = ***Parathelypteris noveboracensis* (Linnaeus) Ching**]

Thelypteris ovata R. P. St. John *var.* ***ovata***, Ovate Maiden Fern. Cp (FL, GA, SC): on coquina limestone ("marl") or in disturbed, calcareous areas; rare. S. SC south to s. FL, west to s. AL; and in the Bahamas. In our area, perhaps only adventive from further south. Var. *lindheimeri* (C. Christensen) A.R. Smith occurs in TX, Mexico, Belize, Guatemala, and Jamaica. [= FNA, K; > *Th. ovata* var. *ovata* – S, in a narrower sense; > *Th. ovata* var. *harperi* (C. Christensen) R. P. St. John – S; < *Th. ovata* –.WH; = ***Christella ovata* (R.P. St. John) Löve & Löve**]

Thelypteris palustris Schott *var.* ***pubescens*** (Lawson) Fernald, Marsh Fern. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA), Ip (KY): bogs, marshes (including freshwater tidal marshes), and bottomland forests; common (rare in KY). June-September. The species is circumboreal, occurring in n. Europe, n. Asia, and n. North America. Var. *pubescens* is the American variety, ranging from Newfoundland and Manitoba south to FL and TX. [= C, FNA, G, K, W, WH, WV; < *Th. palustris* – RAB; = *Dryopteris thelypteris* (Linnaeus) Swartz var. *pubescens* (Lawson) A.R. Prince ex Weatherby – F; < *Th. thelypteris* (Linnaeus) Nieuwland – S]

Thelypteris simulata (Davenport) Nieuwland, Bog Fern, Massachusetts Fern. Mt (NC), Cp (VA): in NC in acid peat bogs at about 1000 meters in elevation, in VA in acid seepage swamps in the Coastal Plain; rare. July-September. Northeastern, ranging from Nova Scotia south to ne. VA (Accomack, New Kent, Northampton and Westmoreland counties) and n. WV (Tucker and Preston counties), and disjunct in NC (Alleghany and Avery counties) and WI. Discovered in NC in the 1980's. Presently known in NC only from two sites. [= C, FNA, G, S, W, WV; = *Dryopteris simulata* Davenport – F; = ***Parathelypteris simulata* (Davenport) Holttum**]

WOODSIACEAE Herter 1949 (Lady Fern Family)

A family of about 15 genera and 700 species, cosmopolitan in distribution, but concentrated in temperate and montane areas. References: Smith in FNA (1993b); Smith et al. (2006); Lellinger (1985); Kramer et al. in Kramer & Green (1990).

1 Sori elongate, indusia present and flaplike, attached along a long side.
  2 Leaves 2-pinnate to 3-pinnate (the pinnae at least 1-pinnate); sori elongate, 2-3× as long as wide, the larger sori generally curved and extending across the veins (except *Diplazium esculentum*).
    3 Veins free, simple or forked ..... ***Athyrium***
    3 Veins anastamosing ..... ***Diplazium***
  2 Leaves 1-pinnate to 1-pinnate-pinnatifid (the pinnae entire or pinnatifid); sori elongate, 2.5-6× as long as wide, even the larger sori generally straight and not extending across the veins.
    3 Leaves 1-pinnate-pinnatifid, the pinnae pinnatifid ..... ***Deparia***
    3 Leaves 1-pinnate, the pinnae entire ..... ***Diplazium***
1 Sori round, indusia present or absent, if present cuplike or lateral (but not attached along a long side).
  4 Leaf blades broadly triangular in outline, ca. 1× as long as wide; rhizome ca. 1 mm in diameter; indusia absent; [native species of mountain peaks of n. NC and VA] ..... ***Gymnocarpium***
  4 Leaf blades lanceolate, oblong, or ovate in outline, 2× or more as long as wide; rhizome more than 2 mm in diameter.
    5 Indusium attached under one side of the sorus, hoodlike or pocketlike, arching over the sorus; petioles glabrous or sparsely beset with scales, the petiole bases not persistent ..... ***Cystopteris***
    5 Indusium attached under the sorus, cuplike (divided into 3-6 lanceolate to ovate lobes which surround the sorus from below) or of minute numerous septate hairs, which extend out from under the sorus on all sides; petioles often densely beset with scales, the petiole bases persistent ..... ***Woodsia***

Athyrium Roth 1799 (Lady Fern)

A genus of about 180 species, cosmopolitan in distribution, but concentrated in e. and se. Asia. Kelloff et al. (2002) and Kelloff & Werth (1998) support recognition of two taxa at either specific or infraspecific levels, based on morphology, allozymes, and spores. References: Kato in FNA (1993b); Kramer et al. in Kramer & Green (1990); Kelloff et al. (2002). [also see *Deparia* and *Diplazium*]

Identification notes: *Athyrium* and *Deparia* superficially resemble *Dryopteris*, and they often grow together. *Athyrium* and *Deparia* have linear, flap-like sori (vs. rounded, reniform sori). Sterile individuals can be distinguished by the number of vascular bundles in the petiole (easily determined by breaking off a leaf and counting the vascular bundles, which will appear as thread-like, but flattened, strands); *Athyrium* and *Deparia* have 2, *Dryopteris* has 4-7.

1 Leaf blade widest near middle (the fourth or fifth pair of pinnae from the base the largest); margins of indusium toothed or ciliate (not glandular); rachis glandular; spores yellow or brown, finely papillose; petiole scales persistent, up to 1 cm long and 1.5 mm wide ..... ***A. angustum***
1 Leaf blade widest near base (the second or third pair of pinnae from the base the largest); margins of indusium ciliate and glandular-ciliate; rachis eglandular; spores brown or dark brown, reticulate-wrinkled; petiole scales early deciduous, up to 5 mm long and 1 mm wide ..... ***A. asplenioides***

Athyrium angustum (Willdenow) K. Presl, Northern Lady Fern. Mt (NC, TN, VA?): rock outcrops on grassy balds at high elevations; rare. June-September. The occurrence of this northern species is not fully documented in NC or VA; it was found in the 1980's by Murray Evans on Hump Mountain, on or near the TN-NC border. Newfoundland and n. Québec west to Saskatchewan, south to w. NC, e. TN, OH, MO, and NE. Reported for VA by Kartesz (1999). [= S, WV; = *A. filix-femina* (Linnaeus) Roth ex Mertens var. *michauxii* (Sprengel) Farwell – C, F, G; = *A. filix-femina* var. *angustum* (Willdenow) G. Lawson – FNA; = *A. filix-femina* ssp. *angustum* (Willdenow) Clausen – K, W]

Athyrium asplenioides (Michaux) A.A. Eaton, Southern Lady Fern. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA), Ip (KY): moist forests; common. May-September. MA, WV, IL, and KS south to n. FL and e. TX. [= RAB, S, WV; = *A. filix-femina* (Linnaeus) Roth ex Mertens var. *asplenioides* (Michaux) Farwell – C, F, FNA, G; = *A. filix-femina* ssp. *asplenioides* (Michaux) Hultén – K, W, WH]

Cystopteris Bernhardi 1806 (Bladder Fern, Brittle Fern)

A genus of about 20 species, sub-cosmopolitan in distribution, primarily of temperate regions but also in montane to alpine settings in tropical regions. References: Haufler, Moran, & Windham in FNA (1993b); Haufler, Windham, & Ranker (1990); Kramer et al. in Kramer & Green (1990).

Identification notes: See *Woodsia* for suggestions on distinguishing between *Cystopteris* and *Woodsia*, similar ferns often confused.

1 Lowest pair of pinnae the longest, thus the leaf widest at the base; bulblets often present on the rachis; indusia, rachises, and veins with stalked glands (these sometimes sparse in *C. tennesseensis*).
  2 Leaf blade 10-55 cm long, usually 2-3× as long as the reddish to tan petiole; bulblets usually present, smooth, green, 2-3 mm in diameter, usually on the rachis and the midrib; spores 20-27 µ long ..... ***C. bulbifera***
  2 Leaf blade 6-25 cm long, usually about 1× as long as the dark brown petiole; bulblets present or absent, deformed and scaly, dark, < 1.5 mm in diameter, on the rachis only; spores 25-35 µ long ..... ***C. tennesseensis***

WOODSIACEAE

1 Lowest pair of pinnae shorter than the second or third pair, thus the leaf widest above the base; bulblets never present; indusia, rachises, and veins eglandular.
3 Leaf blade (2.5-) 3-4× as long as wide; pinnae usually perpendicular to the rachis (or even reflexed); margins of pinnae serrulate, the teeth sharp; basal pinnules sessile, truncate to rounded at the base; indusium up to1 mm long, lanceolate; pinnae usually perpendicular to rachis; [on rock outcrops] ..... ***C. fragilis***
3 Leaf blade 2-2.5 (-3)× as long as wide; pinnae usually at an acute angle to the rachis, curving toward the blade apex; margins of pinnae crenulate, the teeth rounded; basal pinnules short-stalked or sessile, rounded to cuneate at the base; indusium about 0.5 mm long, ovate to round; pinnae usually at an acute angle to the rachis; [on rock outcrops or forest floor].
4 Rhizome long-creeping, the apex extending 10-60 mm beyond the last of the widely-spaced petioles (especially as seen from late spring to summer); rhizome covered with scales and tan to golden hairs; spores 20-32 µ long; leaves membranaceous in texture; basal pinnules conspicuously stalked; petiole green to tan, darkened at base; lowermost pinnules of each pinna deeply cut; [typically on forest floor, less commonly on rocks] ..... ***C. protrusa***
4 Rhizome short-creeping, the apex extending only 1-5 mm beyond the last of the closely-spaced petioles; rhizome covered with scales, lacking hairs; spores 32-42 µ long; leaves thicker in texture; basal pinnules slightly stalked or merely cuneate to the base; petiole dark brown; lowermost pinnules of each pinna slightly lobed; [often on rocks, less commonly on forest floor] ..... ***C. tenuis***

Cystopteris bulbifera (Linnaeus) Bernhardi, Bulblet Fern, Bulblet Bladder Fern. Ip (KY), Mt (GA, KY, NC, VA), Pd (NC, SC, VA): moist outcrops and talus of calcareous rocks, rarely up to 1500 m elevation; uncommon (common in KY Interior Low Plateau, rare in Piedmont). May-August. Newfoundland west to MN, south to NC, nw. SC (Oconee County), nw. GA, AL, and AR; also disjunct in UT, AZ, NM, and TX. This species is a diploid involved in the reticulate evolution of *Cystopteris* in e. North America. It is one parent of *C. tennesseensis*. Its genome can be symbolized BB. [= RAB, C, F, FNA, G, K, S, W, WV]

Cystopteris fragilis (Linnaeus) Bernhardi, Fragile Fern, Brittle Fern. Mt (NC, VA): cliffs, ascending in our area to 1650 m; rare. June-September. Circumboreal, in North America ranging from Newfoundland west to AK, south to MA, CT, NJ, montane NC, VA, KY, MO, OK, TX, NM, and AZ. This species is a fertile allotetraploid, presumed to be derived from hybridization between *C. reevesiana* Lellinger and an extinct or currently undiscovered second parent (*C. "hemifragilis"*); its genome can be symbolized HHRR (Paler & Barrington 1995). *C. fragilis* appears to be a complex needing further study; additional entities may be found to warrant taxonomic recognition (see FNA for discussion). [= FNA, K, W; = *C. fragilis* var. *fragilis* – C, F, G, S; < *C. fragilis* (also see *C. tenuis*) – WV]

Cystopteris protrusa (Weatherby) Blasdell, Lowland Bladder Fern. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY), Cp (FL): rich woods or on moss- and soil-covered talus in boulderfields, occasionally on ledges of rock outcrops; common (rare in Coastal Plain). April-June. NY and Ontario west to MN, south to GA, Panhandle FL (Washington County) (Wunderlin & Hansen 2006), AL, MS, LA, AR, e. KS, and IA. This species is a diploid involved in the reticulate evolution of *Cystopteris* in e. North America. It is one parent of *C. tennesseensis* and *C. tenuis*. Its genome can be symbolized PP. [= RAB, C, FNA, K, W, WV; = *C. fragilis* var. *protrusa* Weatherby – F, G, S]

Cystopteris tennesseensis Shaver, Tennessee Bladder Fern. Ip (KY), Mt (GA, KY, NC, VA), Cp (NC): moist to dry outcrops of calcareous rocks, including coquina limestone ("marl") in the outer Coastal Plain; rare (uncommon in KY Interior Low Plateau). April-June. PA, KY, IL, WI, and IA south to NC, nw. GA, n. AL, AR, and OK. This species is a fertile allotetraploid derived from hybridization between *C. bulbifera* and *C. protrusa.* Its genome can be symbolized BBPP. Haufler, Windham, & Ranker (1990) consider this a "successfully fledged and vigorous young species," adapted to a hybrid niche not successfully utilized by either parent. [= RAB, C, FNA, K, W; = *C. ×tennesseensis* – WV]

Cystopteris tenuis (Michaux) Desvaux, Mackay's Bladder Fern. Mt (GA, NC, VA), Pd (VA), Ip (KY): moist outcrops and cliffs of metamorphic and sedimentary rocks, occasionally in moist soils near rock outcrops; uncommon (rare in KY). May-August. Newfoundland west to MN and NE, south to VA, IL, and MO, and in the mountains to NC, TN, and n. GA. This species is a fertile allotetraploid derived from hybridization between *C. protrusa* and an extinct or currently undiscovered second parent (*C. "hemifragilis"*); its genome can be symbolized HHPP (Paler & Barrington 1995). [= FNA, K, W; = *C. fragilis* var. *mackayi* Lawson – C, F, G; < *C. fragilis* – WV]

Hybrids frequently occur where two or more species of *Cystopteris* grow in proximity. The following hybrids may be anticipated in our area: ***Cystopteris bulbifera* × *tennesseensis***, ***Cystopteris bulbifera* × *tenuis*** [= ***C. ×illinoensis*** R.C. Moran], ***Cystopteris fragilis* × *tenuis***, ***Cystopteris protrusa* × *tennesseensis***, ***Cystopteris protrusa* × *tenuis***, ***Cystopteris tennesseensis* × *tenuis*** [= ***C. ×wagneri*** R.C. Moran].

Deparia Hooker & Greville 1829

A genus of about 40-50 species, primarily in tropical to warm temperate Asia and Africa. References: Kato in FNA (1993b); Kramer et al. in Kramer & Green (1990).

Identification notes: Unlike *Athyrium*, *Deparia* has the costal groove not continuous with the rachis groove. In addition, *Deparia* has multicellular hairs on the leaf blades.

1 Leaf blade narrowed to base; petiole bases swollen, with 2 rows of teeth; [plant a common native species of moist forests]; [section *Lunathyrium*] ..... ***D. acrostichoides***
1 Leaves widest at the base; petiole bases not markedly swollen, lacking teeth; [plant an exotic species, rarely introduced and naturalized]; [section *Athyriopsis*] ..... ***D. petersenii***

Deparia acrostichoides (Swartz) M. Kato, Silvery Spleenwort. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY), Cp (NC, VA): moist forests, cove forests; common (uncommon in Piedmont and Interior Low Plateau, rare in Coastal Plain). June-September. Nova Scotia west to MN, south to NC, SC, n. GA, n. AL, and AR. *D. acrostichoides* is the only species

native to the New World; it has several very closely related species in e. Asia (in section *Lunathyrium*). It stores starch in the swollen, persistent petiole bases. [= FNA, K, W; = *Athyrium thelypteroides* (Michaux) Desvaux – RAB, C, F, G, WV; = *Diplazium acrostichoides* (Swartz) Butters – S]

* ***Deparia petersenii*** (Kunze) M. Kato. Cp (AL, FL, GA): swamp forests, disturbed areas; rare, native to se. Asia. Introduced and naturalized in the Southeast, including in c. and s. GA, AL, s. MS, and FL. [= FNA; = *Deparia petersonii* – K, orthographic variant; = *Deparia japonica* (Thunberg) M. Kato, misapplied; = *Diplazium japonicum* (Thunberg) Beddome, misapplied]

Diplazium Swartz 1800 (Twin-sorus Fern, Glade Fern)

A genus of about 400 species, primarily tropical and north temperate in distribution. References: Kato in FNA (1993b); Kramer et al. in Kramer & Green (1990).

1 Leaves 2-pinnate; veins anastamosing ..... ***D. esculentum***
1 Leaves 1-pinnate; veins free ..... ***D. pycnocarpon***

* ***Diplazium esculentum*** (Retzius) Swartz, Vegetable Fern. Cp (FL): moist disturbed areas; rare, native of the Old World tropics. [= FNA, K]

Diplazium pycnocarpon (Sprengel) M. Broun, Glade Fern. Mt (GA, KY, NC, SC, VA), Ip (KY), Pd (GA, NC, VA), Cp (GA, KY, VA): very nutrient-rich, loamy or seepy forests, over calcareous sedimentary (such as limestone or dolostone) or mafic metamorphic or igneous rocks (such as greenstone or amphibolite); uncommon (common in KY, rare in VA Coastal Plain and all provinces and states south of VA). July-September. Widespread in e. North America, much more common in limestone areas of the Ridge and Valley than in the primarily acid-soil Blue Ridge and Piedmont. [= FNA, K; = *Athyrium pycnocarpon* Sprengel – RAB, C, F, G, WV; = *Homalosorus pycnocarpos* (Sprengel) Pichi-Sermolli – S, W]

Gymnocarpium Newman 1851 (Oak Fern)

A genus of about 8 species, north temperate in distribution. References: Pryer in FNA (1993b); Pryer & Haufler (1993)=Z; Pryer (1992); Kramer et al. in Kramer & Green (1990). Key based on FNA.

1 Sessile basal basiscopic pinnule of the proximal pinnae with basal basiscopic pinnulet shorter than the adjacent pinnulet; pinnae of second pair sessile, with basal pinnules shorter than the adjacent pinnule (or second basal pinnae rarely stalked); spores 27-31 µm in diameter ..... ***G. appalachianum***
1 Sessile basal basiscopic pinnule of the proximal pinnae with basal basiscopic pinnulet more or less equal in length to the adjacent pinnulet; pinnae of second pair usually sessile, with basal pinnules more or less equal in length to the adjacent pinnule; spores 34-39 µm in diameter .... ***[G. dryopteris]***

Gymnocarpium appalachianum Pryer & Haufler, Appalachian Oak Fern. Mt (NC, VA): moist, rocky forests, at medium to high elevations; uncommon (rare in NC). June-September. Endemic to the c. and s. Appalachians (known from ne. WV, nw. VA, sc. PA, and disjunct in nw. NC and OH). Electrophoretic and morphologic analyses show that it is one of the diploid parents of the widespread allotetraploid *G. dryopteris*. In NC, it is limited to a single site, below the north-facing summit cliffs on Bluff Mountain, Ashe County, where seepage results in extensive ice formations which frequently persist until June. [= FNA, K, Z; < *G. dryopteris* (Linnaeus) Newman – C, G, W, WV; < *Dryopteris disjuncta* (Ledebour) C.V. Morton – F]

Gymnocarpium dryopteris (Linnaeus) Newman, Northern Oak Fern. Circumboreal, occurring throughout northern and central Eurasia, Greenland, south in North America to MD (?), s. PA, OH, MI, WI, IA, w. SD, CO, n. NM, and c. AZ. Since it approaches our area from the north and closely resembles *G. appalachianum*, it should be carefully sought in our area, especially in the mountains of VA. See Pryer & Haufler (1993) for a detailed analysis of the distinguishing features of *G. appalachianum* and *G. dryopteris*.

Triploids are known from the mountains of VA. Their identity is uncertain; based on geography they are presumably *G. appalachianum* × *dryopteris*, but could be *G.* ×*brittonii* (Sarvela) Pryer & Haufler [= *G. disjunctum* × *dryopteris*]. Triploids can be distinguished from *G. appalachianum* by the presence of malformed spores, irregular in shape and size, often intermixed with large round spores (vs. all spores reniform and relatively uniform in size and shape). [*G.* ×*brittonii* (Sarvela) Pryer & Haufler – K]

Woodsia R. Brown 1810 (Woodsia, Cliff Fern)

A genus of about 30 species, of temperate and cool-temperate regions, widespread in the Northern Hemisphere, in montane tropical South America, and south temperate in Africa and South America. References: Windham in FNA (1993b); Kramer et al. in Kramer & Green (1990).

Identification notes: *Woodsia* species and *Cystopteris* species are all small ferns with thin-textured leaves, occurring primarily on or near rock outcrops; they frequently occur together or in proximity to one another and are often confused. *Woodsia* has the indusium divided into a series of scale-like or hair-like structures, attached below the sorus; *Cystopteris* has an undivided indusium, pocket-like or hood-like, attached around one side of the sorus. *Woodsia* has persistent dark petiole bases; in *Cystopteris* the petiole bases are deciduous. *Woodsia* has the final veinlets not reaching the margin; *Cystopteris* veins do reach the margin.

WOODSIACEAE

1 Petioles with a distinct joint about 1-3 cm above the base, the petiole bases of former leaves forming a fairly even stubble; leaf blade lacking glands (though bearing both long septate hairs and pale linear scales); indusium of numerous filamentous segments ..... ***W. ilvensis***
1 Petioles lacking a distinct joint, the petiole bases of former leaves disintegrating irregularly and forming an uneven stubble; leaf blade with stalked glands, at least below on the costae, costules, and veins (and also bearing nonglandular hairs and/or linear scales); indusium of 3-6 lanceolate segments.
2 Rachis with flattened, septate, white hairs and elongate stipitate glands; leaf blade with flattened, septate, white hairs and elongate stipitate glands ..... ***W. appalachiana***
2 Rachis with scattered scales; leaf blade with sparse to dense stipitate glands..... ***W. obtusa ssp. obtusa***

Woodsia appalachiana T.M.C. Taylor, Appalachian Woodsia, Appalachian Cliff Fern, Mountain Woodsia. Mt (GA, KY, NC, VA), Pd (NC, VA): on cliffs of sandstone, shale, granite, granitic gneiss, and hornblende gneiss; uncommon, rare in GA, KY, and NC. June-September. Endemic to the Southern and Central Appalachians of VA, WV, NC, nw. GA, TN, and the Ozarks of AR. This species is similar to *W. scopulina* of the western mountains of AK south to CO and CA. The eastern plants have been variously treated as a full species, a subspecies or variety of *W. scopulina*, or as indistinguishable from *W. scopulina* (see synonymy). It now appears that *W. appalachiana* may be a rather cryptic but distinct element of a reticulate complex also involving *W. scopulina* ssp. *scopulina* (of the Rocky Mountains) and *W. scopulina* ssp. *laurentiana* Windham (primarily of the Rocky Mountains but also disjunct eastward in Ontario and Québec). Windham in FNA (1993b) treats these three entities as subspecies, and suggests that ssp. *laurentiana* is the allotetraploid derivative of hybridization of the eastern and western diploids. If this is indeed so, each of the 3 entities should be recognized at the species level. [= F, K; < *W. scopulina* D.C. Eaton – RAB, C, S, W, WV; = *W. scopulina* ssp. *appalachiana* (T.M.C. Taylor) Windham – FNA; = *W. scopulina* var. *appalachiana* (T.M.C. Taylor) Morton – G]

Woodsia ilvensis (Linnaeus) R. Brown, Rusty Woodsia, Rusty Cliff Fern. Mt (NC, VA): cliffs of amphibolite, greenstone, other rocks; uncommon, rare in NC and apparently only in the northernmost few counties of that state. June-September. Circumboreal, ranging in North America from Newfoundland and AK south to VA, nw. NC, OH, n. IL, nw. IA, Saskatchewan, and British Columbia. [= RAB, C, F, FNA, G, K, S, W, WV]

Woodsia obtusa (Sprengel) Torrey *ssp.* ***obtusa***, Common Woodsia, Blunt-lobed Cliff Fern. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA), Ip (KY): rock outcrops of various sorts, moist talus, terrestrial near rock outcrops; common (rare in KY Mountains). June-September. ME, Québec, MN, and e. NE, south to FL and TX. [= FNA, K; < *W. obtusa* – RAB, C, F, G, S, W, WV]

GYMNOSPERMS

The gymnosperms are a likely artificial grouping of about 16 families, about 86 genera, and about 850 species. References: Kramer & Green (1990).

Standard Key to Families

1 Leaves pinnately compound ..... ***ZAMIACEAE***
1 Leaves simple.
  2 Leaves fan-shaped, dichotomously-veined, deciduous ..... ***GINKGOACEAE***
  2 Leaves needle-like or scale-like, not dichotomously veined, evergreen (rarely deciduous).
    3 Seeds borne singly in a soft fleshy to leathery aril ..... ***TAXACEAE***
    3 Seeds 2-many, borne in a woody or fleshy cone (sometimes resembling a rather hard berry).
      4 Foliage leaves needle-like or scale-like, alternate, opposite, or whorled; cone scales valvate or imbricate (if imbricate, the leaves scale-like and opposite) ..... ***CUPRESSACEAE***
      4 Foliage leaves needle-like, alternate or fascicled; cone scales imbricate ..... ***PINACEAE***
{add CEPHALOTAXACEAE to key}

Key to Genera, Emphasizing Vegetative Characters

1 Leaves pinnately compound ..... ***Zamia*** (ZAMIACEAE)
1 Leaves simple.
  2 Leaves fan-shaped, dichotomously-veined, deciduous ..... ***Ginkgo*** (GINKGOACEAE)
  2 Leaves needle-like or scale-like, not dichotomously veined, evergreen (deciduous in *Taxodium* and *Larix*).
    3 Leaves either borne on short spur-shoots or in fascicles of 2-5; leaves rounded to somewhat flattened in cross-section, but not 4-sided.
      4 Leaves evergreen, > 3 cm long, borne in fascicles of 2-5 ..... ***Pinus*** (PINACEAE)
      4 Leaves deciduous or evergreen, < 3 cm long, borne on short spur-shoots.
        5 Leaves evergreen; cones 6-12 cm long ..... ***Cedrus*** (PINACEAE)
        5 Leaves deciduous; cones 1-2 cm long ..... ***Larix*** (PINACEAE)
    3 Leaves borne singly, alternate, opposite, or whorled; leaves flattened, scale-like, or 4-sided in cross-section.
      6 Leaves opposite or whorled, generally scale-like.
        7 Branchlets not disposed in one plane, thus bushy and not fan-like; plants dioecious, male and female cones on separate plants; mature female cones fleshy and berry-like, with smooth surfaces, indehiscent ..... ***Juniperus*** (CUPRESSACEAE)
        7 Branchlets disposed in one plane, thus flattened and fan-like; plants monoecious, male and female cones on the same plant; mature female cones woody or leathery, with irregular surfaces, dehiscent.
          8 Female cones globose and woody, the hard scales peltate, not imbricate; ultimate branchlets (including the scale leaves) about 1 mm broad ..... ***Chamaecyparis*** (CUPRESSACEAE)
          8 Female cones ellipsoid and leathery, the pliable scales basally attached, imbricate; ultimate branchlets (including the scale leaves) about 1.5 mm broad
            9 Branchlets flattened in vertical planes; seeds wingless; [planted tree, sometimes persistent] ..... ***Platycladus*** (CUPRESSACEAE)
            9 Branchlets flattened in horizontal planes; seeds winged; [native tree, but also sometimes planted] ***Thuja*** (CUPRESSACEAE)
      6 Leaves alternate, needle-like or flattened.
        10 Leaves 4-sided in cross-section ..... ***Picea*** (PINACEAE)
        10 Leaves flattened in cross-section.
          11 Leaves rounded, blunt, or minutely notched at the tip (at 10×), prominently whitened beneath (with stomatal stripes); cone scales imbricate.
            12 Leaves attached directly to twig; cones 4-5 cm long, erect ..... ***Abies*** (PINACEAE)
            12 Leaves jointed, on short, persistent base; cones 1-3.8 cm long, pendant ..... ***Tsuga*** (PINACEAE)
          11 Leaves acute to acuminate (distinctly pointed at the tip), green beneath; seeds borne in a fleshy aril **or** cone scales valvate.
            13 Leaves deciduous, soft-textured ..... ***Taxodium*** (CUPRESSACEAE)
            13 Leaves evergreen, firm-textured.
              14 Leaves tapering from near the base to a long-acuminate apex; seeds borne in a woody cone with valvate scales ..... ***Cunninghamia*** (CUPRESSACEAE)
              14 Leaves parallel-sided for most of their length, the apex acute; seeds borne singly in a soft fleshy to leathery aril.
                15 Leaves 2.0-7.5 cm long (at least the larger on a branch > 4 cm long) ..... ***Cephalotaxus*** (CEPHALOTAXACEAE)
                15 Leaves 1.0-3.8 cm long.
                  16 Leaves flexible, the tips pointed but not piercing to the touch; fleshy "cone" ca. 5 mm long, ca. 5 mm in diameter, red when ripe, the seed exposed at the top by a gap in the aril ..... ***Taxus*** (TAXACEAE)
                  16 Leaves stiff, the tips piercing to the touch; fleshy "cone" 2.5-3 cm long, ca. 2 cm in diameter, dark green to purple when ripe, seed entirely surrounded by fleshy tissue ..... ***Torreya*** (TAXACEAE)

CEPHALOTAXACEAE Neger 1907 (Plum-yew Family)

A family of 1 genus and ca. 10 species, trees and shrubs, of e. Asia. References: Farjon (1998); Tripp (1995)=Z; Page in Kramer & Green (1990).

Cephalotaxus Siebold and Zuccarini ex Endlicher 1842 (Plum-yew)

* ***Cephalotaxus harringtonia*** (Knight ex J. Forbes) K. Koch, Plum-yew. Pd (NC), Mt (VA): suburban woodlands; rarely grown horticulturally, rarely naturalizing in the vicinity of plantings (as in Chapel Hill, Orange County, NC, and Grottoes, Augusta County, VA), native of Asia. [= Z] {not yet keyed in family key}

CUPRESSACEAE Bartlett 1830 (Cypress Family)

A family of about 25-30 genera and about 120 species. Recent studies indicate that the separation of the Taxodiaceae from the Cupressaceae is not warranted, and they are here combined (Gadek et al. 2000; Brunsfeld et al. 1994). The subfamilial classification used here follows Gadek et al. (2000). References: Farjon (2005); Hart & Price (1990); Hardin (1971b); Watson & Eckenwalder in FNA (1993b); Page in Kramer & Green (1990).

1 Leaves alternate.
  2 Leaves evergreen, rigid, > 2 cm long, tapering from near the base to a long-acuminate apex; [subfamily *Cunninghamioideae*]..... ***Cunninghamia***
  2 Leaves deciduous, flexible, < 2 cm long, parallel-sided, the apex short-acute; [subfamily *Taxodioideae*]..... ***Taxodium***
1 Leaves opposite or whorled; [subfamily *Cupressoideae*].
  3 Branchlets not disposed in one plane, thus bushy and not fan-like; plants dioecious, male and female cones on separate plants; mature female cones fleshy and berry-like, with smooth surfaces, indehiscent..... ***Juniperus***
  3 Branchlets disposed in one plane, thus flattened and fan-like; plants monoecious, male and female cones on the same plant; mature female cones woody or leathery, with irregular surfaces, dehiscent.
    4 Female cones globose and woody, the hard scales peltate, not imbricate; ultimate branchlets (including the scale leaves) about 1 mm broad..... ***Chamaecyparis***
    4 Female cones ellipsoid and leathery, the pliable scales basally attached, imbricate; ultimate branchlets (including the scale leaves) about 1.5 mm broad
      5 Branchlets flattened in vertical planes; seeds wingless; [planted tree, sometimes persistent]..... ***Platycladus***
      5 Branchlets flattened in horizontal planes; seeds winged; [native tree, but also sometimes planted]..... ***Thuja***

Callitropsis Linnaeus (Cypress)

As newly circumscribed, a genus of ca. 18 species. Little (2006) demonstrates the monophyly of the New World *Cupressus*. References: Little (2006)=Z; Little et al. (2004).

* *Callitropsis ×leylandii* (A.B. Jackson & Dallimore) D.P. Little, Leyland Cypress, is commonly planted as an ornamental tree in our area. It is a hybrid between *Callitropsis nootkatensis* (D. Don in Lambert) Ørsted [*Chamaecyparis nootkatensis* (D. Don in Lambert) Spach; *Cupressus nootkatensis* D. Don in Lambert], Nootka Cypress, and *Callitropsis macrocarpa* (Hartweg) D.P. Little [*Cupressus macrocarpa* Hartweg], Monterey Cypress. [= Z; = ×*Cupressocyparis leylandii* (A.B. Jackson & Dallimore) Dallimore & A.B. Jackson; = *Cupressus ×leylandii* A.B. Jackson & Dallimore] {not keyed }

Chamaecyparis Spach 1841 (White Cedar)

A genus of about 5 species, trees, of warm temperate to cool temperate North America and Asia. The genus consists of 6 species – ours, 1 in w. North America, and 3 in Japan & Taiwan. References: Michener in FNA (1993b); Farjon (2005)=Y; Farjon (1998)=Z; Page in Kramer & Green (1990).

Chamaecyparis thyoides (Linnaeus) Britton, Sterns, & Poggenburg, Atlantic White Cedar, Juniper. Cp (FL, GA, NC, SC, VA): peat dome and streamhead pocosins, blackwater stream swamps, hillside seepages, in highly acidic, peaty or sandy soils; uncommon. March-April; October-November. S. ME south to n. FL and west to s. MS. From NJ south it is strictly a tree of the Coastal Plain; northward it is often found in kettle-hole bogs. In SC and GA, *Ch. thyoides* is absent in the outer Coastal Plain, occurring primarily in the fall-line Sandhills. A prized timber tree, now much reduced in abundance, formerly used for cabinetry, boat-building, shingles, and other uses. The wood is valuable enough (and resistant enough to rot) to have been mined from bogs in NJ. NC has some of the largest remaining stands of Atlantic White Cedar, in areas of very difficult access, such as the interiors of major peat-domes and large peat-filled Carolina bays. The species is generally known as "juniper" in our area. [= RAB, C, F, FNA, G, K, S; > *Ch. thyoides* var. *henryae* (H.L. Li) Little – Y, Z; > *Ch. thyoides* var. *thyoides* – Y, Z; = *Cupressus thyoides* Linnaeus]

Cunninghamia R. Brown 1826 (China-fir)

A genus of 2 species, trees, of e. Asia (China and Taiwan). References: Farjon (1998)=Z; Page in Kramer & Green (1990).

* *Cunninghamia lanceolata* (Lambert) Hooker, China-fir. Pd (NC): planted horticulturally; rare, perhaps only persistent, native of China. A variety of forms are seen, some with dark-green, others with glaucous-blue foliage. [= K, Z; *C. sinensis* R. Brown]

CUPRESSACEAE

Juniperus Linnaeus 1753 (Red Cedar, Juniper, Savin)

A genus of about 60 species, trees and shrubs, of temperate, boreal, and subtropical regions of the Northern Hemisphere. Various species of *Juniperus*, especially creeping species, are frequently used in landscaping. Molecular studies suggest that section *Juniperus* (*J. communis* var. *depressa* in our area) and section *Sabina* (*J. virginiana* in our area) are quite divergent (Adams & Demeke 1993). Small's (1933) recognition of the genus *Sabina* may prove to be warranted; some modern authors accept it (especially Europeans) and recent molecular evidence provides some support. References: Adams in FNA (1993b); Adams (1986); Adams & Demeke (1993); Adams (1995); Page in Kramer & Green (1990).

1 Leaves flat-acicular, 5-20 mm long, never scale-like, with a white line on the upper surface; leaves borne in whorls of 3, spreading at 45-90 degrees from the twig; female cone ("berry") axillary, maturing in 2-3 years; [section *Juniperus*] ..... ***J. communis* var. *depressa***

1 Leaves primarily scale-like, ca. 1-2 mm long, though acicular and 2-10 mm long on young trees and some lower branches of larger trees, without a white line on the upper surface (though generally somewhat glaucous); leaves of mature twigs borne in opposite pairs of 2, decussate (thus 4-ranked), appressed to the twig (leaves of immature twigs sometimes in whorls of 3, spreading at 10-45 degrees from the twig); female cones ("berries") terminal on short branches, maturing the first year; [section *Sabina*].

2 Female cones ("berries") 3-4 mm long; terminal twigs 0.75-0.90 mm wide (including the scale-like leaves); scale leaves 1.20-1.45 mm long, obtuse to acute; trees generally with rounded crowns, the lower branches often drooping ..... ***J. virginiana* var. *silicicola***

2 Female cones ("berries") 4-7 mm long; terminal twigs 0.85-1.00 mm wide (including the scale-like leaves); scale leaves 1.40-1.65 mm long, acute; trees generally with sharply tapered crowns, the lower branches generally ascending ..... ***J. virginiana* var. *virginiana***

Juniperus communis Linnaeus *var.* ***depressa*** Pursh, Ground Juniper, Mountain Juniper, Common Juniper. Mt (NC, SC, VA), Pd (GA, NC, VA), Cp (SC, VA), Ip (KY): in thin soil around rock outcrops on mountain summits and Piedmont monadnocks and rocky bluffs (in GA and NC), high elevation old fields (in VA), xeric Coastal plain sandhills (in SC and VA); rare. March-April; fleshy cone maturing in second or third year. This species is circumpolar, widespread in n. North America, n. Europe, and n. Asia. In North America it is primarily northern and montane, occurring nearly throughout Canada and AK, south in the Appalachians to n. GA, south in the Rocky Mountains to NM, AZ, and CA. Its berry is the juniper berry used as a spice, as well as the main flavoring of gin. It is sometimes planted as a landscaping plant. In e. North America, it is rare and scattered south of PA, MI, and WI, ranging south to a few disjunct sites in VA, NC, SC, GA, and s. IN. As a native species, it is very rare in the Southeast; in NC known only from a few sites, notably Mount Satulah (Macon County) and King's Pinnacle (Gaston County). In SC, a notable population occurs in sandy soils in Aiken County (Hitchcock Woods). Definitely in our area is var. *depressa,* a decumbent shrub, up to about 1 meter high, forming large clonal patches. Harvill et al. (1992) report scattered sites for var. *communis* in montane VA; these are based on columnar trees. Adams in FNA (1993b) considers var. *depressa* to be the only variety occurring in e. United States, and states that var. *depressa* sometimes forms columnar trees to 10 m tall; such individuals may be the basis of reports of var. *communis* from our area. Additional problems about the status of *Juniperus communis* in our area remain unresolved; variation in growth form, morphologic characters, and habitat suggest the possibility of the presence of several native taxa. See Coker & Totten (1945) for additional discussion. [= RAB, C, F, FNA, G, K, W; ? *J. sibirica* Burgsdorff – S; < *J. communis* – WV]

Juniperus virginiana Linnaeus *var.* ***silicicola*** (Small) E. Murray, Southern Red Cedar, Coastal Red Cedar. Cp (FL, GA, NC, SC, VA?): maritime forests and scrub, hammocks, coastal shell middens and natural shell deposits, brackish marshes, and other sandy or peaty, circumneutral situations; common. January-February; October-November. Var. *silicicola* ranges from e. NC (VA?) south to s. FL, and possibly west to MS. Many recent authors have treated this taxon as a species, but Adams (1986) and Adams in FNA (1993b) consider varietal status more appropriate; Adams (1995) suggests that the two may have diverged as recently as the Pleistocene. The two varieties are said to intergrade in GA, and in other areas the characters used to separate them seem variable or imperfectly correlated. Large individuals can be as much as a meter in diameter. [= FNA, K; = *Juniperus silicicola* (Small) Bailey – RAB; = *Sabina silicicola* Small – S; = *Juniperus virginiana* ssp. *silicicola* (Small) J. Silba]

Juniperus virginiana Linnaeus *var.* ***virginiana***, Eastern Red Cedar. Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA), Ip (KY): in a wide variety of forests, pastures, old fields, roadsides, and fencerows, primarily upland, occurring most abundantly on circumneutral soils (including shrink-swell clays), derived from mafic or calcareous rocks; common (especially in the Piedmont). January-March; October-November. Var. *virginiana* ranges throughout e. United States. The wood is much used for fence posts and the traditional southern cedar chest (which takes advantage of the moth-deterrent properties of cedar wood). [= C, F, FNA, G, K; = *Juniperus virginiana* – RAB, W, WV; = *Sabina virginiana* (Linnaeus) Antoine – S]

Platycladus Spach 1842 (Chinese Arborvitae)

A monotypic genus, a tree, of e. Asia (n. China and Manchuria). *Platycladus* is distinct from *Thuja*. References: Watson & Eckenwalder in FNA (1993); Page in Kramer & Green (1990).

* ***Platycladus orientalis*** (Linnaeus) Franco, Oriental Arborvitae, Tree-of-life. Cp, Mt (NC): commonly planted, especially in graveyards, and rarely persisting and spreading to pastures, fields, and roadsides; rare, native of Asia. [= FNA, K; = *Biota orientalis* (Linnaeus) Endlicher – S; = *Thuja orientalis* Linnaeus]

Taxodium L.C. Richard 1810 (Bald-cypress)

CUPRESSACEAE

A genus of 3 species, trees, of e. North America and Mexico. There has been much debate over whether the two taxa of *Taxodium* in our area should be treated as species or varieties, and if as varieties, the proper nomenclature. I agree with Godfrey (1988), in his preference "to recognize two species ... because it is my perception that the vast majority of trees (populations) are thus distinguishable." True intermediates appear to be non-existent, though the "mimicry" of the two species creates "pseudo-intermediates" that can cause difficulties in identification. Occasionally, the two species can be seen growing together, in "hybrid habitats," as at the junction of Lake Waccamaw and the Waccamaw River (Columbus County, NC); there are no intermediates, and with both species present for comparison, even juvenile trees are readily identifiable. Neufeld (1986) discusses the different architecture and ecophysiology of the two species. The only other species in the genus is *T. mucronatum* Tenore, ranging from s. TX south to Mexico and Guatemala. West of the Mississippi River, the architecture of *T. distichum* comes to resemble that of *T. mucronatum*, suggesting the possibility of introgression. For this and other reasons, Watson in FNA (1993b) and other authors prefer to treat *T. mucronatum* as a third variety of *T. distichum*, *T. distichum* var. *mexicanum* Gordon. *Taxodium* is most closely related to *Glyptostrobus* and *Cryptomeris*. References: Godfrey (1988)=Z; Duncan and Duncan (1988); Watson in FNA (1993b); Page in Kramer & Green (1990); Tsumura et al. (1999). Key adapted from Z.

1 Larger knees short, rarely > 4 dm tall, usually columnar or broad and mound-like, with thick, compact bark on top; leafy branchlets ascending from the twigs, secundly erect (the base often curving, the apical portion of the branchlet borne in a vertical plane), except on juvenile trees (which mimic *T. distichum*); leaves subulate, spirally arranged, not spreading laterally and featherlike (except on juvenile trees), ascending or appressed; leaves mostly 3-10 mm long (to 15 mm long on juvenile trees); bark thick (1-2.5 cm thick), furrowed, dark-brown, not exfoliating; [trees of isolated depressions (clay-based Carolina bays, depression ponds), wet savannas, pocosins and other wet peaty habitats, and, less commonly, blackwater swamps and natural lakes] ..... ***T. ascendens***

1 Larger knees often tall, often > 4 dm tall, usually narrowly conical, with thin, shreddy bark on top; leafy branchlets spreading laterally from the twigs, except in the crowns of mature trees (which mimic *T. ascendens*); leaves linear, flat, spirally arranged but by twisting of their basal portions spreading laterally and featherlike (pseudo-distichous), appressed only on drooping branches of the crown, if at all; leaves mostly 8-20 mm long (sometimes less on crown branches); bark thin (< 1 cm thick), exfoliating in shreddy, orange-brown strips; [trees of brownwater swamp forests, blackwater swamp forests, natural lakes, and millponds] ..... ***T. distichum***

Taxodium ascendens Brongniart, Pond-cypress. Cp (FL, GA, NC, SC, VA): limesink ponds (dolines), clay-based Carolina bays, wet savannas, pocosins and other wet, peaty habitats, shores of natural blackwater lakes, swamps of blackwater streams; common. March-April; October. Se. VA south to s. FL, west to e. LA; it is surely one of the most scenic trees of eastern North America. [= RAB, G, K, S, Z; < *T. distichum* – F; = *T. distichum* var. *imbricarium* (Nuttall) Croom – FNA; = *T. distichum* var. *nutans* (Aiton) Sweet]

Taxodium distichum (Linnaeus) L.C. Richard, Bald-cypress. Cp (FL, GA, KY, NC, SC, VA), Ip (KY), Pd (GA*?, NC*): brownwater and blackwater swamps, usually in riverine situations; common (rare in Coastal Plain and Interior Low Plateau). March-April; October. DE and e. MD south to FL and west to e. TX and se. OK, north along the Mississippi River and its tributaries to s. IN and s. IL. This species is sometimes planted as an ornamental in upland sites. [= RAB, G, K, S, Z; = *T. distichum* var. *distichum* – C, FNA; < *T. distichum* – F (also see *T. ascendens*)]

Thuja Linnaeus 1753 (Arborvitae)

A genus of 5 species, trees, of e. North America, w. North America, and e. Asia. References: Chambers in FNA (1993b); Page in Kramer & Green (1990).

Thuja occidentalis Linnaeus, American Arborvitae, Northern White Cedar, Flat Cedar. Mt (KY, NC?, VA), Ip (KY), Pd (VA): dry limestone, dolostone, and calcareous sandstone cliffs, talus, and boulderfields, rarely in our area in calcareous swamps, also planted and persisting around old homesites and cemeteries (mainly in the Mountains); uncommon (rare in VA Piedmont, rare in KY, rare in NC, where perhaps only introduced). March-April. Nova Scotia, Hudson Bay, and Manitoba south to PA (where considered strictly introduced by Rhoads & Klein 1993), OH, n. IN, n. IL, and in the mountains to WV, w. VA, and e. TN. This species is alleged by various authors to have occurred as a native species in nw. NC on limestone bluffs in Alleghany, Ashe, and/or Burke counties, but it has not been relocated in this century, and little apparently suitable habitat occurs in NC. [= RAB, C, F, FNA, G, K, S, W, WV]

GINKGOACEAE Engler in Engler & Prantl 1897 (Ginkgo Family)

A family of a single genus and single species, a tree, native of China. *Ginkgo* has no close living relatives. References: Whetstone in FNA (1993b); Page in Kramer & Green (1990).

Ginkgo Linnaeus 1771 (Ginkgo, Maidenhair Tree)

A monotypic genus, a tree, native of China. *Ginkgo* is famous as a "living fossil," known from fossils nearly 200 million years old which are nearly identical to modern plants; it may be extinct as a native plant. References: Whetstone in FNA (1993b); Page in Kramer & Green (1990).

GINKGOACEAE

* ***Ginkgo biloba*** Linnaeus, Ginkgo, Maidenhair Tree. Pd, Mt (NC): frequently planted, rarely escaped to suburban woodlands and yards; rare, native to se. China. As pointed out by Whetstone in FNA (1993b), *Ginkgo* is only weakly naturalized. [= C, FNA, K]

PINACEAE Lindley 1836 (Pine Family)

A family of about 12 genera and about 220 species, trees and shrubs, almost exclusively in the Northern Hemisphere. References: Thieret in FNA (1993b); Price (1989)=Z; Page in Kramer & Green (1990).

1 Leaves flat and linear; [subfamily *Abietoideae*].
  2 Leaves attached directly to twig; cones 4-5 cm long, erect ..... ***Abies***
  2 Leaves jointed, on short, persistent base; cones 1-3.8 cm long, pendant ..... ***Tsuga***
1 Leaves needle-like, angular rather than flat in cross-section.
  3 Leaves borne singly, 4-sided; [subfamily *Abietoideae*] ..... ***Picea***
  3 Leaves either borne on short spur-shoots or in fascicles of 2-5, rounded to somewhat flattened in cross-section, but not 4-sided.
    4 Leaves evergreen, > 3 cm long, borne in fascicles of 2-5; [subfamily *Pinoideae*] ..... ***Pinus***
    4 Leaves deciduous or evergreen, < 3 cm long, borne on short spur-shoots; [subfamily *Laricoideae*].
      5 Leaves evergreen; cones 6-12 cm long ..... ***Cedrus***
      5 Leaves deciduous; cones 1-2 cm long ..... ***Larix***

Abies P. Miller 1754 (Fir)

A genus of about 40-50 species, trees, of temperate regions of the Northern Hemisphere, south to Central America. Our 2 native species and other non-natives are grown as ornamentals, especially in the mountains. References: Hunt in FNA (1993b); Liu (1971)=Y; Page in Kramer & Green (1990).

1 Cones 10-15 cm long; [section *Abies*] ..... ***A. alba***
1 Cones 3.5-8 cm long; [section *Balsameae*].
  2 Bracts of the mature cones shorter than the scales or slightly exserted beyond the scales; stomatal rows (4-) 7 (-8) on each side of the midvein on the lower leaf surface (visible at 10× magnification); [plant of the Central Appalachians and north, from Page and Madison counties, VA, northward] ..... ***A. balsamea***
  2 Bracts of the mature cones longer than the scales and reflexed; stomatal rows (8-) 10 (-12) on each side of the midvein on the lower leaf surface (visible at 10× magnification); [plant of the Southern Appalachians, from Grayson and Smyth counties, VA, southward] ..... ***A. fraseri***

* ***Abies alba*** P. Miller, European Fir, Silver Fir. Mt (NC): naturalized in Highlands, NC (Macon Co.), from plantings made by Thomas G. Harbison in the late 1800's (J.D. Pittillo, pers. comm.); rare. May; October. [= Y]

Abies balsamea (Linnaeus) P. Miller, Balsam Fir, Northern Balsam. Mt (VA): high elevation forests and cliffs; rare (VA Rare). April-May. Newfoundland and Labrador west to n. Alberta, south to NY, PA, MI, WI, and IA, and (disjunct) in the mountains to n. VA (known in our area as a native only from Page and Madison counties, VA). There has been considerable debate over the taxonomic status of some, especially southern, populations of *A. balsamea*, which show some transition in characters toward *A. fraseri*, and have been variously treated as *A. intermedia* Fulling, *A. balsamea* var. *phanerolepis* Fernald, or *A.* ×*phanerolepis* (Fernald) Liu. Variation in e. North American *Abies* is somewhat clinal, with the greatest geographical and morphological discontinuity between n. VA and s. VA. It seems best, therefore, to recognize *A. fraseri* as a species and *A. balsamea* as a species which includes the clinal var. *phanerolepis*. The balsam woolly adelgid, an alien pest, is afflicting this species in Shenandoah National Park. [= C, FNA, K, W, Y, Z; > *A. balsamea* var. *balsamea* – F, G; > *A. balsamea* var. *phanerolepis* Fernald – F, G, WV; > *A.* ×*phanerolepis* (Fernald) Liu – Y; > *A. intermedia* Fulling]

Abies fraseri (Pursh) Poiret, Fraser Fir, She Balsam, Southern Balsam. Mt (*GA, NC, VA): high elevation forests, from about 1500-2037 m; uncommon (US Species of Concern, NC Rare, VA Rare). May-June; September-November. Southern Appalachian endemic, from Grayson and Smyth counties, VA (notably, Mount Rogers) south to e. TN and sw. NC; naturalizing on Brasstown Bald in GA, where planted. This species is threatened as a native species by a virulent alien pest, the balsam woolly adelgid, and environmental damage caused by pollution. Populations on Mt. Rogers and, to a lesser extent, Roan and Grandfather mountains, appear to be relatively healthy. *A. fraseri* is closely related to the northern Balsam Fir, *A. balsamea*, and may be a relatively recent derivative of it. During the 1970's and 1980's, the cultivation of Fraser Fir Christmas trees became an important part of the economy of the North Carolina mountains. Most Christmas tree plantations are at 1000-1500 m in elevation; below 1000 m, Fraser Fir is very susceptible to a fungal root rot (*Phytophthora*), above 1500 m it grows too slowly to be profitable and is often "flagged" by winds, ruining its shape for commercial purposes. [= RAB, C, F, FNA, G, K, S, W, WV, Y, Z]

Cedrus Trew 1757 (Cedar)

A genus of 2-4 species, trees, native to n. Africa to Asia. References: Page in Kramer & Green (1990).

* ***Cedrus deodara*** (Roxburgh ex D. Don) G. Don, Deodar Cedar. Pd, Cp (NC, SC): frequently planted, rarely escaped to suburban woodlands; rare. [= K]

Larix P. Miller 1754 (Larch)

A genus of about 10 species, trees, of cold temperate and boreal regions of the Northern Hemisphere. References: Parker in FNA (1993b); Page in Kramer & Green (1990).

1 Leaves 2.5-3 cm long; cones 2-3.5 cm long; [alien species rarely planted] ..... ***L. decidua***
1 Leaves 1-2.5 cm long; cones 1.2-2 cm long; [native species south to MD and WV] ..... ***[L. laricina]***

* ***Larix decidua*** P. Miller, European Larch. Mt (NC): forests; rare, native of Europe. Planted as an ornamental and experimentally as a forest tree, persisting and sometimes escaping in the high mountains of NC. [= F, K]

Larix laricina (Du Roi) K. Koch, Eastern Larch or Tamarack. Bogs and swamps. South to Garrett County, MD and Preston County, WV. [= FNA, C, F, G, K, WV]

Picea A. Dietrich 1824 (Spruce)

A genus of about 40 species, trees, of cool temperate and boreal parts of the Northern Hemisphere. References: Taylor in FNA (1993b); Page in Kramer & Green (1990).

1 Cones 10-16 cm long; upper branches spreading to ascending, the lower drooping; outer bud scales without hairlike projections; [plant an alien, but widely planted as an ornamental and sometimes as an experimental timber plantation tree] ..... ***P. abies***
1 Cones 1.5-4.5 cm long; upper branches ascending, the lower spreading; outer bud scales prolonged into minute hairlike projections; [plant native].
  2 Cones 1.5-2.5 cm long, gray at maturity, long-persistent ..... ***[P. mariana]***
  2 Cones 2.5-4.5 cm long, red-brown at maturity, short-persistent ..... ***P. rubens***

* ***Picea abies*** (Linnaeus) H. Karsten, Norway Spruce. Mt (NC, VA): persisting and escaping from forestry plantations at moderate or high elevations, notably in Great Smoky Mountains National Park (Kephart Prong), Mount Mitchell State Park, and the Biltmore Estate; rare, native of n. Europe. [= FNA, K, WV]

Picea rubens Sargent, Red Spruce, He Balsam. Mt (NC, VA): common to dominant in spruce and spruce-fir forests at high elevations, scattered in northern hardwood forests, heath balds, boulderfield forests, ridges, and rarely coves, also in bogs or swampy forests at lower elevations (down to about 1000 m), ranging in moisture tolerance from dry ridges (though these are often fog-bathed) to saturated peats; uncommon. May-June; October. Nova Scotia and New Brunswick south (interruptedly) to w. NC and e. TN. Hardin (1971b) discusses the existence of southern populations of *P. rubens* growing in bogs (notably Long Hope Valley, Ashe and Watauga counties, NC and Pineola Bog, Avery County, NC) with shorter than normal leaves (8-10 mm long vs. 12-15 mm long). He suggests that "this may be ecotypic, but one wonders whether the short leaves and bog habitat might reflect a few Black Spruce genes that have persisted since the Pleistocene." Further study with modern electrophoretic and molecular techniques seems warranted. [= RAB, C, F, FNA, G, K, S, W, WV, Z; > *P. australis* Small – S]

* *Picea mariana* (P. Miller) Britton, Sterns, & Poggenburg, Black Spruce, ranges south to s. PA and NJ. It has also been reported from bogs in our area: for NC (Small 1933) and for VA (Fernald 1950). These reports are apparently based on misidentifications of short-leaved, bog-inhabiting populations of *P. rubens* (see discussion under *P. rubens*). [= C, F, FNA, G; > *P. mariana* var. *mariana* – K]

Pinus Linnaeus 1753 (Pine)

A genus of about 110 species, trees, of the Northern Hemisphere, south to Central America. References: Kral in FNA (1993b); Duncan & Duncan (1988); Gernandt et al. (2005); Price, Liston, & Strauss (1998); Richardson (1998); Page in Kramer & Green (1990).

Identification notes: Young saplings generally have shorter needles than larger saplings and mature trees; measurements in the key are those of mature trees.

Main Key

1 Needles 5 in each bundle; each needle with 1 vascular bundle; [subgenus *Strobus*, section *Strobus*] ..... ***P. strobus***
1 Needles 2-3 (-4) in each bundle; each needle with 2 vascular bundles; [subgenus *Pinus*].
  2 Bracts and bud scales fimbriate; sheath > 1.3 cm long; needles 20-50 cm long, in bundles of 3 (-4); twigs about 1 cm in diameter; [subgenus *Pinus*, section *Trifoliae*, subsection *Australes*] ..... ***P. palustris***
  2 Bracts and bud scales entire or edged with hairs, but not fimbriate; sheath < 1.5 cm long; needles (2-) 3-30 cm long, in bundles of 2-4; twigs < 1 cm in diameter.
    3 Needles in bundles of 3, or 2 and 3, or 3 and 4 (predominantly or at least substantially in 3's); [subgenus *Pinus*, section *Trifoliae*, subsection *Australes*].
      4 Needles in bundles of 2 and 3.
        5 Needles 3-7 cm long; prickles on cones 3-8 mm long, stout (> 1 mm wide at base of prickle) ..... ***P. pungens***

5 Needles 5-30 cm long; prickles on cones 1-3 mm long, slender (< 1 mm wide at base of prickle).
6 Needles 17-30 cm long; cones (6) 12-15 cm long ..... ***P. elliottii var. elliottii***
6 Needles 5-12 cm long; cones 4-7 cm long ..... ***P. echinata***
4 Needles in bundles of 3 (rarely with a few 2's), or 3 and 4.
7 Cones distinctly longer than broad when open or closed, 5-13 cm long; needles mostly (10-) 12-23 (-28) cm long, 0.7-1.5 mm wide; buds not resinous (or only slightly so); trunks not producing adventitious sprouts (epicormic sprouting)..... ***P. taeda***
7 Cones about as broad as long, 3-6 cm long; needles (4-) 7-16 (-20) cm long, 1.5-2.0 mm wide; buds resinous; trunks commonly producing adventitious sprouts (epicormic sprouting), especially in response to fire.
8 Needles (10-) 16-20 (-21) cm long, persisting 3-4 years; cones serotinous; [trees of pocosins, savannas, and other wetlands of the Coastal Pain] ..... ***P. serotina***
8 Needles (4-) 7-10 (-15) cm long, persisting only 2 years; cones opening at maturity, not serotinous; [trees of ridges, slopes, bottomlands, and bogs of the Mountains and Piedmont] ..... ***P. rigida***
3 Needles in bundles of 2 only.
9 Needles stout, 1.3-2 mm wide.
10 Needles 7-16 cm long; cones 4-6 cm long, each scale bearing a small depressed mucro; [introduced tree, usually planted only on Coastal Plain barrier islands]; [subgenus *Pinus*, section *Pinus*, subsection *Pinus*] ..... ***P. thunbergiana***
10 Needles 3-6 (-8) cm long; cones **either** 6-9 cm long with each scale bearing a stout, woody spine, **or** 3-6 cm long and unarmed; [native tree of the Mountains and upper Piedmont **or** introduced tree south to MD and WV].
11 Cones 6-9 cm long with each scale bearing a stout, woody spine; [native tree of the Mountains and upper Piedmont; [subgenus *Pinus*, section *Trifoliae*, subsection *Australes*] ..... ***P. pungens***
11 Cones 3-6 cm long, unarmed; [introduced tree south to MD and WV]; [subgenus *Pinus*, section *Pinus*, subsection *Pinus*]..... ***[P. sylvestris var. sylvestris]***
9 Needles slender to somewhat stout, 0.5-1.2 mm wide.
12 Needles 15-25 cm long; [trees naturalized on barrier islands]; [subgenus *Pinus*, section *Pinus*, subsection *Pinaster*]..... ***P. pinaster***
12 Needles 2-17 cm long; [trees generally elsewhere].
13 Needles 10-17 cm long; branches brittle; spring shoots with a single node, with 1 whorl of branches; [trees of the north, sometimes planted in our Mountains]; [subgenus *Pinus*, section *Pinus*, subsection *Pinus*] ..... ***P. resinosa***
13 Needles 2-13 cm long; branches flexible; spring shoots usually with several nodes (several whorls of branches); [trees of various habitats].
14 Needles 2-8 cm long, generally twisted; cones opening at maturity, not serotinous, the scales bearing prominent, slender prickles 2-5 mm long; [subgenus *Pinus*, section *Trifoliae*, subsection *Contortae*] ..... ***P. virginiana***
14 Needles 5-13 cm long, twisted or not; cones opening at maturity or serotinous, the scales bearing prominent, short, stout prickles or minute, deciduous prickles, and also with a faint to conspicuous horizontal ridge.
15 Anthers yellow; bark tight, closely ridged, not sloughing off, reminiscent of a hardwood; [native trees of mesic to fairly wet, fertile soils]; [subgenus *Pinus*, section *Trifoliae*, subsection *Australes*] ..... ***P. glabra***
15 Anthers dark orange; bark flaky, the laminated layers sloughing off in a manner typical of a pine; [non-native (in our immediate area) trees of xeric sands]; [subgenus *Pinus*, section *Trifoliae*, subsection *Contortae*] ..... ***P. clausa***

Auxiliary Key to common pines of the Piedmont

1 Needles 12-25 cm long, predominantly in bundles of 3; winter buds > 1 cm long; cones 6-15 cm long, falling soon after releasing seed; bark plates thick, without crater-like blisters ..... ***P. taeda***
1 Needles 2-13 cm long, predominantly in bundles of 2; winter buds < 1 cm long; cones 3-7 cm long, persisting on trees for several years after releasing seed; bark plates thin, with or without crater-like blisters.
2 Needles 7-13 cm long, not twisted, or slightly so, in bundles of 2 (usually with some in bundles of 3), rather slender, < 1.0 mm wide; bark plates mostly > 4 cm wide, with crater-like blisters ca. 1 mm in diameter; winter buds not very resinous; 3-4 year-old twigs rough and flaking ..... ***P. echinata***
2 Needles 2-8 cm long, typically twisted, in bundles of 2, rather stout, often 1.0-1.2 mm wide; bark plates mostly about 2 cm wide, without crater-like blisters; winter buds very resinous; 3-4 year-old twigs smoothish to rough, but not flaking ..... ***P. virginiana***

Pinus clausa (Chapman ex Engelmann) Vasey ex Sargent, Sand Pine. Cp (FL, *GA, *NC): widely planted in pulp plantations in FL and s. GA, experimentally planted as far north as NC; rare, native to Florida. *P. clausa* is closely related to *P. virginiana*, the northern North American *P. banksiana*, and the northwestern North American *P. contorta* complex. [= FNA, K, S, WH, Z]

Pinus echinata P. Miller, Shortleaf Pine, Rosemary Pine, Yellow Pine. Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA), Ip (KY): dry rocky ridges and slopes, sandhills, old fields, forests, generally in rather xeric sites, but also occurring in mesic to even wet sites; common (uncommon in KY Interior Low Plateau). March-April; September-October. Widespread in se. North America, north to s. NY, NJ, s. PA, s. OH, s. IL, s. MO, and e. OK, perhaps reaching its greatest importance in dry, sandstone landscapes, such as the Cumberland Plateau of WV, KY, TN, and AL, and the Ozarks and Ouachitas of AR, MO, and OK. [= RAB, C, F, FNA, G, K, S, W, WH, WV, Z]

Pinus elliottii Engelmann *var. elliottii*, Slash Pine. Cp (FL, GA, NC*, SC): native in wet pine flatwoods and maritime forests in GA and SC, extensively planted in GA, SC, and NC in silvicultural plantations on a wide variety of soils, many of them unsuitable for its successful growth; common. January-February; October-November. *P. elliottii* var. *elliottii* ranges from e. SC south to c. peninsular FL, west to e. LA; var. *densa* Little & Dorman is restricted to c. and s. peninsular FL. *P. elliottii* var. *densa* is perhaps better treated as a full species, *Pinus densa* (Little & Dorman) de Laubenfels & Silba. *P. elliottii* var. *elliottii* has been extensively planted throughout the Coastal Plain of Ga, NC, and SC, where it now occupies tens of thousands of hectares. Superficially, *P. elliottii* resembles both *P. palustris* and *P. taeda*, with cone size and needle length intermediate. *P. elliottii* var. *elliottii* is sometimes difficult to tell from *P. taeda*; additional helpful characteristics are the seed cones on 1.5-3 cm long stalks (vs. essentially sessile), seed cones reddish-brown and glossy, appearing varnished (vs. brown and dull), needles thicker and a dark glossy green (vs. thinner and a yellowish green); bark prominently flaking off and revealing reddish patches (vs. not notably

flaking off and revealing reddish patches). [= FNA, K, Z; < *P. elliottii* – RAB, WH; *P. caribaea* Morelet – S, in part, misapplied; *P. palustris* P. Miller – S, in part, misapplied; *P. heterophylla* – S]

Pinus glabra Walter, Spruce Pine, Walter's Pine. Cp (FL, GA, SC): bottomland forests, rich, moist soils; common, uncommon in SC. March-April; September-October. SC south to n. FL and west to se. LA. This pine is unusual in growing in moist (even infrequently flooded), fertile habitats, usually mixed with bottomland hardwoods, and apparently rather shade tolerant, sometimes growing as an understory tree. [= RAB, FNA, K, S, WH, Z]

Pinus palustris P. Miller, Longleaf Pine, Southern Pine. Cp (AL, FL, GA, LA, MS, NC, SC, VA), Pd (GA, NC, SC), Mt (AL, GA): formerly throughout the Coastal Plain, Sandhills, and lower Piedmont, on a wide variety of soils (sandy, loamy, clayey, or peaty), from very dry to very wet conditions, in savannas, woodlands, and forests affected by relatively frequent natural (lightning caused) fires (likely augmented by native Americans), now reduced to less than a tenth of its former abundance by a variety of forces, including turpentining, timbering, free-range hogs, fire suppression, and "site conversion" by foresters to other trees, now extremely rare in VA and north of the Neuse River in NC, still occurring in some abundance in the outer Coastal Plain from Carteret County, NC south into GA, in the Bladen Lakes area of Bladen and Cumberland counties, and in the Sandhills of Harnett, Hoke, Scotland, Richmond, Moore, Anson, and Montgomery counties, NC and south into GA; common (locally). March-April; September-October. A Southeastern Coastal Plain endemic: se. VA south to FL and west to se. TX; it extends slightly into the Piedmont in most states where it occurs, and further into the Piedmont and low mountains in GA and AL. "The species has been heavily exploited for timber and turpentine production, and it has been estimated that by 1930 only ten percent of its original volume of timber remained" (Price 1989); certainly much less now remains. Longleaf Pine is the state tree of NC. A hybrid with *P. taeda*, *P.* ×*sondereggeri* H.H. Chapman, occurs. [= RAB, C, FNA, K, WH; = *P. australis* Michaux f. – F, G, S]

* ***Pinus pinaster*** Aiton, Maritime Pine, Cluster Pine. Cp (NC): planted and naturalized on barrier islands; rare, native of Mediterranean Europe. *P. pinaster* is reported by Brown (1959) to be "introduced from Mediterranean region and planted on sand-flats in vicinity of Corolla, Currituck Banks, Bodie and Hatteras Island 1936-1940.... Now producing seeds and becoming naturalized near Cape Hatteras Lighthouse. More resistant to salt spray than native pines" (Brown 1959). Graetz (1973) discusses its use on the Outer Banks and concludes that it is "not as well adapted to inclement beach conditions as Japanese black pine." *P. pinaster* is conspicuous just south of Nags Head on NC 12 (Dare County, NC), further south at Bodie Island Lighthouse (Dare County, NC), on Ocracoke Island (Hyde County, NC), and elsewhere. It has needles in 2's, (10-) 15-20 (-25) cm long. [= K]

Pinus pungens Lambert, Table Mountain Pine, Burr Pine, Hickory Pine. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): dry ridges, cliffs, shale barrens, usually requiring fire for its reproduction, occurring at least up to 1550 m; common (rare in Coastal Plain). May; September-October. A Central and Southern Appalachian endemic: n. NJ, through se. PA, w. MD, WV, w. VA, w. NC, and e. TN to nw. SC and ne. GA. [= RAB, C, F, FNA, G, K, S, W, WV, Z]

* ***Pinus resinosa*** Aiton, Red Pine. Mt (NC, VA): in pine plantations, and persisting after silvicultural planting; rare. This species is native as far south as WV (Pendleton and Hardy counties) and PA (Luzerne, Wyoming, Tioga, and Centre counties). [= C, F, FNA, G, K, WV]

Pinus rigida P. Miller, Pitch Pine. Mt (GA, KY, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): primarily on dry ridges, more or less requiring fire for its reproduction, less commonly in peat soils of mountain bogs (and then often at elevations of 800-1000 m) and also scattered through a variety of forest types; uncommon (rare in Coastal Plain of VA). May; September-October. S. Canada and s. ME south to n. GA. It is abundant near sea level in the Pine Barrens of NJ, but in NC is limited to the mountains and upper Piedmont; it is replaced in Coastal Plain fire-maintained wetland communities by the related *Pinus serotina*. [= RAB, C, F, FNA, G, K, S, W, WV, Z; = *P. rigida* ssp. *rigida*]

Pinus serotina Michaux, Pocosin Pine, Pond Pine, Marsh Pine. Cp (FL, GA, NC, SC, VA), Pd (NC, SC, VA): peaty soils of pocosins, swamps of small blackwater streams; common, rare in Piedmont. April; August (or at any time of year in response to fire). A Southeastern Coastal Plain endemic: s. NJ south to n. FL and se. AL, restricted to the Coastal Plain. A remarkable tree, well-adapted to fire by its serotinous cones and its ability to resprout needles from the branches, trunk ("epicormic sprouting"), or roots following fire. Extensive areas of peatland in the outer Coastal Plain are dominated by *P. serotina*, sometimes codominant with *Gordonia lasianthus*. Following fires which destroy all branches but do not kill the trees, epicormic sprouting results in entire forests of odd-looking cylindrical pond pines, the trunk thickly beset with needles, the outline of the tree a narrow cylinder 10-20 meters tall and less than 1 meter in diameter from base to summit. *P. serotina* is clearly a southern relative of *P. rigida*. It normally occurs in fire-maintained wetlands associated with ("downhill" from) *P. palustris*. On deep peats, *P. serotina* is stunted and of very irregular form; on mineral or shallower organic soils it can reach large size. Even when well-developed, the trunk is typically twisted and gnarled, helping to distinguish it from *P. taeda*. [= RAB, C, F, FNA, G, K, S, WH, Z; = *P. rigida* P. Miller ssp. *serotina* (Michaux) Clausen]

Pinus strobus Linnaeus, Eastern White Pine. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (SC*, VA), Ip (KY): moist to dry forests, bottomlands, dry, rocky ridges in humid gorges; common (uncommon in KY Mountains, rare in Coastal Plain and Interior Low Plateau). April; August-September. Widespread in ne. North America, south to VA, w. and (rarely) c. NC, nw. SC, n. GA, e. TN, KY, IN, n. IL, e. IA, and MN. *P. strobus* was probably the tallest tree in e. North America, reaching heights of 60-70 meters. It was a very important timber tree historically. In NC a notable relict and disjunct stand of *P. strobus* occurs on bluffs of the Deep River in the eastern Piedmont of Chatham County; in VA *P. strobus* is widely but irregularly distributed in the lower Piedmont. [= RAB, C, F, FNA, G, K, W, WV, Z; = *Strobus strobus* (Linnaeus) Small – S]

Pinus taeda Linnaeus, Loblolly Pine, Old Field Pine. Cp (FL, GA, KY*, MD, NC, SC, VA), Pd (GA, NC, SC, VA): forests, fields, pine plantations; common, much more abundant and widespread than formerly, occurring further west than as a native (rare in KY). March-April; October-November. Native from s. NJ, DE, and e. MD south to n. peninsular FL, west to e. TX and se. OK, primarily on the Coastal Plain, but inland to s. TN; this distribution now expanded by forestry plantation. Northward. See *P. elliottii* for additional characters to distinguish these two species. [= RAB, C, F, FNA, G, K, S, W, WH, Z]

PINACEAE

* ***Pinus thunbergiana*** Franco, Japanese Black Pine. Cp (GA?, MD, NC, SC): planted and persisting, sometimes appearing native, on barrier islands; rare, native of Japan. Growing in maritime situations in its native land, this tree's strong resistance to salt spray is the reason for its horticultural use in our area. Following moderate storm events on the coast, *P. thunbergiana*'s needles remain green and undamaged, even when needles of *P. taeda*, native to such situations, are salt-killed. [= K; =? *P. thunbergii* Parlin]

Pinus virginiana P. Miller, Virginia Pine, Scrub Pine, Jersey Pine. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY), Cp (NC, SC, VA): dry forests and woodlands, especially on slopes and ridges, also common in certain areas as a weedy successional tree on nearly any kind of site; common (rare in the Coastal Plain). March-May; September-November. Primarily a Central and Southern Appalachian endemic: s. NY, NJ, and PA, south through VA, WV, s. OH, s. IL, KY, TN, and NC to nw. SC, n. GA, n. AL, and ne. MS. A small, scrubby pine, occurring in very dense, monospecific stands in the upper Piedmont as a result of secondary succession of old fields. [= RAB, C, F, FNA, G, K, S, W, WV, Z]

* *Pinus sylvestris* Linnaeus var. *sylvestris*, Scots Pine, is introduced and at least weakly naturalized south to MD (Kartesz 1999) and e. WV (Morton et al. 2004). [= FNA; < *P. sylvestris* – C, F, G, K]

The following pines occur on barrier islands in GA, NC and SC: *P. taeda*, *P. palustris*, *P. elliottii* var. *elliottii*, *P. thunbergiana*, and *P. pinaster* (the latter two not native). In the Coastal Plain, the pines are *P. palustris*, *P. serotina*, *P. echinata*, *P. taeda*, *P. glabra*, and *P. elliottii* var. *elliottii*. In the Piedmont, three pines are common and typically present in disturbed upland soils: *P. taeda*, *P. echinata*, and *P. virginiana*. The auxiliary key is useful in separating these sometimes confusing trees.

Tsuga Carrière 1847 (Hemlock)

A genus of about 14 species, trees, of North America and e. Asia (China, Japan, and Taiwan). References: Taylor in FNA (1993b); Page in Kramer & Green (19\90).

1 Most of the leaves 8-13 mm long, those originating from the sides and lower surface of the twig spreading more or less distichously in a horizontal plane, normally sized, those borne on the upper surface of the twig more or less appressed, dwarf, mostly 1/6 to 1/2 as long as the adjacent lateral leaves, 1-3 (-6) mm long, the whitened undersurface (consisting of rows of stomata) exposed upward; leaf margins minutely serrulate; leaf apices obtuse to rounded; seed cones 12-25 mm long..... ***T. canadensis***

1 Most of the leaves 10-18 mm long, those originating from the sides and lower surface of the twig spreading more or less distichously in a horizontal plane, normally sized, those borne on the upper surface of the twig not appressed, spreading at a 60-90 degree angle from the twig, more or less normally sized, mostly 3/4 to as long as the adjacent lateral leaves, 8-15 mm long, the whitened undersurface (consisting of rows of stomata) not exposed upward; leaf margins entire; leaf apices minutely retuse (notched), truncate, or rounded; seed cones 20-38 mm long.. ..... ***T. caroliniana***

Tsuga canadensis (Linnaeus) Carrière, Eastern Hemlock, Canada Hemlock. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, VA), Cp (VA): in a wide variety of habitats in the mountains, most typically and abundantly in moist sites in ravines or coves along streams, but likely to be found in all but the driest habitats between 300 and 1500 m (even occurring in peaty bogs, where it has a sickly yellow color and short life expectancy); in the western piedmont of NC limited to progressively rarer microhabitats (primarily north-facing river bluffs), reaching its eastward limit in NC at a disjunct stand at Hemlock Bluff State Natural Area, Wake County (but uncommon in the piedmont of VA and even present, though rare, in the coastal plain of VA); common (uncommon in KY Interior Low Plateau, rare in NC Piedmont, rare in VA Coastal Plain). March-April; September-November. Widespread in ne. North America, south to w. and c. VA, w. and (rarely) c. NC, nw. SC, n. GA, n. AL, TN, KY, IN, WI, and MN. One of the largest trees commonly encountered nowadays in our area, but probably not naturally larger than many other trees – because of its low timber value, it is often left by loggers. The hemlock woolly adelgic is severely affecting this species. [= RAB, C, F, FNA, G, K, S, W, WV, Z]

Tsuga caroliniana Engelmann, Carolina Hemlock. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): primarily in open forests on ridge tops, rocky bluffs, or gorge walls, generally in drier and rockier sites than *T. canadensis*, but the two sometimes growing in close proximity or even intermixed in humid gorges; very limited in the western Piedmont, apparently reaching its eastern limit in NC at Hanging Rock State Park, Stokes County, and ranging east to Halifax County in the Piedmont of VA; uncommon (rare in piedmont). March-April; August-September. *T. caroliniana* is a rather narrow Southern Appalachian endemic, occurring only in w. NC, e. TN, sw. and sc. VA, nw. SC, and ne. GA. Carolina Hemlock has achieved a substantial reputation in NC as a Christmas tree, and is finally coming into favor as an ornamental; Coker and Totten (1945) wrote "the Carolina Hemlock is a very beautiful tree in cultivation, perhaps the handsomest of any eastern American conifer, combining in a remarkable way delicacy, symmetry, and strength." The hemlock woolly adelgid threatens this species. [= RAB, C, F, FNA, G, K, S, W, Z]

The folk taxonomy of conifers in our area is an interesting, though tangled, story. The town of Spruce Pine, NC is apparently named for *Tsuga canadensis*. Spruce Pinnacle in Buncombe County, NC is crowned with old *Tsuga caroliniana*. *Picea rubens* and *Abies fraseri* are called "He Balsam" and "She Balsam" (considered the male and female of a single species), Tamarack Post Office in Watauga County, NC and Tamarack Ridge in Highland County, VA are named for the abundance of *Picea rubens*! The generally used common name for *Juniperus* is "cedar," and *Chamaecyparis* is called "juniper."

TAXACEAE S.F. Gray 1821 (Yew Family)

TAXACEAE

A family of about 4 genera and ca. 16-20 species, shrubs and trees, of isolated regions of the Northern Hemisphere and New Caledonia. References: Hils in FNA (1993b); Price (1990); Page in Kramer & Green (1990).

1 Leaves flexible, the tips pointed but not piercing to the touch; fleshy "cone" ca. 5 mm long, ca. 5 mm in diameter, red when ripe, the seed exposed at the top by a gap in the aril ..... ***Taxus***
1 Leaves stiff, the tips piercing to the touch; fleshy "cone" 2.5-3 cm long, ca. 2 cm in diameter, dark green to purple when ripe, seed entirely surrounded by fleshy tissue ..... ***Torreya***

Taxus Linnaeus 1753 (Yew)

The genus consists of about 8 (or more) very closely related species, trees and shrubs, of temperate regions of the Northern Hemisphere. The species have been termed "discouragingly similar" by Hils in FNA (1993b). In e. North America, *T. canadensis* occurs in ne. North America, and *T. floridana* Chapman is endemic to panhandle FL. *T. brevifolia* Nuttall, Pacific Yew, of British Columbia and Alberta south to MT, ID, OR, and CA, has recently been widely publicized as the source of an anti-cancer drug, present in all species of the genus. *T. baccata* Linnaeus is native to Europe, and 3-4 additional species occur in Japan and e. mainland Asia (Price 1990). References: Hils in FNA (1993b); Spjut (2007a, 2007b)=Y; Farjon (1998)=Z; Page in Kramer & Green (1990).

1 Leaf undersurfaces usually lacking cuticular papillae along the stomatal bands; shrubs to 2 m tall; [of w. NC and VA northward] ..... ***T. canadensis***
1 Leaf undersurfaces with cuticular papillae along the stomatal bands; shrubs or small trees to 10 m tall; [of Panhandle FL] ..... ***T. floridana***

Taxus canadensis Marshall, Canada Yew, American Yew. Mt (NC, VA), Pd (VA), Ip (KY): cliffs, bluffs, and rocky slopes over calcareous or mafic rocks, red spruce and hemlock swamps and bogs; uncommon (rare in KY and NC). April-May. Newfoundland, Labrador, MN, and s. Manitoba south to nw. NC, ne. TN, KY, and IA. *Taxus* was first found in NC in 1968 (McDowell 1969). In our area, *Taxus* occurs primarily on limestone and mafic bluffs, but at its southernmost site in the "hanging valley" of Long Hope Creek (Ashe and Watauga counties, NC), *Taxus* is found in red spruce swamps and bog edges, where it is locally rather common. Deer have a devastating effect on populations of this species in our area. [= C, F, FNA, G, K, W, WV, Z; = *T. baccata* Linnaeus ssp. *canadensis* (Marshall) Pilger]

Taxus floridana Nuttall ex Chapman, Florida Yew. Cp (FL): mesic bluffs and ravines, rare. Endemic to Panhandle FL. [= FNA, K, S, WH, Z; = *T. baccata* Linnaeus ssp. *floridana* (Nuttall ex Chapman) Pilger; = *T. baccata* var. *floridana* (Nuttall ex Chapman) Silba]

* *Taxus baccata* Linnaeus, English Yew. Planted as hedges and ornamentals, escaping locally, as in Rock Creek Park, Washington, DC (Shetler & Orli 2000). [= C, G, K, Z; = *T. baccata* ssp. *baccata*] {not keyed}

* *Taxus cuspidata* Siebold & Zuccarini, Japanese Yew. Planted as hedges and ornamentals, possibly escaping locally (Shetler & Orli 2000). [= C, G, K; > *T. cuspidata* var. *cuspidata* – Z; = *T. baccata* Linnaeus ssp. *cuspidata* (Siebold & Zuccarini) Pilger] {not keyed}

Torreya Arnott 1838 (Torreya, Stinking Cedar)

The genus consists of 6-7 species, trees, of temperate regions of the Northern Hemisphere – 1 in FL and adjacent GA, 1 in CA, 1 in Japan, and 4 in c. and s. China and adjacent Burma (Price 1990). References: Hils in FNA (1993b); Page in Kramer & Green (1990).

Torreya taxifolia Arnott, Florida Torreya. Cp (FL, GA), *Mt (*NC): moist ravines and bluffs, and also rarely established near plantings; rare. An endangered endemic of ravines along the Apalachicola River in panhandle FL and sw. GA. Pittillo and Brown (1988) report that "young saplings [are] established downslope and beneath transplanted trees south of Highlands [Macon County, NC]." Godfrey (1988) reports that the national champion Florida Torreya is in Warren County, NC, with "a near-basal circumference of 9 feet, a spread of 52 feet, and a height of 60 feet. It is estimated that it may have been planted there about 1830." [= FNA, K, WH; = *Tumion taxifolium* (Arnott) Greene – S]

ZAMIACEAE Reichenbach 1837 (Sago-palm Family)

A family of about 9-11 genera and 100-185 species, of tropical and warm temperate North America, Central America, South America, Africa, and Australia. References: Landry in FNA (1993b); Johnson & Wilson in Kramer & Green (1990); Jones (1993).

Zamia Linnaeus

A genus of about 30-60 species, of extreme se. North America, West Indies, Central America, and South America. References: Landry in FNA (1993b); Johnson & Wilson in Kramer & Green (1990); Ward (2001)=Y; Stevenson (1991)=Z.

ZAMIACEAE

Zamia floridana Alphonse de Candolle *var.* ***umbrosa*** (Small) D.B. Ward, Coontie. Cp (FL, GA): maritime forests, pinelands; rare (GA Special Concern). Se. GA (Camden and Glynn counties) south to FL. *Zamia floridana* var. *floridana* is more widespread in the FL Peninsula. Ward (2001), Landry in FNA (1993b), and Stevenson (1991) conclude that North American *Zamia* belongs to one of several *Zamia* species in the West Indies. Ward (2001) concludes that *Z. floridana* is the correct name for this taxon, and that varietal status is warranted for the "*umbrosa*" entity. [= Y; < *Zamia integrifolia* Linnaeus f. in Aiton – FNA, Z; < *Z. pumila* Linnaeus – K, misapplied; = *Z. umbrosa* Small – S; < *Z. floridana* Alphonse de Candolle]

DICOTYLEDONS

ACANTHACEAE Durande 1762 (Acanthus Family)

A family of about 230 genera and about 3450 species, herbs, shrubs, vines, and trees, largely tropical. References: Wasshausen (1998); Long (1970); McDade & Moody (1999).

1 Plant a tree, with opposite leathery leaves; [of FL, s. MS, s. LA southward] ..... ***Avicennia***
1 Plant an herb, with various leaf arrangements.
2 Leaves in a basal rosette (sometimes with smaller leaves on a scape).
3 Leaves glabrate, to 22 cm long and 8 cm wide; corolla 0.8-1.3 cm long; capsule 8-10 mm long; stamens 2; [of moist to wet swamps] ..... ***Elytraria***
3 Leaves pubescent, to 10 cm long and 3 cm wide; corolla 1.8-4 cm long; capsule 9-18 mm long; stamens 4; [of dry upland pinelands].
4 Leaves 2-10 cm long, 1-3 cm wide; corolla 3-4 cm long; calyx lobes 15-30 mm long; capsule 12-18 mm long ..... ***Ruellia ciliosa***
4 Leaves 1.5-2.5 cm long, 0.7-0.8 cm wide; corolla ca. 2 cm long; calyx lobes 6-9 mm long; capsule ca. 10 mm long ..... ***Stenandrium***
2 Leaves cauline.
5 Fertile stamens 4; corolla not distinctly 2-lipped, the corolla lobes of nearly equal size (except distinctly 2-lipped in *Hygrophila*).
6 Corolla distinctly 2-lipped ..... ***Hygrophila***
6 Corolla not distinctly 2-lipped, the corolla lobes of nearly equal size.
7 Plant an herbaceous vine; leaves cordate-hastate at the base; flowers yellow to orange, usually with a dark purple "eye" ..... ***Thunbergia***
7 Plant an herb; leaves cuneate to rounded at the base; flowers white to various shades of blue or pink.
8 Calyx lobes linear-aristate; anther sacs awned or pointed at the base ..... ***Dyschoriste***
8 Calyx lobes lanceolate or linear; anther sacs blunt ..... ***Ruellia***
5 Fertile stamens 2; corolla distinctly 2-lipped (except salverform in *Pseuderanthemum* and with with 4 nearly equal lobes in *Yeatesia*).
9 Corolla salverform, 5-lobed ..... ***Pseuderanthemum***
9 Corolla distinctly 2-lipped or 4-lobed.
10 Bracts and bractlets inconspicuous, 2-5 mm long, linear or triangular; stem subterete or obscurely 4-angled ..... ***Justicia***
10 Bracts and/or bractlets subtending the flowers conspicuous, 5-15 mm long, obovate; stem terete or 6-angled.
11 Stem six-angled in cross-section; corolla conspicuously 2-lipped ..... ***Dicliptera***
11 Stem terete in cross-section; corolla 4-lobed, the lobes nearly equal ..... ***Yeatesia***

Andrographis Wallich (False Water-willow)

A genus of about 20 species of tropical Asia.

* *Andrographis echioides* (Linnaeus) Nees, native of India, is reported for chrome ore piles near Newport News, VA, by Reed (1961); it is likely not established in our area. [= K] {not keyed}

Avicennia Linnaeus (Black Mangrove)

A genus of 4-7 species, tropical. Of variable family placement, in the Acanthaceae, Verbenaceae, or Avicenniaceae.

Avicennia germinans (Linnaeus) Linnaeus, Black Mangrove. Cp (FL, MS): brackish and salt marshes and swamps; rare. Scattered on the Gulf Coast in FL peninsula (Dixie county southward on the west coast, St. Johns County southwards on the east coast), Panhandle FL (Franklin and Taylor counties), s. MS, s. LA, and se. TX, southwards into the West Indies and Tropical America. [= GW, K, WH; = *A. nitida* Jacquin – S]

Dicliptera Antoine Laurent de Jussieu (Dicliptera, Foldwing)

A genus of about 150 species, largely tropical, but extending into warm temperate regions. References: Wasshausen (1998)=Y; Long (1970)=Z.

1 Corolla tan to purplish-pink, 15-20 mm long, the tube straight or nearly so ..... ***D. brachiata***
1 Corolla scarlet red, 20-25 mm long, the tube curved ..... ***D. sexangularis***

Dicliptera brachiata (Pursh) Sprengel, Dicliptera, Branched Foldwing. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): bottomland forests; uncommon. August-October. Se. VA south to c. peninsular FL, west to TX, and north in the interior to c. TN, s. IN, s. IL, MO, and se. KS. [= RAB, C, F, GW, K, WH, Y; = *Diapedium brachiatum* (Pursh) Kuntze – S; > *Dicliptera brachiata* var. *brachiata* – Z]

Dicliptera sexangularis (Linnaeus) de Jussieu, Six-angle Foldwing. Cp (FL): disturbed areas, hammocks; rare. [= K, WH, Y; = *Diapedium assurgens* (Linnaeus) Kuntze – S; > *Dicliptera assurgens* (Linnaeus) de Jussieu var. *vahliana* (Nees) M. Gómez – Z]

Dyschoriste Nees (Twinflower, Snakeherb, Dyschoriste)

A genus of about 65 species, of tropical and warm temperate regions. References: Wasshausen (1998)=Y; Long (1970)=Z.

1 Corolla 10-15 mm long (including the 3-5 mm lobes); capsule 8-10 mm long; [of floodplain forests] ..... ***D. humistrata***
1 Corolla 25-27 mm long (including the 5-10 mm lobes); capsule 10-14 mm long; [of pinelands] ..... ***D. oblongifolia***

Dyschoriste humistrata (Michaux) Kuntze, Swamp Twinflower, Swamp Dyschoriste. Cp (FL, GA, SC): bottomland forests, especially on soils over limestone; uncommon, rare north of GA. April-May. SC to c. peninsular FL, west to panhandle FL. [= RAB, GW, K, S, WH, Y, Z]

Dyschoriste oblongifolia (Michaux) Kuntze, Blue Twinflower, Pineland Dyschoriste. Cp (FL, GA, SC): pine savannas, flatwoods, and sandhills; uncommon. April-May. SC to s. FL, west to panhandle FL. The basis of Small's (1933) attribution of this species to VA is unknown. [= RAB, K, S, WH, Y; > *Dyschoriste oblongifolia* var. *oblongifolia* – Z]

Elytraria Michaux (Elytraria)

A genus of about 17 species, of tropical and warm temperate regions of the Western and Eastern Hemispheres. The placement of this genus in the Acanthaceae is uncertain (McDade & Moody 1999, McDade et al. 2000). References: Long (1970)=Z; Ward (2004d)=Y.

Elytraria caroliniensis (J.F. Gmelin) Persoon *var. **caroliniensis***, Carolina Elytraria. Cp (FL, GA, SC): swamp forests over coquina limestone ("marl"); uncommon (rare north of FL). June-August. Var. *caroliniensis* ranges from se. SC south to c. peninsular FL, west to panhandle FL and sw. GA. Var. *angustifolia* (Fernald) Blake is restricted to s. FL. Ward (2004d) also recognizes *E. caroliniensis* var. *vahliana* (Nees in A.P. de Candolle) D.B. Ward, in ne. and Panhandle FL, south to c. peninsular FL. [= K, Y, Z; < *E. caroliniensis* – RAB, WH; = *E. carolinensis* var. *carolinensis* – GW, misspelling; = *Tubiflora carolinensis* J.F. Gmelin – S, misspelling]

Hygrophila R. Brown

A genus of about 25 species, of tropical regions. References: Wasshausen (1998)=Y; Les & Wunderlin (1981)=Z. Key based on Y.

1 Leaf blades 5-12 cm long; calyx segments ca. 5 mm long, glabrous; flowers borne in axillary clusters ..... ***H. lacustris***
1 Leaf blades 1-3.5 cm long; calyx segments ca. 2 mm long, pubescent; flowers borne in terminal and axillary spikes ..... ***H. polysperma***

Hygrophila lacustris (Schlectendahl & Chamisso) Nees, Gulf Swampweed. Cp (FL, GA): shallow water of swamps and shores; common (rare in GA). Sw. GA south to FL Peninsula, west to e. TX; West Indies. [= GW, K, S, Y, Z; = *Hygrophila costata* Nees et al. – WH; = *Ruellia lacustris* Schlectendahl & Chamisso]

* ***Hygrophila polysperma*** (Roxburgh) T. Anderson, East Indian Swampweed. Cp (FL, VA): lakes, rivers, canals; rare, established in FL, doubtfully established in VA, native of the East Indies. Grown for the aquarium trade, and sporadically introduced to bodies of water, apparently well-established in FL (Les & Wunderlin 1981). [= GW (footnote), K, WH, Y, Z]

Justicia Linnaeus (Water-willow)

A genus of about 600 species, herbs and shrubs of the tropics and warm temperate North America. References: Wasshausen (1998)=Y; Long (1970)=Z. Key based in part on Y.

1 Spike densely flowered; seeds verrucose; primary leaves averaging 6-8× as long as wide; [of the Piedmont, Mountains, and Coastal Plain] ***J. americana***
1 Spike loosely flowered; seeds smooth or minutely muricate (with very fine, sharp projections); primary leaves **either** ca. 2-6× as long as wide **or** > 8× as long as wide; [of the Coastal Plain].
  2 Corolla purple, 18-30 mm long; leaves averaging > 8× as long as wide; cystoliths parallel to the midvein of the leaf; [of s. GA south into FL].
    3 Upper leaf blades 4-7 cm long, not channeled, tough but not fleshy; calyx segments 5-7 mm long, < 1 mm wide ..... ***J. angusta***
    3 Upper leaf blades 8-13.5 cm long, channeled, fleshy; calyx segments 11-15 mm long, ca. 1 mm wide ..... ***J. crassifolia***
  2 Corolla pale lavender to white, 8-13 mm long; leaves averaging 2-6× as long as wide; cystoliths parallel to the secondary veins of the leaf; [of the Coastal Plain throughout our area].
    4 Spikes lax, the flowers usually borne singly, secund; seeds smooth; leaves averaging ca. 5× as long as wide ..... ***J. ovata var. lanceolata***
    4 Spikes somewhat congested, the flowers borne in opposite pairs; seeds minutely muricate (with very fine, sharp projections); leaves averaging ca. 3× as long as wide ..... ***J. ovata var. ovata***

Justicia americana (Linnaeus) Vahl, American Water-willow. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA), Cp (FL, NC, VA): river and stream beds, in shallow water, often rooted in rocky shallows; common (rare in FL). June-October. W. Québec

west to MI and WI, south to GA, TX, and KS. [= RAB, C, GW, K, W, WH, Y, Z; > *J. americana* var. *americana* – F, G; > *J. americana* var. *subcoriacea* Fernald – F, G; > *J. mortuifluminis* Fernald – F; = *Dianthera americana* Linnaeus – S]

Justicia angusta (Chapman) Small, Pineland Water-willow, Narrowleaf Water-willow. Cp (FL, GA): roadside ditches, savannas; rare. Se. GA (Camden County) (Sorrie 1998b) south to s. FL. [= K, WH, Y; < *J. ovata* – GW; < *J. crassifolia* (Chapman) Chapman ex Small – S; = *J. ovata* (Walter) Lindau var. *angusta* (Chapman) R.W. Long – Z]

Justicia crassifolia (Chapman) Chapman ex Small. Cp (FL, GA): flatwoods, cypress ponds; rare. S. GA to the FL Panhandle. [= GW, K, WH, Y; < *J. crassifolia* – S]

Justicia ovata (Walter) Lindau *var. **lanceolata*** (Chapman) R.W. Long. Cp (FL, GA): swamps, marshes; uncommon. May. Se. GA west to TX, north in the Mississippi Embayment to s. IL, s. IN, w. KY. Needs additional study; may warrant specific status. [= K, WH, Y, Z; < *J. ovata* – GW; = *J. lanceolata* (Chapman) Small – S]

Justicia ovata (Walter) Lindau *var. **ovata***, Coastal Plain Water-willow, Loose-flower Water-willow. Cp (FL, GA, NC, SC, VA): swamps, marshes; common. May-July. S. VA south to c. peninsular FL, Panhandle FL, and se. AL. [= C, K, WH, Y, Z; < *J. ovata* – RAB, F, GW; ? *J. humilis* Michaux var. *humilis* – G; = *J. ovata* (Walter) Lindau – S]

Pseuderanthemum Radlk.

A genus of about 60 species, mostly shrubs, of tropical regions.

* ***Pseuderanthemum variabile*** (R. Brown) Radlkofer, Night-and-Afternoon. Cp (FL, SC?): disturbed areas, also in potted plants and greenhouses; rare, native of the Old World. Reported as a greenhouse weed from SC (Nelson & Kelly 1997), but not included as a regular member of the flora of SC because "it is unlikely that it could persist anywhere in South Carolina outside a greenhouse environment" (Nelson & Kelly 1997). [= K, Y; ? *Ps. fasciculatum* (Oerst.) Leonard -- WH]

Ruellia Linnaeus (Wild-petunia)

A genus of about 150 species, of the tropics and temperate North America. References: Ward (2007)=X; Wasshausen (1998)=Y; Long (1970)=Z; Ezcurra & Daniel (2007)=Q.

1 Principal leaves linear-lanceolate, > 10× as long as wide (8-27 cm long, 0.7-2 cm wide); [alien, cultivated and naturalized] ..... ***R. simplex***
1 Principal leaves elliptic, ovate or broadly lanceolate, 2-5 × as long as wide (2-16 cm long, 0.5-7 cm broad); [native].
  2 Calyx lobes narrowly linear-lanceolate, flattened to the tip, 1-4 mm wide ..... ***R. strepens***
  2 Calyx lobes linear, filiform or setaceous at least apically, < 1.2 mm wide at their widest point (usually the base), hairlike at the tip.
    3 Corolla 6-10 cm long, opening at night and withering by mid-morning, white to pale lavender; calyx lobes 2.5-4.5 cm long; [of Coastal Plain seepage bogs and wet pine flatwoods] ..... ***R. noctiflora***
    3 Corolla 3-7 cm long, opening during the day, lavender to lavender-blue (rarely white in *R. humilis*); calyx lobes 1-3 cm long; [of various habitats].
      4 Flowers borne on peduncles 0.2-7 cm long, from the axils of lower and median nodes, not from the terminal node or terminal cluster.
        5 Stem divergently branched (rarely simple); calyx glabrous or glabrate, with many partially imbedded cystoliths; calyx lobes 0.5-1 mm wide, tapering from the base to a very slender tip; [of dry to wet pine woodlands of the Coastal Plain] ..... ***R. pinetorum***
        5 Stem simple (rarely with a few ascending branches); calyx pubescent, without cystoliths; calyx lobes 0.7-1.2 mm wide, widest near the middle and tapering to the apex; [of dry woodlands, forests, and glades of the Piedmont and Mountains] ..... ***R. purshiana***
      4 Flowers sessile or subsessile, in the axils of median and upper nodes, and usually also from the terminal node or cluster.
        6 Leaves sessile or subsessile; flower-bearing nodes usually 4-8; stem typically branched at base; stigma lobe 1 ..... ***R. humilis***
        6 Leaves petioled; flower-bearing nodes usually 1-3; stem typically simple below (unless damaged), sometimes branched upward; stigma lobes (1-) 2.
          7 Plant with all leaves caulescent; leaves ovate, lanceolate, elliptic, or oblong; [plant widespread in our area and common] ..... ***R. caroliniensis***
          7 Plant with a rosette of basal leaves; leaves spatulate to obovate; [plant rare, restricted to dry pinelands in the Coastal Plain] ..... ***R. ciliosa var. ciliosa***

Ruellia caroliniensis (J.F. Gmelin) Steudel, Carolina Wild-petunia, Common Wild-petunia. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry to moist forests and woodlands; common. May-September. NJ, s. OH, and s. IN, south to s. FL and TX. [= RAB, C, G, WH, X; > *R. caroliniensis* var. *caroliniensis* – F; > *R. caroliniensis* var. *cheloniformis* Fernald – F; > *R. caroliniensis* var. *dentata* (Nees) Fernald – F; > *R. caroliniensis* var. *membranacea* Fernald – F; > *R. caroliniensis* var. *nanella* Fernald – F; > *R. caroliniensis* var. *salicina* Fernald – F; > *R. caroliniensis* var. *semicalva* Fernald – F; = *R. caroliniensis* ssp. *caroliniensis* var. *caroliniensis* – K, Y, Z; *R. parviflora* (Nees) Britton – S; < *R. caroliniensis* – W (also see *R. ciliosa*)]

Ruellia ciliosa Pursh *var. **ciliosa***, Sandhills Wild-petunia. Cp (FL, GA, NC, SC): sandhills, particularly in loamy, submesic swales; common (uncommon in GA, rare in NC and SC). May-September. Sc. NC south to c. peninsular FL, west to se. LA. Although treated as only subspecifically distinct from *R. caroliniensis* by many recent authors, there seem ample differences in morphology, distribution, and habitat to warrant specific distinction. Var. *cinerascens* Fernald of the FL Panhandle needs additional assessment. [< *R. ciliosa* – RAB, S, WH, X; = *R. caroliniensis* (J.F. Gmelin) Steudel ssp. *ciliosa* (Pursh) R.W. Long var. *cinerascens* (Fernald) Kartesz & Gandhi – K; = *R. caroliniensis* ssp. *ciliosa* var. *ciliosa* – Y, Z; < *R. caroliniensis* – W; > *R. ciliosa* var. *cinerascens* Fernald]

Ruellia humilis Nuttall, Low Wild-petunia, Hairy Wild-petunia. Mt (GA, VA), Pd (NC, VA): diabase glades and woodlands; rare. May-September. PA west to se. MN and NE, south to c. NC, AL, and TX. Piedmont plants of NC are

uniformly white-flowered. [= RAB, K, W, Y, Z; > *R. humilis* var. *calvescens* Fernald – C, F, G; > *R. humilis* var. *frondosa* Fernald – F, G; > *R. humilis* var. *humilis* – C, F, G]

Ruellia noctiflora (Nees) A. Gray, Night-flowering Wild-petunia. Cp (FL, GA): wet pinelands and savannas; uncommon (rare in GA). (May-) June-July (-August). E. GA (in counties immediately adjacent to SC) south to ne. FL; Panhandle FL west to se. LA. [= GW, K, S, WH, X, Y, Z]

Ruellia pinetorum Fernald, Pineland Wild-petunia. Cp (FL, GA, SC): dry to wet pinelands; rare. May-September. SC south to Panhandle FL, west to TX. Although treated as only subspecifically distinct from *R. pedunculata* by many recent authors, there seem ample differences in morphology, distribution, and habitat to warrant specific distinction. First reported for GA by Sorrie (1998b). [= RAB, F, X; = *R. pedunculata* Torrey ex A. Gray ssp. *pinetorum* (Fernald) R.W. Long – K, WH, Y, Z]

Ruellia purshiana Fernald, Pursh's Wild-petunia. Pd (GA, NC, SC, VA), Mt (GA, NC, VA): dry woodlands and forests, especially over mafic or calcareous rocks; uncommon (NC Rare). May-September. MD south to GA and AL, in and adjacent to the Appalachians. [= RAB, F, K, W, Y, Z; < *R. pedunculata* Torrey ex A. Gray – C, G]

* ***Ruellia simplex*** Wright in Sauvalle, Mexican Bluebell. Cp (FL, GA, SC): disturbed areas; rare, native of e. Mexico. May-September. [= Q; = *R. brittoniana* Leonard – RAB, GW, X, Z = *R. coerulea* Morong – Y; = *R. tweediana* Grisebach – WH; = *R. caerulea* – K, orthographic variant; = *R. malacosperma* Greenman – S]

Ruellia strepens Linnaeus, Limestone Wild-petunia. Mt (GA, VA), Pd (NC, VA), Cp (NC, SC, VA): calcareous forests; uncommon, rare south of VA (NC Rare, SC Rare). May-September. NJ west to OH and IA, south to se. and sc. NC, e. SC, AL, and TX. [= RAB, C, F, G, K, S, W, Y, Z]

Stenandrium Nees

A genus of about 25 species, of tropical to warm temperate New World. References: Wasshausen (1998)=Y; Long (1970)=Z.

Stenandrium dulce (Cavanilles) Nees *var.* ***dulce***, Sweet Shaggytuft. Cp (GA): pine savannas; rare. GA to FL. Var. *dulce* ranges from GA south to FL; var. *floridanum* A. Gray is restricted to s. peninsular FL. [= K, Y; < *Gerardia floridana* (A. Gray) Small – S; < *S. dulce* – WH; < *S. dulce* var. *floridanum* A. Gray – Z]

Thunbergia Retzius (Clock-vine)

A genus of 100-200 species, of the Old World tropics. References: Wasshausen (1998)=Y; Long (1970)=Z.

* ***Thunbergia alata*** Bojer ex Sims, Black-eyed-Susan Vine. Cp (FL): disturbed areas; rare, native of Africa. [= K, S, WH, Y, Z]

Yeatesia Small (Bractspike)

A genus of 3-4 species, of warm temperate to tropical areas, se. United States to ne. Mexico. References: Wasshausen (1998)=Y; Long (1970)=Z.

Yeatesia viridiflora (Nees) Small, Yellow bract-spike, Cp (FL, GA): rich bottomlands; rare. Sw. GA (Jones & Coile 1988) and Panhandle FL west to TX (Kartesz 1999). [= K, S, WH, Y; = *Dicliptera viridiflora* (Nees) R.W. Long – Z; *Dicliptera halei* Riddell]

ACTINIDIACEAE Hutchinson 1926 (Kiwi-fruit Family)

A family of 3 genera and 340-360 species, trees, shrubs, and lianas, of tropical and warm temperate Asia. References: Dressler & Bayer in Kubitzki (2004).

Actinidia Lindley (Kiwi-fruit)

A genus of 40-60 species, lianas, of e. and se. Asia. In addition to *A. chinensis*, various other species in the genus *Actinidia* are in cultivation in our area. Some show potential to escape and naturalize. References: Dressler & Bayer in Kubitzki (2004).

* ***Actinidia chinensis*** Planchon, Kiwi-fruit, Chinese Gooseberry. Pd (NC): suburban woodlands; rare, native of e. Asia. Also naturalized in nc. TN.

ADOXACEAE Trautvetter 1853 (Moschatel Family)

A family of about 4 genera and about 165-200 species, shrubs, small trees, and herbs (here interpreted as including *Sambucus* and *Viburnum*). There now appears to be little doubt that *Sambucus* and *Viburnum* are more naturally placed in the Adoxaceae, in

contrast to their traditional placement in the Caprifoliaceae (Zhang et al. 2003, Eriksson & Donoghue 1997). References: Ferguson (1966a).

1 Leaves pinnately compound; fruit 3-5-seeded ..... ***Sambucus***
1 Leaves simple; fruit 1-seeded ..... ***Viburnum***

Sambucus Linnaeus (Elderberry)

A genus of about 9 species of shrubs and small trees, north temperate and subtropical. References: Bolli (1994)=Z; Ferguson (1966a)=Y.

1 Inflorescence racemose, normally longer than broad; fruits red when ripe; pith of stems and second-year branches brown; leaves with 5-7 leaflets, these never further divided; foliage and young twigs puberulent; [primarily of the Mountains, extending into the Piedmont in VA] ..... ***S. racemosa var. pubens***
1 Inflorescence cymose, normally broader than long; fruits black or deep purple when ripe; pith of stems and second-year branches white; leaves with 5-11 leaflets, the lower leaflets sometimes further divided; foliage and young twigs glabrous or with trichomes mostly limited to the veins of the leaves; [collectively widespread].
2 Fruits purplish black, 4-6 mm in diameter; plant a shrub to small tree (usually multi-stemmed from the base); [common, widespread, and native] ..... ***S. canadensis***
2 Fruits black, 6-8 mm in diameter; plant a small tree; [rare, restricted, and alien] ..... ***[S. nigra]***

Sambucus canadensis Linnaeus, Common Elderberry. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): streambanks, thickets, moist forests, disturbed areas; common. Late April-July; July-August. The species ranges from Nova Scotia west to Manitoba, south to s. FL, TX, Mexico; West Indies. The leaflets, particularly of young shoots or stunted sprouts, are often variegated. This is one of the first woody plants to leaf out in the spring. Bolli (1994) treats this taxon as a subspecies of a broadly defined *S. nigra*. He recognizes 6 subspecies: ssp. *nigra* in Europe, ssp. *palmensis* (Link) R. Bolli in the Canary Islands, ssp. *maderensis* (Lowe) R. Bolli in Madeira Island, ssp. *canadensis* in eastern North America, Mexico, Central America, and the West Indies, ssp. *cerulea* (Rafinesque) R. Bolli of western North America, and ssp. *peruviana* (Humboldt, Bonplandt, and Kunth) R. Bolli of South America. I prefer to retain these taxa at the species level, particularly as Bolli states "the geographical races, in the following defined as subspecies, turned out to be the biological units in *Sambucus*." Bolli further discusses 3 races within what is here called *S. canadensis* (his *S. nigra ssp. canadensis*), one from eastern North America, another from montane Mexico and Central America, and a third from subtropical se. North America and the West Indies; he considers these geographic races to represent "morphological and perhaps genetical" differences, and that "at present, all races are probably interconnected." This variation may be worthy of taxonomic recognition at the varietal level, and these "races" have formerly been considered to be species or varieties. Plants of most of our area represent *S. canadensis* var. *canadensis*, while evergreen (or tardily deciduous), bipinnate plants of FL, s. GA, s. AL, s. MS, s. LA, se. TX, and the West Indies represent *S. canadensis* var. *laciniata* A. Gray. [= RAB, C, GW, W, Y; > *S. canadensis* var. *canadensis* – F, G; > *S. canadensis* var. *submollis* Rehder – F, G; = *S. nigra* Linnaeus ssp. *canadensis* (Linnaeus) R. Bolli – K, WH, Z; > *S. canadensis* – S; > *S. simpsonii* Rehder ex Sargent – S; > *Sambucus canadensis* Linnaeus var. *laciniata* A. Gray]

Sambucus racemosa Linnaeus *var. **pubens*** (Michaux) Koehne, Red Elderberry. Mt (GA, NC, VA): spruce-fir and northern hardwood forests, especially typical on boulderfield, talus, and other rocky situations, primarily at high elevations in the Mountains, though sometimes descending in our area (mainly in VA) to low elevations; uncommon (GA Special Concern). Late April-early June; late June-August. As interpreted here, *S. racemosa* is an interruptedly circumboreal species, represented in ne. North America by var. *pubens*, in n. Europe by var. *racemosa*, and in ne. Asia and nw. North America by several additional varieties. *S. racemosa var. pubens* ranges from Newfoundland west to British Columbia (?), south to PA, IN, IL, and in the mountains to w. NC, e. TN, and ne. GA (Jones & Coile 1988). [= *S. pubens* – RAB, F, G, S, W; = *S. racemosa* ssp. *pubens* (Michaux) House var. *pubens* – C; < *S. pubens* ssp. *pubens* – Y; < *S. racemosa* var. *racemosa* – K, Z]

* *Sambucus nigra* Linnaeus, European Elder, is escaped from cultivation, native of Europe. Reported for Petersburg, Dinwiddie County, VA by Fernald (1941). [= C, F, G; = *S. nigra* ssp. *nigra* – K, Z]

Viburnum Linnaeus 1753 (Viburnum)
(contributed by B.A. Sorrie & A.S. Weakley)

A genus of about 150 species of shrubs and small trees, largely temperate, and primarily in Asia and North America. There remain a number of taxonomic problems, particularly in the *Viburnum dentatum* complex; the treatment and key for that group is highly provisional. Dirr (2007) discusses the genus in detail from a horticultural perspective. References: McAtee (1956)=Z; Ferguson (1966a)=Y; Weckman et al. (2002); Winkworth & Donoghue (2005).

Identification notes: Leaves vary in shape in some taxa more than in others; we have allowed for some of this variation in the key, but readers should expect that some specimens will not key cleanly, especially vegetative shoots. Petiole length of leaves varies considerably, even with those possessing "short" petioles. However, by measuring only the petioles of the first leaves below an inflorescence one reduces the chances of misidentifications greatly. Warning: even in some of the "long" petioled taxa, one may occasionally encounter unusually short petioles; therefore it is wise to examine several twigs. Density of pubescence and glandularity of leaves, petioles, and inflorescences varies more in some taxa than in others; we have allowed for some of this variation in the key, but readers should expect that some specimens will not key cleanly, especially vegetative shoots. Stipitate glands are usually very short, especially those on leaf veins; a 10x lens may not be adequate to see them clearly. It is

our belief, based on thousands of specimens examined and years of fieldwork, that most *Viburnum* tend to lose pubescence, and perhaps glandularity as well, as the season progresses.

1 Leaves (at least the larger and better developed) palmately lobed and veined.
  2 Petioles lacking glands near its junction with the leaf blade; flowers all alike and fertile; twibs pubescent; fruit blue-black; [section *Lobata*] ..... ***V. acerifolium***
  2 Petioles with several glands near its junction with the leaf blade; marginal flowers of the inflorescence sterile and much larger than the fertile central flowers (or in cultivated forms all the flowers sterile and enlarged); twigs glabrous; fruit red; [section *Opulus*].
    3 Petiolar glands mostly taller than wide, stalked, rounded on the top; [native, of n. WV, PA, and NJ northward] ..... ***[V. opulus var. americanum]***
    3 Petiolar glands mostly wider than tall, sessile, concave on the top; [alien, sometimes planted and escaped] ..... ***V. opulus var. opulus***
1 Leaves unlobed and pinnately veined.
  4 Lateral veins curving and branching repeatedly through most of their length, not noticeably parallel, the lateral veins becoming obscure in the general pattern of anastamosing veins and not obviously leading to marginal teeth; [section *Lentago*].
    5 Leaves entire or with a crenate margin, the teeth < 5 per cm of margin.
      6 Leaves 2-5 cm long, obovate or spatulate, widest towards the tip; [of e. SC southward in then Coastal Plain] ..... ***V. obovatum***
      6 Leaves 5-12 cm long, generally elliptic or ovate, widest at or below the middle; [collectively widespread and of various habitats].
        7 Leaves dull to slightly shiny above; peduncle (5-) avg. 13 (-25) mm long; leaves undulate-crenulate (or rarely entire); [of Mountains and upper Piedmont] ..... ***V. cassinoides***
        7 Leaves shiny above (as if varnished); peduncle (20-) avg. 35 (-50) mm long; leaves entire (rarely somewhat undulate-crenate); [of Coastal Plain, Piedmont, and low elevation boggy sites in the Mountains] ..... ***V. nudum***
    5 Leaves serrulate, the teeth > 5 per cm of margin.
      8 Leaves mostly strongly acuminate at the tip; [of w. VA northward] ..... ***V. lentago***
      8 Leaves acute, obtuse, or rounded (rarely somewhat acuminate) at the tip; [collectively widespread in our area].
        9 Leaves herbaeous in texture, dull above; petioles and veins (lower surface) glabrous or slightly brown-scurfy; [widespread in our area, usually in bottomland or other mesic forests] ..... ***V. prunifolium***
        9 Leaves somewhat coriaceous in texture, glossy above (as if lacquered); petioles and veins (lower surface) red-scurfy; [of c. VA southward, usually in dry to dry-mesic woodlands and forests] ..... ***V. rufidulum***
  4 Lateral veins of the leaves nearly straight and prominently parallel for most of their length, many of them forking near the margin, the ultimate veins leading to a tooth.
    10 Winter buds consisting of tightly folded leaves uncovered by bud scales; plants strongly and noticeably stellate pubescent, especially on young parts and on the lower leaf surface; fruits red then turning black.
      11 Leaves lanceolate, 3-5× as long as wide, entire; leaf base truncate to rounded; leaf surface strongly rugose; [section *Viburnum*] ..... ***V. rhytidophyllum***
      11 Leaves ovate, 1-2.5× as long as wide, serrate; leaf base cordate; leaf surface planar to somewhat rugose.
        12 Leaves 10-25 cm long, 8-20 cm wide, deeply cordate at the base; [native, of cool, high elevation forests and bogs]; [section *Pseudotinus*] ..... ***V. lantanoides***
        12 Leaves 5-12 cm long, 2-6 cm wide, rounded to cordate at the base; [alien, cultivated and escaping to suburban forests]; [section *Lantana*].
          13 Flowers all alike and fertile ..... ***[V. lantana]***
          13 Marginal flowers of the inflorescence sterile and much larger than the fertile central flowers (or all the flowers sterile and enlarged) ..... ***[V. macrocephalum]***
    10 Winter buds covered by bud scales; plants noticeably stellate-pubescent or not.
      14 Leaves oblong-obovate, wider towards the tip; inflorescence paniculate, with an elongate central axis, the lowest branches opposite and with other branches above; fresh leaves malodorous; [section *Solenotinus*] ..... ***V. sieboldii***
      14 Leaves ovate or suborbicular, widest near or below the middle; inflorescence umbelliform, the main branches all attached at the same point; fresh leaves not malodorous.
        15 Leaves with 8-12 lateral veins on each side; marginal flowers of the inflorescence sterile and much larger than the fertile central flowers; winter buds with 2 scales; [section *Tomentosa*] ..... ***V. plicatum***
        15 Leaves with 5-8 lateral veins on each side; flowers all alike and fertile; winter buds with > 2, imbricate scales.
          16 Fruit orange or red; [aliens, planted and escaping]; [section *Succodontotinus*].
            17 Leaves broadly ovate, acute, pubescent on both surfaces ..... ***V. dilatatum***
            17 Leaves ovate or ovate-lanceolate, acuminate, glabrous except for long, somewhat appressed hairs along the veins beneath ..... ***V. setigerum***
          16 Fruit blue-black; [native].
            18 Petioles short, those immediately below a cyme ≤ 8mm long ..... ***V. rafinesquianum***
            18 Petioles longer, those immediately below a cyme ≥ 11mm long.
              19 Cymes stipitate-glandular (occasionally glabrous in *V. dentatum* var. *deamii* and *V. dentatum* var. *indianense*).
                20 Leaf bases strongly cordate; plants usually restricted to limestone substrates.
                  21 Petioles eglandular; leaf veins eglandular; leaves glabrate beneath or with simple hairs in axils; bark not exfoliating; [endemic to n. AL, sc. TN, and nw. GA] ..... ***V. bracteatum***
                  21 Petioles stipitate-glandular (may be sparse); leaf veins stipitate-glandular; leaves densely pubescent beneath (forma *molle*) to glabrate (forma *leiophyllum*); bark of stems and branches exfoliating ..... ***[V. molle]***
                20 Leaf bases cuneate, truncate, or occasionally subcordate; plants of various substrates.
                  22 Stipitate glands absent on petioles and leaf veins; stipular leaf bracts absent; [of sandstone substrates in Lookout Mountain region of ne. AL] ..... ***[V. species 1]***
                  22 Stipitate glands present on petioles and leaf veins; stipular leaf bracts often present.
                    23 Petioles with stellate hairs all over; leaves beneath moderately to densely stellate pubescent ..... ***[V. dentatum var. deamii]***
                    23 Petioles with stellate hairs confined to groove; leaves beneath glabrate ..... ***[V. dentatum var. indianense]***
              19 Cymes eglandular (occasionally glandular in *V. dentatum* var. *dentatum* and *V. scabrellum*)
                24 Petioles glabrous or glabrate; stellate hairs absent on leaves and petioles; hairs on leaf undersides confined to axils and a few veins; leaf shape usually ovate ..... ***V. dentatum var. lucidum***

24 Petioles sparsely to densely stellate pubescent; stellate hairs present on leaf underside and petiole, dense and soft to touch (*V. carolinianum*, *V. scabrellum*, most *V. venosum*) or sparse to moderate (*V. dentatum* var. *dentatum*, some *V. venosum*); leaf shape various
25 Cymes not stellate pubescent (occasionally sparsely so); leaves thinner textured and with less prominent veins, sparsely to moderately stellate pubescent below; plants relatively widespread..... ***V. dentatum var. dentatum***
25 Cymes stellate-pubescent; leaves thick textured and with prominent veins, moderately to densely stellate-pubescent below
26 Leaf shape ovate to broadly ovate; leaf teeth __ per half; upper leaf surface scabridulous with abundant simple hairs; [of southern Atlantic and Gulf Coastal Plain] ..... ***V. scabrellum***
26 Leaf shape rotund; leaf teeth __ per half; upper leaf surface glabrate, not scabridulous; [of Southern Appalachian mountains or northern Atlantic Coastal Plain].
27 Leaf underside densely pubescent and soft to touch (felt-like); stipular leaf bracts often present; fruits pubescent; [of southern Appalachian mountains of w. NC, n. GA, and se. TN] ..... ***V. carolinianum***
27 Leaf underside moderately to densely pubescent and somewhat soft to touch (but not felt-like); stipular leaf bracts absent; fruits glabrous; [of northern Atlantic Coastal Plain of se. MA, s. RIs RI-Long Island NY] ..... ***[V. venosum]***

Viburnum acerifolium Linnaeus, Mapleleaf Viburnum, Dockmackie. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): mesic to dry forests and woodlands; common (rare in Coastal Plain south of VA). Late April-early June; August-October. New Brunswick, Ontario, and WI south to Panhandle FL and TX. [= RAB, C, G, K, S, W, WH, Y; > *V. acerifolium* var. *acerifolium* – F, Z; > *V. acerifolium* Linnaeus var. *glabrescens* Rehder – F, Z; > *V. acerifolium* var. *densiflorum* (Chapman) McAtee – Z; > *V. acerifolium* var. *ovatum* (Rehder) McAtee – Z]

Viburnum bracteatum Rehder, Limerock Arrow-wood. Mt (GA): calcareous forests and woodlands; rare (GA Endangered). Late April-early May. Se. TN south to nw. GA and ne. AL. [= K, S, Y, Z]

Viburnum carolinianum Ashe, Carolina Arrow-wood. Mt (GA, NC, SC?, VA?), Pd (NC): moist to dry forests, rock outcrops, streambanks; uncommon. April; July-September. Sw. NC and adjacent GA and TN; remainder of distribution unclear at this time. [<? *V. dentatum* Linnaeus var. *deamii* (Rehder) Fernald – C, F, G; < *V. dentatum* var. *dentatum* – RAB, K; < *V. dentatum* – GW; < *V. semitomentosum* (Michaux) Rehder – S; > *V. carolinianum* Ashe var. *cismontanum* McAtee – Z; > *V. carolinianum* Ashe var. *carolinianum* – Z]

Viburnum cassinoides Linnaeus, Northern Wild Raisin, Withe-rod, Shonny Haw. Mt (GA, NC, SC, VA), Pd (NC, SC): bogs, moist forests, high elevation forests and outcrops; common. Late May-June; August-October. Newfoundland, Ontario, and WI south to n. GA and AL. [= RAB, F, G, S, W, Y; = *V. nudum* Linnaeus var. *cassinoides* (Linnaeus) Torrey & A. Gray – C, K; < *V. nudum* – GW; > *V. cassinoides* var. *cassinoides* – Z; > *V. cassinoides* var. *nitidum* Aiton – Z; > *V. cassinoides* var. *harbisonii* McAtee – Z]

Viburnum dentatum Linnaeus *var.* ***dentatum***, Arrow-wood. Cp (FL?, NC, SC, VA), Pd, Mt (NC, SC, VA): marshes, streambanks, other moist places; common. Late March-April; July-September. [= C, F, G, K; < *V. dentatum* var. *dentatum* – RAB (also see *V. carolinianum*); < *V. dentatum* – GW, W, WH, Y; < *V. semitomentosum* (Michaux) Rehder – S; = *V. dentatum* – Z]

Viburnum dentatum Linnaeus *var.* ***lucidum*** Aiton, Smooth Arrow-wood. Cp (NC, SC, VA), Pd, Mt (GA, NC, SC, VA): marshes, moist forests, streambanks; common. Late March-May; July-September. ME, NY, and OH south to e. SC, c. GA, and ne. AL. [= RAB, C, G; = *V. recognitum* Fernald – F, K; < *V. dentatum* – GW, W; = *V. dentatum* – S, misapplied; > *V. recognitum* var. *recognitum* – Z; > *V. recognitum* var. *alabamense* McAtee – Z]

* ***Viburnum dilatatum*** Thunberg, Linden Viburnum. Pd (VA): suburban woodlands; rare, native of e. Asia. [= C, K]

Viburnum lantanoides Michaux, Hobblebush, Witch's-hobble, Tangle-legs. Mt (GA, NC, VA): spruce-fir forests, northern hardwood forests, boulderfields, primarily over 1000 m elevation; common. April-early June; June-July. New Brunswick and Ontario south to w.NC, ne. GA, e. TN, and OH. [= K, S, W, Y; = *V. alnifolium* Marshall – RAB, C, F, G; = *V. grandifolium* Aiton – Z]

Viburnum lentago Linnaeus, Nannyberry, Sheepberry. Mt (VA), {GA}: shrubby stream-bottoms, other wetlands and wetland margins; rare. New Brunswick and Saskatchewan south to w. VA, MO, and CO. Reported in the past for NC (see Radford, Ahles, & Bell 1968), but there is no known documentation. Also reported for GA. [= RAB, C, F, G, K, S, W, Y, Z]

Viburnum nudum Linnaeus, Southern Wild Raisin, Possumhaw. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): bogs, blackwater floodplains, seepages; common (rare in Mountains). April-May; August-October. RI, CT, and NY south to c. peninsular FL, west to TX, inland to w. NC, TN, w. KY, and AR. [= RAB, G, S, W, WH, Y, Z; = *V. nudum* var. *nudum* – C, K; > *V. nudum* var. *nudum* – F; > *V. nudum* var. *angustifolium* Torrey & A. Gray – F; < *V. nudum* – GW (also see *V. cassinoides*)]

Viburnum obovatum Walter, Small-leaf Viburnum, Walter's Viburnum. Cp (FL, GA, SC): alluvial forests; common. March-April; September-October. E. SC south to s. FL, west to s. AL. [= RAB, GW, K, Y, Z; > *V. obovatum* – S; > *V. nashii* Small – S]

* ***Viburnum opulus*** Linnaeus *var.* ***opulus***, Guelder-rose, Snowball. Mt (VA): {habitat}; rare, native of Europe. Well-established in KY (Weckman et al. 2002). [= C, G, K, Z; > *V. opulus* var. *opulus* – F; > *V. opulus* var. *roseum* Linnaeus – F]

* ***Viburnum plicatum*** Thunberg, Japanese Snowball, Doublefile Viburnum. Pd (NC): suburban woodlands; rare, native of e. Asia. Also reported as naturalized in various more northern states, including se. and sw. PA (Rhoads & Klein 1993), OH (Cooperrider 1995), MI (Voss 1996), and others. [= C, G, K, Z]

Viburnum prunifolium Linnaeus, Black Haw, Nannyberry. Pd, Mt, Cp (GA, NC, SC, VA): alluvial forests, other mesic forests; common. March-April; September-October. NY, MI, WI, IA, and KS south to GA, AL, MS, LA, and TX. [= RAB, C, K, S, W, Y, Z; > *V. prunifolium* var. *prunifolium* – F, G]

Viburnum rafinesquianum J.A. Schultes, Downy Arrow-wood. Pd (GA, NC, VA), Mt (VA): dry-mesic to dry woodlands and forests, especially common over mafic rocks (but not at all restricted to such sites). Mid April-May; June-July. NH, Québec

and Manitoba south to n. GA, AL, AR, and OK; apparently not yet recorded for SC. [= RAB, K, S, W; > *V. rafinesquianum* var. *rafinesquianum* – C, F, G, Y; =? *V. affine* Bush ex Schneider var. *hypomalacum* Blake – Z]

* ***Viburnum rhytidophyllum*** Hemsley, Leatherleaf Viburnum. Mt (NC): planted and rarely naturalizing; rare, native of . c. and w. China. First reported for NC by Pittillo & Brown (1988): "naturalized beneath hedges on the campus of Western Carolina University" (Jackson County, NC). Elsewhere escaping at least as far south as KY (Weckman et al. 2002). [= K]

Viburnum rufidulum Rafinesque, Southern Black Haw. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC, VA): dry woodlands, dry-mesic woodlands and forests, especially common over mafic rocks (but not at all restricted to such sites); common. Late March-April; September-October. C. VA, OH, IL, and KS south to n. peninsular FL and TX. [= RAB, C, F, G, K, W, WH, Y, Z; > *V. rufidulum* – S; > *V. rufotomentosum* Small]

Viburnum scabrellum (Torrey & A. Gray) Chapman. Cp (FL, GA, SC): streambanks, marshes, other moist sites; common. A Coastal Plain endemic, ranging from se. GA south to c. peninsular FL, west to e. TX; with scattered collections north to ec. GA (Richmond County), ne. AL (Cherokee County), nw. AL (Lamar County), c. MS, and n. LA. Expected in s AR, but no specimens seen. Specimens of *V. dentatum* from s. SC show signs of hybridization. Mohr (1901) and some other 19th century authors misapplied the name *V. molle* to it. [< *V. dentatum* var. *dentatum* – RAB; < *V. dentatum* var. *venosum* (Britton) Gleason – G, K; < *V. dentatum* – GW, W, WH, Y; < *V. semitomentosum* (Michaux) Rehder – S, misapplied; > *V. scabrellum* (Torrey & Gray) Chapman var. *scabrellum* – Z; > *V. scabrellum* var. *ashei* Bush – Z; *Viburnum dentatum* Linnaeus var. *scabrellum* Torrey & A. Gray]

* ***Viburnum setigerum*** Hance, Tea Viburnum. Pd (NC): suburban forests; rare, planted horticulturally, rarely escaping, native of China. Naturalizing at Guilford Courthouse National Military Park (Greensboro, Guilford County, NC) and in Battle Park (Chapel Hill, Orange County, NC), and elsewhere in our area. Also naturalizing in KY (Weckman et al. 2002). [= K]

* ***Viburnum sieboldii*** Miquel, Siebold Viburnum. (VA). Also naturalizing in KY (Weckman et al. 2002). [= C, F, K; = *V. sieboldi* – Z, orthographic variant]

Viburnum species 1, Alabama Arrow-wood. Mt (AL): sandstone substrates; rare. Restricted to Lookout Mountain region of ne. AL, in Cullman, DeKalb, and Marshall Counties. Closer to *V. dentatum* than to *V. recognitum* due to hairy petioles and broad ovate-rotund leaf shape. [= *V. recognitum* Fernald var. *alabamense* McAtee]

* *Viburnum lantana* Linnaeus, Wayfaring Tree. Native of Eurasia. Widely planted and sometimes escaped or persistent, reportedly as far south as MD (Kartesz 1999) and KY (Weckman et al. 2002). May; September. [= C, F, G, K, Z]

* *Viburnum macrocephalum* Fortune, Chinese Snowball. Reported as naturalized in the Mountains of NC (Pittillo 2003, pers. comm.). {investigate}

Viburnum molle Michaux. Limestone areas. Scattered, discontinuous range (but locally may occur in several contiguous counties) from sw. OH, nc. IN, wc. IL, and se. IA south to sc. TN, nw. AR; disjunct in sw. IA. [= C, F, G, K, Y, Z]

Viburnum opulus Linnaeus var. *americanum* Aiton, Cranberry-tree, Highbush-cranberry. Newfoundland and British Columbia south to s. PA (Rhoads & Klein 1993), NJ, n. WV, OH, NE, and WY. [= C, G, K; = *V. trilobum* Marshall – F; = *V. opulus* var. *trilobum* (Marshall) McAtee – Z]

Viburnum venosum Britton. Cp (VA): moist places; rare? E. MA south long Island, NY (and reputedly as far south as e. MD and e. VA). [= *V. dentatum* Linnaeus var. *venosum* (Britton) Gleason – G, K; < *V. dentatum* – GW, W, Y; < *V. semitomentosum* (Michaux) Rehder – S; = *V. scabrellum* Torrey & A. Gray var. *venosum* (Britton) McAtee – Z]

AIZOACEAE Rudolphi 1830 (Fig-marigold Family)

A family of about 128 genera and about 1850-2500 species, mostly succulent herbs and subshrubs, of tropical and subtropical regions, especially in s. Africa and Australia. References: Boetsch (2002); Vivrette, Bleck, & Ferren in FNA (2003b); Hartmann in Kubitzki, Rohwer, & Bittrich (1993). [also see *MOLLUGINACEAE*]

1 Leaves opposite, connate-perfoliate around the stem, triangular in cross-section; fruit a fleshy, indehiscent berry; [subfamily *Ruschioideae*] ... ***Carpobrotus***

1 Leaves opposite or alternate, sessile or short-petiolate, flattened in cross-section (though often succulent-thickened); fruit **either** a dry, indehiscent nut **or** a capsule.

2 Leaves linear, lanceolate, or oblanceolate, the blade > 3× as long as wide; [subfamily *Sesuvioideae*] ... ***Sesuvium***

2 Leaves orbicular, obovate, or triangular-ovate, the blade < 2.5× as long as wide.

3 Leaves opposite to subopposite; fruit a circumcissile capsule; [subfamily *Sesuvioideae*] ... ***Trianthema***

3 Leaves alternate; fruit **either** a loculicidal capsule **or** an indehiscent nut.

4 Fruit a loculicidal capsule; ovary superior; stems densely covered with white scales; [subfamily *Aizoideae*] ... ***Galenia***

4 Fruit an indehiscent nut; ovary inferior; stems green; [subfamily *Tetragonioideae*] ... ***Tetragonia***

Carpobrotus N.E. Brown 1925 (Fig-marigold)

A genus of 13 species, succulent subshrubs, native of s. Africa. References: Vivrette in FNA (2003b); Hartmann in Kubitzki, Rohwer, & Bittrich (1993).

* ***Carpobrotus edulis*** (Linnaeus) N.E. Brown, Hottentot-fig. Cp (FL): dunes, disturbed sandy sites; rare, native eof s. Africa. [= FNA, WH]

Galenia Linnaeus 1753

A genus of 15-25 species, perennial subshrubs, native of s. Africa and Australia. References: Vivrette in FNA (2003b); Hartmann in Kubitzki, Rohwer, & Bittrich (1993).

* ***Galenia secunda*** (Linnaeus f.) Sonder. Cp (FL): disturbed areas; rare, native of s. Africa. [= FNA, S, WH]

Sesuvium Linnaeus 1759 (Sea-purslane)

A genus of about 8-12 species, especially in tropical and subtropical coastal areas. References: Boetsch (2002)=Z; Ferren in FNA (2003b); Hartmann in Kubitzki, Rohwer, & Bittrich (1993).

1 Flowers and fruits on pedicels (3-) 5-20 mm long ..... ***S. portulacastrum***
1 Flowers and fruits sessile (or on pedicels to 1 mm long).
  2 Stamens numerous, in fascicles; leaves 3-6 cm long, 10-20× as long as wide; [rare waif] ..... ***S. crithmoides***
  2 Stamens 5, distinct; leaves 1-3.5 cm long, 3-10× as long as wide; [native] ..... ***S. maritimum***

* ***Sesuvium crithmoides*** Welwitsch, Tropical Sea-purslane. Cp (GA): disturbed area; rare, waif, native of Africa. Reported for GA by Small (1933) and Boetsch (2002) based on collections in Brunswick, GA in 1902 by Roland Harper. It is native to Africa. [= FNA, K, S, Z]

Sesuvium maritimum (Walter) Britton, Sterns, & Poggenburg, Small Sea-purslane, Slender Sea-purslane. Cp (FL, GA, NC, SC, VA): island end flats and sea beaches, salt flats; rare. May-December. NY south to s. FL, west to TX; also in the West Indies. [= RAB, C, F, FNA, G, GW, K, S, WH, Z]

Sesuvium portulacastrum (Linnaeus) Linnaeus, Large Sea-purslane, Shoreline Sea-purslane. Cp (FL, GA, NC, SC): island end flats and sea beaches; uncommon (rare in NC). May-December. A pantropical coastal species, in North America from e. NC south to s. FL, west to e. TX; also in the West Indies and south into the tropics (introduced on ballast in se. PA). [= RAB, FNA, GW, K, S, WH, Z]

Tetragonia Linnaeus 1753 (New Zealand Spinach)

A genus of about 60-85 species, mostly tropical and warm temperate. References: Boetsch (2002)=Y; Vivrette in FNA (2003b); Taylor (1994)=Z; Hartmann in Kubitzki, Rohwer, & Bittrich (1993).

* ***Tetragonia tetragonioides*** (Pallas) Kuntze, New Zealand Spinach. Pd (NC): persistent after cultivation; rare, native of e. Asia. July-November. *Tetragonia* is sometimes segregated into the Tetragoniaceae. *T. tetragonioides* is a member of subgenus *Tetragonioides* (Taylor 1994). [= C, F, FNA, G, K, Y, Z; = *T. expansa* Murray – RAB]

Trianthema Linnaeus 1753 (Horse-purslane)

A genus of about 17-20 species, of tropical and warm temperate areas, especially Australia. References: Boetsch (2002)=Z; Ferren in FNA (2003b); Hartmann in Kubitzki, Rohwer, & Bittrich (1993).

* ***Trianthema portulacastrum*** Linnaeus, Horse-purslane. Cp (GA, NC, SC, VA): disturbed areas; rare, native of the Gulf Coast and the tropics. April-November. [= RAB, C, F, FNA, G, GW, K, S, Z]

ALTINGIACEAE Lindley 1846 (Sweet-gum Family)

A family of 2 genera and about 12 species, trees, of e. Asia, Indomalaysia, e. North America, Central America, and e. Mediterranean. Various molecular studies show that *Liquidambar* is better separated from the Hamamelidaceae (Hoot, Magallón, and Crane 1999). References: Endress in Kubitzki, Rohwer, & Bittrich (1993); Hoot, Magallón, and Crane (1999).

Liquidambar Linnaeus 1753 (Sweet Gum)

A genus of 4-5 species, trees, north temperate, of e. North America, Central America (Mexico to Nicaragua), e. Asia (s. China, Taiwan, Vietnam), and e. Mediterranean (Turkey, Rhodos, Cyprus). References: Endress in Kubitzki, Rohwer, & Bittrich (1993); Li & Donoghue (1999).

Liquidambar styraciflua Linnaeus, Sweet Gum, Red Gum. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): swamp forests, floodplains, moist forests, depressional wetlands, old fields, disturbed areas; common (absent from much of the Mountains). April-May; August-September. CT west to s. OH, s. IL and OK, south to s. FL, TX, and Guatemala. One of the most spectacular of our trees in the fall; a single tree often has a mixture of green, yellow, orange, dark red, bronze, and purple leaves. The sap was previously gathered as a source of chewing gum. The bark is one of the favorite foods of beavers. Although

sometimes thought of as a small and weedy tree, *Liquidambar* reaches its greatest abundance and size in Coastal Plain swamp forests, where it can reach 2 meters in diameter. Along with such species as *Pinus taeda*, *Quercus phellos*, and others, *Liquidambar* is a good example of a primarily bottomland tree which has proven to be an excellent colonizer of disturbed uplands. [= RAB, C, F, FNA, G, GW, K, S, W]

AMARANTHACEAE A.L. de Jussieu 1789 (Amaranth Family)

A family of about 65-71 genera and 750-1000 species, mostly herbs, but including shrubs and trees, of tropical and warm temperate (rarely cold temperate) regions. References: Robertson & Clemants in FNA (2003b); Townsend in Kubitzki, Rohwer, & Bittrich (1993).

Subfamily Amaranthoideae
- Tribe Celosieae: *Celosia.*
- Tribe Amarantheae, subtribe Amaranthinae: *Amaranthus.*
- Tribe Amarantheae, subtribe Aervinae: *Achyranthes.*

Subfamily Gomphrenoideae
- Tribe Gomphrenae, subtribe Froelichiinae: *Alternanthera, Froelichia, Guellimenea.*
- Tribe Gomphrenae, subtribe Gomphreninae: *Gomphrena, Iresine.*

Achyranthes Linnaeus 1753 (Chaff-flower)

A genus of 6-8 species, of warm temperate and tropical regions of the Old World. References: Robertson in FNA (2003b); Townsend in Kubitzki, Rohwer, & Bittrich (1993). Key based closely on FNA.

1 Pseudostaminode margins entire, denticulate, or slightly 2-lobed at the tip ..... ***[A. japonica var. hachijoensis]***
1 Pseudostaminode margins fimbriate at the tip.
  2 Leaf blades 1-4 (-6) cm long, 1-4 (-6) cm wide, obtuse to rounded and apiculate at the tip; tepals 3-4 mm long; utricles 2-2.5 mm long ..... ***A. aspera var. aspera***
  2 Leaf blades 4-20 cm long, 2-5 cm wide, acuminate at the tip; tepals 6-7 mm long; utricles 3-4 mm long ..... ***[A. aspera var. pubescens]***

* ***Achyranthes aspera*** Linnaeus *var.* ***aspera***. Cp (FL, SC): disturbed areas, waste areas around wool-combing mills; rare, native of Asia, perhaps merely a waif. [= FNA, K, WH; = *Centrostachys indica* (Linnaeus) Standley – S]

* *Achyranthes aspera* Linnaeus var. *pubescens* (Moquin-Tandon) C.C. Townsend, Devil's-horsewhip. Reported for MD and s. FL (FNA, K). Native of West Indies and perhaps s. FL. [= FNA, K; = *Centrostachys aspera* (Linnaeus) Standley – S]

* *Achyranthes japonica* (Miq.) Nakai var. *hachijoensis* Honda, Japanese Chaff-flower. Native of e. Asia. Escaped in KY and WV (Mingo and Wayne counties) (Medley et al. 1985) and n. AL (Limestone County) (D. Spaulding, pers.comm.). It will likely become established in our area as well. [= FNA, K; < *A. japonica* – C]

Alternanthera Forsskål 1775 (Chaff-flower, Joyweed)

A genus of about 100 species, tropical and warm temperate, especially in America. References: Clemants in FNA (2003b); Townsend in Kubitzki, Rohwer, & Bittrich (1993). Key based in part on Clemants in FNA (2003b).

1 Inflorescences borne on peduncles 1-7 cm long, these from the leaf axils or terminal
  2 Bracts keeled; tepals pilose; leaves not succulent, acute to acuminate at the tip ..... ***A. flavescens***
  2 Bracts not keeled; tepals glabrous; leaves somewhat succulent, obtuse to rounded at the tip ..... ***A. philoxeroides***
1 Inflorescences sessile, in the leaf axils.
  3 Tepals dimorphic; tepal hairs barbed.
    4 Leaf blades longer than broad; tepals 3-5 mm long, densely villous ..... ***A. caracasana***
    4 Leaf blades as broad as long; tepals 5-7 mm long, sparsely villous ..... ***A. pungens***
  3 Tepals monomorphic; tepal hairs not barbed.
    5 Mature fruit included within the tepals; spikes globular; stems sericeous ..... ***A. paronychioides***
    5 Mature fruit exserted between the tepals; spikes narrow, short-cylindric; stems glabrous to pubescent in lines (the nodes also pubescent) ..... ***A. sessilis***

* ***Alternanthera caracasana*** Kunth. Cp (FL, GA, NC, SC): disturbed areas; rare, native of South America. Reported for Coastal Plain of SC, and in s. Coastal Plain of GA (Jones & Coile 1988) and for NC (FNA, K) and MD (K). [= FNA, K, WH; = *Achyranthes repens* Linnaeus – S, misapplied]

Alternanthera flavescens Kunth, Yellow Joyweed. Cp (FL): hammocks, sandbars; rare. Widespread in the FL peninsula, north to ne. FL (Clay County) (Wunderlin & Hansen 2004). [= K; > *Achyranthes ramosissima* (Mart.) Stand. -- S; > *Alternanthera floridana* (Chapman) Small] {add synonymy}

* ***Alternanthera paronychioides*** St.-Hilaire. Cp (FL, GA, NC, SC): disturbed areas; rare, native of tropical America. July-October. [= FNA, WH; > *Alternanthera paronychioides* St.-Hilaire var. *paronychioides* – K; = *Alternanthera polygonoides* (Linnaeus) R. Brown ex Sweet – RAB, G, misapplied; = *Achyranthes polygonoides* (Linnaeus) Lamarck – S, misapplied]

* ***Alternanthera philoxeroides*** (Martius) Grisebach, Alligator-weed. Cp (FL, GA, NC, SC, VA): floating in mats on the surface of the waters of blackwater rivers, sloughs, ditches, ponds, and in very moist soil of ditches and shores; common, native of tropical America. April-October. This plant is a serious weed. [= RAB, C, FNA, K; = *Achyranthes philoxeroides* (Martius) Standley – S]

* ***Alternanthera pungens*** Kunth. Cp (FL): disturbed areas (ballast?); rare, not recently seen in FL and perhaps onlya waif, native of tropical America. Known from scattered locations in AL, FL, LA, NY, and TX (Clemants in FNA 2003b); native of tropical America. [= FNA, K, WH; > *Achyranthes leiantha* (Seubert) Standley – S; > *Achyranthes repens* Linnaeus -- S]

* ***Alternanthera sessilis*** (Linnaeus) R. Brown ex A.P. de Candolle, Sessile Joyweed. Cp (FL, GA, SC): disturbed wet muck; uncommon (rare in GA and SC), native of the Tropics. First reported for SC by Nelson & Kelly (1997). Apparently now known in the Southeast from SC, FL, AL, MS, LA, TX (Brown & Marcus 1998) and GA (Jones & Coile 1988). [= FNA, GW, K]

Amaranthus Linnaeus 1753 (Amaranth, Pigweed)

A genus of about 60 species, all annual herbs, of tropical and temperate regions. References: Mosyakin & Robertson in FNA (2003b); Costea & Tardif (2003b)=Y; Henrickson (1999)=Z; Sauer (1955)=X; Costea, Sanders & Waines (2001a, 2001b); Townsend in Kubitzki, Rohwer, & Bittrich (1993). Key based closely on Mosyakin & Robertson in FNA (2003b) and Sauer (1955).

1 Plants dioecious; [subgenus *Acnida*] ..... **Key A**
1 Plants monoecious (the pistillate and staminate flowers intermingled, or in separate inflorescences on the same plant); [subgenera *Albersia* and *Amaranthus*] ..... **Key B**

Key A – *Amaranthus*, subgenus *Acnida*

1 Plants pistillate.
  2 Tepals present and well-developed (usually 5 present, at least the outer tepals >2 mm long and with a visible midvein).
    3 Tepals 1 or 2, lanceolate to linear; [subgenus *Acnida*, section *Acnida*] ..... ***A. tuberculatus***
    3 Tepals 5, at least the inner spatulate; [subgenus *Acnida*, section *Saueranthus*].
      4 Outermost tepal obtuse or notched (similar to the others), the midvein excurrent slightly or not at all ..... ***A. arenicola***
      4 Outermost tepal acute or acuminate (dissimilar to the inner obtuse tepals), the midvein excurrent into a rigid point ..... ***A. palmeri***
  2 Tepals lacking, or rudimentary (often only 1-2 present, these <1 (2) mm long and lacking a visible midvein); subgenus *Acnida*, section *Acnida*].
    5 Seeds 2-3 mm long; utricle 2.5-4 mm long ..... ***A. cannabinus***
    5 Seeds 0.7-1.2 mm long; utricle 1-2.5 mm long.
      6 Utricle with conspicuous and regular longitudinal ridges; bract > 1.5 mm long, with a stout midrib not far excurrent beyond the bract blade ..... ***A. australis***
      6 Utricle smooth or irregularly tuberculate; bract < 1.5 mm long, with a slender excurrent midrib
        7 Leaf blades narrow, all or nearly all < 1 cm wide ..... ***A. floridanus***
        7 Leaf blades broader, well-developed leaves 1-3 cm wide ..... ***A. tuberculatus***
1 Plants staminate (some identifications following this lead may not be reliable).
  8 Outer tepals with prominent midribs, usually longer than the inner tepals; bracts >2 mm long (or 1-2 mm long in *A. tuberculatus*), mostly with prominent midribs.
    9 Outer tepals with apex acute or obtuse; dark midribs not excurrent ..... ***A. arenicola***
    9 Outer tepals with apex acuminate; midribs excurrent as rigid spines.
      10 Bracts ca. 4 mm long, equaling or exceeding the outer tepals ..... ***A. palmeri***
      10 Bracts ca. 2 mm long, shorter than the outer tepals ..... ***A. tuberculatus***
  8 Outer tepals without prominent midribs, not appreciably longer than the inner tepals; bracts <2 mm long, the midribs usually not prominent (except sometimes in *A. australis*).
    11 Bracts < 1 mm long; midribs scarcely excurrent ..... ***A. cannabinus***
    11 Bracts > 1mm long; midribs often conspicuously excurrent.
      12 Leaf blades narrow, all or nearly all < 1 cm wide ..... ***A. floridanus***
      12 Leaf blades broader, well-developed leaves 1-3 cm wide
        13 Bracts with moderately prominent midribs; midribs of outer tepals excurrent ..... ***A. australis***
        13 Bracts with slender midribs; midribs of outer sepals not excurrent ..... ***A. tuberculatus***

Key B – *Amaranthus*, subgenera *Albersia* and *Amaranthus*

1 Inflorescences axillary clusters of glomerules (sometimes leafy terminal spikes also present); [subgenus *Albersia*].
  2 Pistillate flowers usually with 3 tepals; utricles usually regularly dehiscent (indehiscent in *A. blitum*).
    3 Utricles indehiscent; leaf blades usually deeply notched at the tip ..... ***A. blitum***
    3 Utricles dehiscent; leaf blades obtuse, acuminate, or very shallowly notched at the tip.
      4 Tepals of pistillate flowers acute to short-acuminate at the tip, not reflexed; seeds 0.6-1.0 mm in diameter ..... ***A. albus***
      4 Tepals of the pistillate flowers long-aristate at the tip, usually reflexed outward; seeds 1.0-1.4 mm in diameter ..... ***[A. thunbergii]***
  2 Pistillate flowers usually with (4-) 5 tepals; utricles usually indehiscent or tardily dehiscent (regularly dehiscent in *A. blitoides*).
    5 Inflorescence axes thickened, becoming indurate at maturity ..... ***A. crassipes var. crassipes***
    5 Inflorescence axes not thickened, not indurate at maturity.
      6 Utricles with regular, circumscissile dehiscence ..... ***A. blitoides***

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6 Utricles indehiscent (or tardily and irregularly dehiscent).
7 Leaves crisped-erose, conspicuously undulate (non planar) ..... ***A. crispus***
7 Leaves entire or erose, plane or slightly undulate.
8 Leaves ovate, obovate-rhombic, to narrowly ovate or lanceolate; plants not fleshy; [alien of disturbed situations] ..... ***A. polygonoides***
8 Leaves orbicular or obovate; plants fleshy; [native of sea-beaches] ..... ***A. pumilus***
1 Inflorescences terminal spikes or panicles, leafless or nearly so at least in the distal portions (axillary spikes or clusters usually also present).
9 Utricles indehiscent; tepals of pistillate flowers usually 2-3 (5 in *A. spinosus*); inflorescence bracts shorter than the tepals.
10 Stems with paired nodal spines; tepals of pistillate flowers 5; [subgenus *Amaranthus*] ..... ***A. spinosus***
10 Stems lacking spines; tepals of pistillate flowers 2-3; [subgenus *Albersia*].
11 Utricles distinctly rugose, equaling or slightly exceeding the tepals; terminal inflorescences usually thin and interrupted ..... ***A. viridis***
11 Utricles smooth to faintly rugose (occasionally wrinkled or rugose in dried material), distinctly exceeding the tepals; terminal inflorescences usually thick and dense (or thin and interrupted in some forms of *A. blitum*).
12 Utricles subglobose to obovate, compressed; seeds filling the fruit almost completely; leaf blades usually deeply notched at the tip; annual ..... ***A. blitum***
12 Utricles ellipsoid, slightly to distinctly inflated; seeds filling only the proximal portions of the fruit; leaf blades shallowly notched at the tip; short-lived perennials, or annuals ..... ***A. deflexus***
9 Utricles dehiscent; tepals of pistillate flowers usually usually 5 (3-5 in *A. powellii*); inflorescence bracts exceeding the tepals (shorter than the tepals in some cultivated forms); [subgenus *Amaranthus*].
13 Fully developed inflorescences large and robust, usually brightly colored (red, purple, occasionally white or yellow, rarely green); bracts usually not exceeding style branches at maturity (occasionally longer than the style branches in *A. hypochondriacus*); seeds white, ivory, red, brown, or black; [cultivated, only weakly naturalized].
14 Inflorescences stiff, erect ..... ***A. hypochondriacus***
14 Inflorescences lax, erect to drooping.
15 Tepals of pistillate flowers (at least the inner tepals of the pistillate flowers) obovate or spatulate, the tip obtuse to slightly notched; style branches spreading or reflexed ..... ***[A. caudatus]***
15 Tepals of pistillate flowers oblong to lanceolate, the tip acute; style branches erect or slightly reflexed ..... ***A. cruentus***
13 Fully developed inflorescences moderately large, usually green (rarely with some whitish or reddish coloration); bracts exceeding the style branches and tepals; seeds brown or black; [wild and weedy].
16 Tepals of pistillate flowers obtuse, rounded, or slightly notched at the tip; plants rather densely pubescent ..... ***A. retroflexus***
16 Tepals of pistillate flowers acute, acuminate, or aristate at the tip; plants slightly pubescent when young, becoming glabrous or nearly so.
17 Bracts 2-4 mm long; inflorescences usually soft and lax, with spreading branches ..... ***A. hybridus***
17 Bracts 4-7 mm long; inflorescences usually stiff, with erect branches ..... ***A. powellii***

* ***Amaranthus albus*** Linnaeus, Tumbleweed Amaranth. Cp (FL), Pd, Mt (VA), {GA, NC, SC}: disturbed areas, agricultural fields; common (rare in FL), native of c. North America. July-October. [= C, FNA, G, K, W, WH, Y; < *Amaranthus graecizans* Linnaeus – RAB, misapplied; > *Amaranthus albus* var. *albus* – F]

* ***Amaranthus arenicola*** I.M. Johnston, Sandhill Amaranth. Cp, Pd (VA): rare, native of w. North America. [= C, FNA, G, K, X; = *Amaranthus torreyi* A. Gray – F]

*? ***Amaranthus australis*** (A. Gray) J.D. Sauer, Southern Water-hemp, Careless. Cp (FL, GA, NC, VA): tidal marshes, ditches; uncommon. VA, TN, AR, and TX south into West Indies, Mexico, and n. South America; perhaps adventive in most of our range, from an original distribution on the Gulf Coast, in FL, and southward into the New World tropics. This annual is alleged to get as large as 9 m tall and 30 cm diameter at the base of the stem! [= FNA, GW, K, WH, X; > *Acnida cuspidata* Bertero ex Sprengel – S; > *Acnida alabamensis* Standley – S]

Amaranthus blitoides S. Watson, Matweed Amaranth, Prostrate Pigweed. {GA, SC, VA}: [= C, FNA, K, S, Y; < *A. graecizans* Linnaeus – RAB, F, misapplied]

* ***Amaranthus blitum*** Linnaeus, Purple Amaranth, Livid Amaranth. Cp (FL), Pd (SC) {GA, NC, VA}: disturbed habitats; uncommon, native of the tropics. First reported from South Carolina by Hill & Horn (1997). [= C, FNA, K; = *Amaranthus lividus* – RAB, F, misapplied; > *Amaranthus blitum* – G; > *Amaranthus lividus* – G; > *Amaranthus blitum* Linnaeus ssp. *emarginatus* (Moquin-Tandon ex Uline & Bray) Carretero – WH, Y; > *Amaranthus blitum* ssp. *polygonoides* (Moquin-Tandon) Carretero]

Amaranthus cannabinus (Linnaeus) J.D. Sauer, Salt-marsh Water-hemp. Cp (FL, GA, NC, SC, VA): salt, brackish, and freshwater tidal marshes, especially along the banks of tidal guts; common (rare in FL). July-December. ME south to ne. FL; AL? Extremely variable in size, flowering and fruiting at heights ranging from 3 dm to 4 m tall. The stem can reach 10 cm in diameter at the base. [= RAB, C, FNA, GW, K, WH, X; = *Acnida cannabina* Linnaeus – F, G, S]

*? ***Amaranthus crassipes*** Schlechtendahl *var. **crassipes***, Spreading Amaranth. (SC): shores and wet areas; rare, probably introduced from tropical America. Var. *warnockii* (I.M. Johnston) Henrickson occurs in the Chihuahuan Desert region. [= Z; < *Amaranthus crassipes* – RAB, C, FNA, G, GW, K, S]

* ***Amaranthus crispus*** (Lespinasse & Thévenau) A. Braun, Crisp-leaved Amaranth. Cp (NC, VA): disturbed areas, especially around seaports; rare, native of South America. [= FNA, C, F, G, K, S]

* ***Amaranthus cruentus*** Linnaeus, Red Amaranth, Blood Amaranth, Purple Amaranth. (NC, SC): native of Central America. [= RAB, C, F, FNA, K, S, Y]

* ***Amaranthus deflexus*** Linnaeus, Large-fruit Amaranth, Argentine Amaranth. Cp (FL), {GA, VA}: disturbed areas; rare, native of South America. Reported for VA by Kartesz (1999) and FNA. [= FNA, C, F, G, K, WH]

Amaranthus floridanus (S. Watson) Sauer, Florida Amaranth. Cp (FL): dunes, beaches; rare. Native, endemic to FL peninsula, north to Duval and Alachua counties (Wunderlin & Hansen 2004). [= FNA, K, WH; = *Acnida floridana* S. Watson -- S]

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* ***Amaranthus hybridus*** Linnaeus, Smooth Amaranth, Green Amaranth, Hybrid Amaranth, Smooth Pigweed. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): July-October. [= RAB, C, F, FNA, G, K, S, W, WH; = *Amaranthus hybridus* ssp. *hybridus* – Y]

* ***Amaranthus hypochondriacus*** Linnaeus, Prince's-feather. (VA): Type locality is "Virginia". Possibly of hybrid origin, from *A. cruentus* × *powellii*. [= FNA, C, K]

* ***Amaranthus palmeri*** S. Watson, Careless-weed. Cp (FL), {GA, NC, SC, VA}: disturbed areas; uncommon, native of c. North America. [= RAB, C, F, FNA, G, K, WH, X]

* ***Amaranthus polygonoides*** Linnaeus, Tropical Amaranth, Smartweed Amaranth. Cp (SC): disturbed areas; rare, native of tropical America. Reported for SC (FNA, K). [= FNA, K, S]

* ***Amaranthus powellii*** S. Watson, Green Amaranth, Powell's Amaranth. {GA, NC, SC, VA}: Widespread and common in PA (Rhoads & Klein 1993). Many earlier reports of *A. retroflexus* may actually pertain to this species. [= FNA, C, F, G, K; = *Amaranthus retroflexus* Linnaeus var. *powellii* (S. Watson) Boivin; = *Amaranthus powellii* ssp. *powellii* – Y]

Amaranthus pumilus Rafinesque, Seabeach Amaranth, Dwarf Amaranth. Cp (NC, SC, VA): sea beaches, fore-dunes, island end flats, rarely on sound-side beaches; rare (US Threatened, NC Threatened, SC, Rare, VA Rare). Se. MA south to c. SC; presently known to be extant only from NC, n. SC, e. MD, DE (McAvoy 2002), se. NY (Long Island), VA, and NJ. Seeds of this plant require cold stratification, high temperatures, and light to germinate (Baskin & Baskin 1998); this is apparently responsible for the late seasonality of the species (germination in late spring and early summer) and its seed-banking. See Hancock & Hosier (2003) for discussion of the ecology of this interesting species. [= RAB, C, F, FNA, G, GW, K, S]

* ***Amaranthus retroflexus*** Linnaeus, Rough Pigweed, Redroot. Mt, Pd, Cp (GA, NC, SC, VA): July-October. [= RAB, C, F, FNA, G, K, S, W, Y; = *A. retroflexus* var. *retroflexus*]

* ***Amaranthus spinosus*** Linnaeus, Spiny Amaranth. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, gardens, roadsides, barnyards, pastures; common, native of tropical America. July-October. [= RAB, C, F, FNA, G, K, S, W, WH, Y]

* ***Amaranthus tuberculatus*** (Moquin-Tandon) J.D. Sauer, Inland Water-hemp. (GA, NC, SC). July-October. [= RAB, C, FNA, GW, W; > *Acnida altissima* (Riddell) Moquin-Tandon ex Standley var. *altissima* – F; > *Acnida altissima* var. *subnuda* (S. Watson) Fernald – F; > *Acnida altissima* var. *prostrata* (Uline & Bray) Fernald – F; > *Acnida altissima* – G; > *Acnida subnuda* (S. Watson) Standley – G, S; > *Acnida tamariscina* (Nuttall) Wood – G, S, misapplied; > *Amaranthus tuberculatus* – K, X; > *Amaranthus rudis* J.D. Sauer – K; > *Acnida concatenata* Moquin-Tandon -- S; > *Amaranthus tamariscinus* Nuttall – X, misapplied]

* ***Amaranthus viridis*** Linnaeus, Slender Amaranth, Tropical Green Amaranth. Cp (FL), {GA, NC, SC, VA}: native of South America. [= RAB, C, F, FNA, G, K, WH, Y; = *Amaranthus gracilis* Desfontaines – S]

* *Amaranthus caudatus* Linnaeus, Love-lies-bleeding, is cultivated and rarely escaped or persistent, as in TN (Chester, Wofford, & Kral 1997), and scattered in PA (Rhoads & Klein 1993). [= FNA, C, F, G, K, Y]

* *Amaranthus thunbergii* Moquin-Tandon, Thunberg's Amaranth. Native of Africa. Collected from near wool-combing mills in SC; probably not naturalized. [= FNA, K]

Celosia Linnaeus 1753 (Cockscomb)

A genus of about 45 species, of tropical and warm temperate regions of America and Africa. References: Robertson (1981)=Z; Robertson in FNA (2003b); Townsend in Kubitzki, Rohwer, & Bittrich (1993).

1 Style ca. 0.2 mm long; inflorescence of lax, interrupted panicles ..... ***C. trigyna***
1 Style 3-4 mm long; inflorescence very dense.
  2 Inflorescence of crowded spikes ..... ***C. argentea***
  2 Inflorescence crested, fanlike, or elaborately lobed ..... ***C. cristata***

* ***Celosia argentea*** Linnaeus. Cp, Pd, Mt (NC): commonly cultivated, rarely escaped or persistent in disturbed areas, such as along creeks; rare, native of the Tropics. July-November. [= RAB, C, FNA, G, K, Z; = *C. argentea* var. *argentea* – F; < *C. argentea* – WH]

* ***Celosia cristata*** Linnaeus, Cockscomb. Pd (NC): commonly cultivated, rarely escaped or persistent in disturbed areas; rare, native of the Tropics. July-November. *C. cristata* is clearly closely related to and likely derived from *C. argentea*; it has been variously treated as a species, variety, or form. It is popular in gardens and institutional landscaping, but is not universally appreciated; Stace (1997) calls it "probably the world's ugliest plant." [= C, FNA, G, K, Z; = *C. argentea* Linnaeus var. *cristata* (Linnaeus) Kuntze – F; < *C. argentea* Linnaeus – WH]

* ***Celosia trigyna*** Linnaeus, Woolflower. Cp (FL): distiurbed areas; rare, native of tropical Africa. [= FNA, K, WH]

Froelichia Moench 1794 (Cottonweed, Snake-cotton)

A genus of about 18 species of tropical and subtropical America. References: McCauley in FNA (2003b); Robertson (1981)=Z; Townsend in Kubitzki, Rohwer, & Bittrich (1993).

1 Calyx conical in fruit, ca. 3-4 mm long; plant 2-7 dm tall, branching from the base ..... ***F. gracilis***
1 Calyx flask-shaped in fruit, ca. 5 mm long; plant 3-20 dm tall, not branching from the base
  2 Hairs of the peduncles <0.5 mm long; plants typically 3-10 dm tall; [of w. KY Mississippi Embayment westward] ..... ***F. campestris***
  2 Hairs of the the peduncles mostly 1-2 mm long; plants typically 10-20 dm tall; [of the Southeastern Coastal Plain] ..... ***F. floridana***

Froelichia campestris Small, Plains Cottonseed. Cp (KY): disturbed areas; rare. OH, MN, and CO south to w. KY, AR, and TX. [= *F. floridana* var. *campestris* (Small) Fernald – C, F, G, K, Z; < *F. floridana* – FNA] {add to key}

Froelichia floridana (Nuttall) Moquin-Tandon, Florida Cottonseed, Common Cottonweed. Cp (FL, GA, NC, SC): sandhills, sandy fields, sandy roadsides; common (rare in NC). June-October. S. NC south to FL, and west to LA, north in the interior to w. TN; disjunct (probably introduced) in DE and e. MD. *F. campestris* Small is more midwestern, ranging from OH, IN, WI, and SD south to KY, AR, and TX; it is sometimes treated as a variety of *F. floridana*, but seems amply distinct in morphology, and with an allopatric distribution. [= RAB, S; = *F. floridana* var. *floridana* – C, F, G, K, Z; < *F. floridana* – FNA, WH]

* ***Froelichia gracilis*** (Hooker) Moquin-Tandon, Slender Cottonweed. Cp, Pd (GA, NC, SC, VA), Mt (NC, VA): vacant lots, sandy fields, railroad banks; rare, native of mw. United States. June-October. [= RAB, C, F, FNA, G, K, W, Z]

Gomphrena Linnaeus 1753 (Globe-amaranth)

A genus of about 100-120 species, of the tropics and subtropics of America and Australia (naturalized elsewhere). References: Clemants in FNA (2003b); Townsend in Kubitzki, Rohwer, & Bittrich (1993). Key based on Clemants in FNA (2003b).

1 Heads 20-28 mm in diameter; stems erect ..... ***G. globosa***
1 Heads 8-16 mm in diameter; stems prostrate or decumbent ..... ***G. serrata***

* ***Gomphrena globosa*** Linnaeus, Globe-amaranth. Cp (SC) (VA?): disturbed areas; rare, native of s. Asia. Introduced and known from scattered locations in s. PA (Rhoads & Klein 1993). Also reported for VA (Kartesz 1999) and MD (Reed1961b). [= FNA, C, F, G, K]

Gomphrena serrata Linnaeus, Arrasa con todo. Cp (FL, GA), (VA?): sandy woodlands and disturbed areas; rare. Also reported for VA by Kartesz (1999) {investigate}. [= FNA, K; > *G. dispersa* Standley – S]

Guilleminea Kunth 1823

A genus of 2-5 species of sw. North America, Central America, and South America. References: Clemants in FNA (2003b); Henrickson (1987)=Z; Townsend in Kubitzki, Rohwer, & Bittrich (1993).

* ***Guilleminea densa*** (Humboldt & Bonplandt ex Willdenow) Moquin-Tandon *var.* ***aggregata*** Uline & Bray. Cp (SC): sandy disturbed area; rare, native of sw. United States. First reported for SC by Nelson & Kelly (1997). [= FNA, K, Z]

Iresine P. Browne 1856 (Bloodleaf)

A genus of about 80 species of tropical and temperate regions (especially America). References: Clemants in FNA (2003b); Townsend in Kubitzki, Rohwer, & Bittrich (1993).

1 Plant an annual to weak perennial, 4-30 dm tall, with fibrous roots; tepals 0.6-0.8 mm long, the tips obtuse to rounded ..... ***I. diffusa***
1 Plant a perennial, 3-10 dm tall, with stolons; tepals 1.0-1.3 mm long, the tips acute to acuminate ..... ***I. rhizomatosa***

Iresine diffusa Humboldt & Bonpland ex Willdenow, Juba's-bush. Cp (FL): hammocks, disturbed areas; rare. Reported for NC by Small (1933), so far as is known in error. Ne. FL, Panhandle FL, south to s. FL. [= FNA, K; < *Iresine celosia* Linnaeus – S]

Iresine rhizomatosa Standley. Cp (FL, GA, NC, SC, VA), Pd (VA): moist interdune thickets, hammocks, edges of maritime forests, moist thickets inland; rare. August-October. MD south to FL, west to se. TX; also inland from KY and TN west and south to KS and n. TX. [= RAB, C, F, FNA, G, K, S]

ANACARDIACEAE Lindley 1830 (Cashew Family)

A family of about 70 genera and about 875 species, trees, shrubs, lianas, and rarely herbs, of tropical, subtropical, and temperate regions. References: Barkley (1937).

1 Leaves simple ..... ***Cotinus***
1 Leaves compound.
  2 Fruits both red and glabrous ..... ***Schinus***
  2 Fruits not simultaneously red and glabrous.
    3 Fruits red, glandular pubescent; foliage and stems lacking contact poisons; inflorescences dense, either terminal or lateral on last year's growth ..... ***Rhus***
    3 Fruits white or yellow, glabrous or puberulent (the hairs not glandular); foliage and stems containing contact poisons; inflorescences openly branched, axillary ..... ***Toxicodendron***

Cotinus P. Miller (Smoketree)

A genus of 3-5 species, of southeastern United States and temperate Eurasia.

1 Leaves elliptic, to 10 cm long; [planted tree] ..... *[C. coggygria]*
1 Leaves obovate, to 20 cm long; [native tree of calcareous habitats] ..... ***C. obovatus***

Cotinus obovatus Rafinesque, American Smoketree. Mt (GA): limestone woodlands and glades; rare (GA Special Concern). Se. TN (Cumberland Plateau) (Chester, Wofford, & Kral 1997), nw. GA, and n. AL west to OK and TX. A small tree of limestone woodlands and glade margins, occasionally planted as an ornamental tree. [= K; = *C. americanus* Nuttall – S]

* *Cotinus coggygria* Scopoli, European Smoketree, is planted as an ornamental. It is reported as naturalized in various states in ne. United States. There is no evidence of its naturalization or persistence in our area. [= K]

Rhus Linnaeus (Sumac)

A genus of about 25 species, trees, shrubs, and lianas, temperate and subtropical, of Eurasia, Hawaii, North America, and n. Central America. References: Yi, Miller, & Web (2007); Hardin & Phillips (1985a); Miller, Young, & Wen (2001).

1 Leaves 3-foliolate; shrub to 2 m tall; inflorescence of small lateral and terminal clusters; [subgenus *Lobadium*] ..... ***Rh. aromatica*** *var.* ***aromatica***
1 Leaves (5-) 7-31-foliolate; shrub or small tree, to 12 m tall; inflorescence of dense, terminal panicles; [subgenus *Rhus*].
  2 Rachis of the leaf winged between each pair of adjacent leaflets; stems and petioles puberulent; leaflets entire to remotely toothed.
    3 Leaflets 11-23, attenuate to base, 4-9 cm long, 1-2 cm wide, typically with an obtuse tip ..... ***Rh. copallinum*** *var.* ***copallinum***
    3 Leaflets 5-13, rounded to base on the upper side, 4-9 cm long, 1.5-4 cm wide, typically with an acute to acuminate tip ..... ***Rh. copallinum*** *var.* ***latifolia***
  2 Rachis of the leaf not winged between each pair of adjacent leaflets (sometimes winged between the last 1 or 2 pairs of leaflets on each side of the rachis); stems and petioles either densely villous or essentially glabrous; leaflets sharply and rather coarsely serrate.
    4 Leaflets densely pubescent (rarely sparsely pubescent); short shrubs to 1 m tall; stems densely long-pubescent; rachis of the leaf often winged terminally; leaflets mostly ovate, averaging about 2× as long as wide, acute ..... ***Rh. michauxii***
    4 Leaflets glabrous, glaucous beneath; medium shrubs to small trees, to 12 m tall; stems densely long-pubescent or essentially glabrous; rachis of the leaf not winged; leaflets mostly lanceolate, averaging 3-4× as long as wide, acuminate.
      5 Stems essentially glabrous; pubescence of the fruit short and blunt-tipped ..... ***Rh. glabra***
      5 Stems densely long-pubescent; pubescence of the fruit long and pointed ..... ***Rh. typhina***

Rhus aromatica Aiton var. ***aromatica***, Fragrant Sumac, Squawbush. Pd, Mt (GA, NC, SC, VA), Cp (GA): rocky, rather dry, woodlands, usually over mafic rocks (such as gabbro or diabase) or calcareous rocks, less commonly in sandy soils; uncommon (rare in FL). Late February-early May; late April-June. The species ranges throughout much of temperate North America; var. *aromatica* is the most eastern component of the complex, distributed from NH, Ontario, and MN south to Panhandle FL and TX. The foliage of *Rh. aromatica* bears some superficial resemblance to *Toxicodendron pubescens*. [= C, F, G, K; < *Rh. aromatica* – RAB, W, WH; = *Schmaltzia crenata* (P. Miller) Greene – S]

Rhus copallinum Linnaeus var. ***copallinum***, Winged Sumac, Flameleaf Sumac. Cp (FL?, GA, NC, SC, VA), Pd, Mt? (GA, NC, SC, VA): sandhills, dry woodlands, maritime thickets (especially from VA northward), old fields, roadsides; common. The relative ranges, habitats, and characteristics of the varieties of *R. copallinum* need further elucidation. [= K; < *Rh. copallina* – RAB, W; < *Rh. copallinum* – C, G, S, WH; = *Rh. copallina* var. *copallina* – F]

Rhus copallinum Linnaeus var. ***latifolia*** Engler, Eastern Winged Sumac. Mt (GA, NC, SC?, VA), Pd (GA?, NC?, SC?, VA): rocky glades, dry woodlands; uncommon. See comments under var. *copallinum*. [= K; < *Rh. copallina* – RAB, W; < *Rh. copallinum* – C, G, S; = *Rh. copallina* var. *latifolia* – F]

Rhus copallinum Linnaeus *var.* ***leucantha*** (Jacquin) A.P. de Candolle, Southern Winged Sumac. Cp (FL, GA, NC, SC, VA?): sandhills, dry woodlands; common. [= K; < *Rh. copallina* – RAB; > *Rh. leucantha* Jacquin – S; > *Rh. obtusifolia* (Small) Small – S; < *Rh. copallinum* -- WH] {not yet keyed}

Rhus glabra Linnaeus, Smooth Sumac. Mt, Pd, Cp (GA, NC, SC, VA): disturbed areas, clearings, roadsides, woodlands; common (rare in Coastal Plain). Late May-July; June-October. ME west to British Columbia, south to Panhandle FL, TX, CA, and beyond. [= RAB, C, G, K, S, W, WH; > *Rh. glabra* var. *glabra* – F]

Rhus michauxii Sargent, Michaux's Sumac, Dwarf Sumac. Cp (NC, SC), Pd (GA, NC, VA): in the fall line sandhills characteristically in submesic, loamy swales, usually associated with such species as *Paspalum bifidum, Helianthus divaricatus, Tridens carolinianus, Rhus copallinum, Anthaenantia villosa, Gymnopogon* sp., and *Aristida lanosa;* in the eastern Piedmont on sandy soils derived from granite; in the central Piedmont on clayey soils derived from mafic rocks such as gabbro or mafic Carolina slates, probably all of its habitats (formerly) in frequently burned situations; rare. June; August-September. Rare and scattered (though formerly more common) from s. VA south to GA; disjunct in Alachua County, FL (just south of area). Large populations were found in sc. VA (Nottoway and Dinwiddie counties) in frequently burned military artillery "impact areas" (Fleming & Ludwig 1996). Barden & Matthews (2004) present a detailed account of its discovery by André Michaux in 1794 in what is now Union County, NC. [= RAB, K, S; = *Rh. pumila* Michaux]

Rhus typhina Linnaeus, Staghorn Sumac. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): roadsides, old pastures, thickets, clearings, rock outcrops, barrens; common (uncommon in upper Piedmont only) (rare in GA). May-June; June-September. Widespread in ne. North America, south in the mountains to n. GA. The apparently older epithet "*hirta*" was rejected in 1999.

The species, especially in its cut-leaved forms, forma *laciniata* (Wood) Rehder and forma *dissecta* Rehder, is very popular in Europe as a cultivated ornamental. [= RAB, C, F, G, K, W; = *Rh. hirta* (Linnaeus) Sudworth – S]

Two hybrids have been documented to occur naturally in our area: *Rhus* ×*pulvinata* Greene (*glabra* × *typhina*) and *Rhus* ×*ashei* (Small) Greene (*glabra* × *michauxii*). They are intermediate between their parents. For instance, *R.* ×*ashei* has sparsely pubescent leaves and stems, slight winging of the rachis between the terminal leaflets, potentially greater stature than *R. michauxii,* and leaflets with a length/width ratio of 2.5-3. Hardin & Phillips (1985b) discuss other natural and artificial hybrids in *Rhus*.

Schinus Linnaeus (Brazilian-pepper)

* ***Schinus terebinthifolius*** Raddi, Brazilian-pepper. Cp (FL) disturbed areas, especially moist or wet; rare (very common and a noxious invasive south of our area in the FL peninsula), native of Brazil and Paraguay. [= GW, WH; > *Sch. terebinthifolius* var. *raddianus* Engl. – K]

Toxicodendron P. Miller (Poison Ivy, Poison Oak, Poison Sumac)

A genus of about 10-15 species, trees and shrubs, primarily temperate, of North America, n. South America, Indonesia, and e. Asia. References: Gillis (1971)=Z.

1 Leaflets 7-13, entire; small tree ..... ***T. vernix***
1 Leaflets 3, toothed, lobed, or entire; shrub or vine.
  2 Fruits pubescent or papillose; leaflets entire, coarsely toothed, undulate, or round-lobed; lower surfaces of leaflets either velvety puberulent, sometimes becoming glabrate in age (*T. pubescens*) or glabrous (glabrescent or rarely pilose beneath) but with prominent tufts of tannish hairs present in the vein axils (*T. radicans* ssp. *radicans*).
    3 Leaves sparsely pubescent (rarely pilose beneath), the apex and the lobes (if present) generally acute to acuminate; drupes; plant a high-climbing vine or stoloniferous shrub; [of mesic, swampy, or dry habitats] ..... ***T. radicans*** *var.* ***radicans***
    3 Leaves velvety puberulent (sometimes becoming glabrate in age), the apex and the lobes (if present) generally obtuse to broadly acute; drupes pubescent (becoming glabrate); plant a stoloniferous shrub; [of dry habitats, especially sandhills] ..... ***T. pubescens***
  2 Fruits glabrous (or very sparsely pubescent); leaflets coarsely toothed or notched (rarely entire); lower surfaces of leaflets glabrous to pubescent, but without tufts of tannish hairs in the vein axils.
    4 Leaves densely pilose and velvety on the lower surface; leaves pubescent on the upper surface; pubescence of the leaves erect ..... ***T. radicans*** *var.* ***pubens***
    4 Leaves glabrous to sparsely strigose on the lower surface; leaves glabrous on the upper surface; pubescence of the leaves appressed.
      5 Leaflets suborbicular or broadly ovate, nearly as wide as long; petiole glabrous (rarely glabrescent); plant a shrub, the stems upright, entirely lacking aerial roots, not vining; fruits (3-) 4-7 mm in diameter ..... ***T. rydbergii***
      5 Leaflets ovate to lanceolate; petiole puberulent to densely pubescent; plant a shrub or vine, the stems upright or twining; fruits 2.5-5.5 mm in diameter ..... ***T. radicans*** *var.* ***negundo***

Toxicodendron pubescens P. Miller, Poison Oak. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry woodlands, around dry rock outcrops in the Piedmont and Mountains, especially prevalent in sandhills; common (uncommon in Piedmont and Mountains). Late April-May; August-October. Primarily Southeastern: NY (Long Island) south to n. FL, west to e. TX, inland to WV, e. TN, c. TN, se. MO, and s. KS. The nomenclatural confusion may still not be resolved. [= C, K, WH; = *Rhus toxicodendron* – RAB, F, G; = *T. toxicodendron* (Linnaeus) Britton – S; = *T. toxicarium* Gillis – W, Z; = *T. quercifolium* (Michaux) Greene]

Toxicodendron radicans (Linnaeus) Kuntze *var.* ***negundo*** (Greene) Reveal, Midwestern Poison Ivy. Mt, Pd (VA): in a wide range of habitats, including mesic forests, rock outcrops, open areas, and disturbed ground; uncommon? Late April-May; August-October. NY west to MI, MN, and NE, south to sw. VA, KY, AR, and TX, almost entirely in or west of the Appalachians. In our area seemingly mostly in the New River drainage; to be expected in nw. NC. [= C; = *Rhus radicans* var. *vulgaris* (Michaux) A.P. de Candolle forma *negundo* (Greene) Fernald – F, G; = *T. radicans* ssp. *negundo* (Greene) Gillis – K, Z]

Toxicodendron radicans (Linnaeus) Kuntze *var.* ***pubens*** (Engelmann ex S. Watson) Reveal. Associated with xeric limestone sites in the Mountains of VA (Virginia Botanical Associates 2006). S. IL and MO south to se. LA and s. TX; disjunct eastward in c. KY, c. TN, and w. VA. [< *T. radicans* – GW, W; = *T. radicans* ssp. *pubens* (Engelmann ex S. Watson) Gillis – K, Z; < *Rhus radicans*]

Toxicodendron radicans (Linnaeus) Kuntze *var.* ***radicans***, Eastern Poison Ivy. Pd (FL, GA, NC, SC, VA), Cp, Mt (GA, NC, SC, VA): in a wide range of habitats, including mesic forests, rock outcrops, swamp forests, brackish marshes, open areas, disturbed ground, usually in more mesic to hydric sites than *T. pubescens*, and particularly common in areas with fertile soils, such as bottomlands or over calcareous rocks or calcareous sands (as in maritime forests; common. Late April-May; August-October. Var. *radicans* is the typical poison ivy of the Atlantic and Gulf Coastal Plains, rarely found west of the Appalachians. It ranges from Nova Scotia south to s. FL (and the Bahamas), west to e. TX, inland to VT, c. PA, WV, KY, and AR. It is normally a vine, climbing by adventitious roots, and can attain diameters of 10 cm and climb to the crowns of forest trees. It can also resemble *T. pubescens* in habit, producing numerous meter-high upright stems from rhizomes. *T. radicans* var. *radicans* is ubiquitous in our area, absent only from the high mountains of NC. [= C; < *Rhus radicans* Linnaeus – RAB; > *Rhus radicans* var. *radicans* – F, G; > *Rhus radicans* var. *vulgaris* (Michaux) A.P. de Candolle forma *vulgaris* – F, G; < *T. radicans* – GW, S, W, WH; = *T. radicans* ssp. *radicans* – K]

Toxicodendron rydbergii (Small ex Rydberg) Greene, Western Poison Ivy. Mt (VA): acid pine-oak forests and woodlands at moderate elevations; rare (VA Rare). Nova Scotia west to British Columbia, south to New England, NY, n. OH, n. IL, IA, w.

KS, w. TX, AZ, and OR; disjunct in the Appalachians in PA, WV, and VA. Reported for NC by Gillis (1971), but the location (Cumberland Co., in the fall-line Sandhills), does not seem plausible {investigate further with specimen}. [= C, K, Z; = *Rhus radicans* var. *rydbergii* (Small) Rehder – F, G; = *T. radicans* (Linnaeus) Kuntze var. *rydbergii* (Small ex Rydberg) Erskine]

Toxicodendron vernix (Linnaeus) Kuntze, Poison Sumac, Thunderwood. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC, VA): in peaty habitats, in the Coastal Plain frequent in streamhead pocosins and sandhill seepage bogs, in the mountains in bogs; uncommon (rare in Mountains and Piedmont). May-early June; August-September. Nova Scotia west to MN, south to c. peninsular FL and TX. The leaf rachis and leaflet petiolules are usually a dark red or maroon color. The leaves turn a very attractive shade of orange-red in autumn. [= C, GW, K, S, W, WH; = *Rhus vernix* Linnaeus – RAB, F, G]

ANNONACEAE A.L. de Jussieu 1789 (Custard-apple Family)

A family of about 128-130 genera and about 2200-2300 species, trees, shrubs, and lianas, mostly tropical. Kessler in Kubitzki, Rohwer, & Bittrich (1993).

Asimina Adanson 1763 (Pawpaw)

A genus of 8 species of shrubs and small trees, endemic to e. North America. References: Kral (1960)=Z; Wilbur (1970a)=Y; Godfrey (1988)=X; Kral in FNA (1997); Ward (2001); Kessler in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: Hybrids are known between some of the pineland species, notably *A. angustifolia* × *incana* [= *A.* ×*nashii* Kral], and should be expected where two species are present.

1 Leaves herbaceous in texture, obovate, >6 cm wide, acute-acuminate at the apex; peduncles with bracts; flowers reddish-maroon; [shrubs and trees]; [collectively widespread in our area]; [section *Asimina*, subsection *Asimina*].
  2 Flowering peduncles 3-8 mm long, the hairs tan to rusty; leaves 6-15 (-20) cm long; sepals 4-7 mm long; outer petals 10-13 mm long; fruit 1-3 (-6) cm long; plant a shrub to 2 m (rarely to 5 m) tall; [primarily of the Coastal Plain in our area, extending into the Piedmont in NC and SC, and into the Mountains in SC] ..... ***A. parviflora***
  2 Flowering peduncles (10-) 15-20 (-25) mm long, the hairs dark reddish-brown; leaves 15-35 cm long; sepals 8-12 mm long; outer petals 15-25 mm long; fruit (3-) 7-15 cm long; plant a tree to 15 m tall; [widespread in our area] ..... ***A. triloba***
1 Leaves coriaceous in texture, linear to oval, blunt at the tip (or acute-acuminate); peduncles lacking bracts; flowers maroon, pale pink, yellow, cream, or white; [shrubs to 1.75 m tall]; [of e. GA, very rarely e. SC, and southward]; [section *Asimina*, subsection *Pityothamna*].
  3 Flowers borne on growth of the previous year, appearing before or with leaf expansion; leaves 1.5-4× as long as broad, 4-10 cm long, 1-6 cm long; flowers with a sweet odor.
    4 Newly emergent leaf blades densely tomentose on both surfaces with pale blonde or tan pubescence; outer petals white to yellowish, inner petals yellowish with a deep yellow corrugated zone; [of dry pinelands] ..... ***A. incana***
    4 Newly emergent leaf blades densely tomentose on the lower surface with the hairs near the midrib reddish, the upper surface sparsely pubescent; outer petals white, inner petals white, yellowish, or pink, with a maroon or purple corrugated zone; [of wet pinelands] ..... ***A. reticulata***
  3 Flowers borne on growth of the current year, appearing after leaf expansion; leaves 3-15× as long as wide, 4-20 cm long, 0.5-4 cm wide; flowers with a sweet or fetid odor.
    5 Flowers terminal; pubescence of new growth, petiole, lower leaf surface and peduncle dense, tomentose, and bright red ..... ***A. obovata***
    5 Flowers axillary; pubescence sparser and/or tan to rusty red.
      6 Outer petals maroon or red, 1.5-3 cm long; leaves erect and secund, 4-11 cm long, 1-4 cm wide, averaging 3-5× as long as wide; leaf tips obtuse, rounded, or rounded-emarginate (rarely somewhat acute); shrubs to 3 (-5) dm tall ..... ***A. pygmaea***
      6 Outer petals yellowish white or pale pink, 3-10 cm long; leaves erect and secund, or not, 5-15 (-20) cm long, 0.5-3 cm wide, averaging 6-15× as long as wide; leaf tips acute or obtuse; shrubs 10-17.5 dm tall.
        7 Leaves widest at or shortly above the middle, mostly 10-15× as long as wide; leaf margins revolute; outer petals white; new growth pubescent, becoming glabrous with age ..... ***A. angustifolia***
        7 Leaves widest near the tip, mostly 6-12× as long as wide; leaf margins slightly revolute; outer petals white or pink; new growth glabrous or very sparsely pubescent, becoming glabrous with age ..... ***A. spatulata***

Asimina angustifolia Rafinesque, Slimleaf Pawpaw. Cp (FL, GA): dry pinelands; common. Se. GA south to c. peninsular FL, west to about the Suwannee River in the e. Panhandle of FL. [= *A. longifolia* var. *longifolia* – FNA, X, Z; < *Asimina angustifolia* – K, WH, Y; < *Pityothamnus angustifolius* (Rafinesque) Small – S]

Asimina incana (W. Bartram) Exell, Flag Pawpaw, Polecat Bush, Woolly Pawpaw. Cp (FL, GA): dry pinelands; uncommon. E. GA south to c. peninsular FL, occurring in dry pinelands. [= FNA, K, WH, Y; = *Pityothamnus incanus* (W. Bartram) Small – S; = *A. speciosa* Nash – Z; = *A. incarna* – X, orthographic variant]

Asimina obovata (Willdenow) Nash. Cp (FL): scrub, sandhills, open dry hammocks; rare. FL peninsula, north to Clay County. [= FNA, K, WH, X, Y, Z; = *Pityothamnus obovatus* (Willdenow) Small – S]

Asimina parviflora (Michaux) Dunal, Small-flowered Pawpaw, Small-fruited Pawpaw. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, SC): sandy or rocky, dry to fairly moist forests; common. April-May; July-September. Se. VA south to c. peninsular FL, west to se. TX, primarily on the Coastal Plain, but inland to sw. SC, n. GA, sc. TN, and n. MS. [= RAB, C, F, G, FNA, K, S, W, WH, X, Y, Z]

Asimina pygmaea (W. Bartram) Dunal, Dwarf Pawpaw. Cp (FL, GA): pine flatwoods, wet savannas; common (rare in GA). Se. GA south to c. peninsular FL. It is a dwarf shrub 2-3 dm tall of pine flatwoods, occupying wetter sites than the other "pineland pawpaws." [= FNA, GW, X, Z; = *A. pygmea* – K, WH, Y, orthographic variant; = *Pityothamnus pygmeus* (W. Bartram) Small – S]

Asimina reticulata Chapman, Netleaf Pawpaw. Cp (FL, GA): wet flatwoods, savannas; rare. S. GA south to s. peninsular FL. Reported for GA by GAHP (2003) and Kartesz (1999). [= FNA, K, WH, X, Y, Z; = *Pityothamnus reticulatus* (Shuttleworth ex Chapman) Small – S; = *A. cuneata* Shuttleworth ex A. Gray] {not yet keyed; synonymy incomplete}

Asimina spatulata (Kral) D.B. Ward, Slimleaf Pawpaw. Cp (GA, SC): dry pinelands, dry maritime forest; rare. E. GA (very near se. SC), southward to n. FL, west to Panhandle FL and s. AL; disjunct in Charleston County, SC (P. McMillan, pers.comm. 2004). [= *Asimina longifolia* Kral var. *spatulata* Kral – FNA, X, Z; < *Pityothamnus angustifolius* (Rafinesque) Small – S; < *A. angustifolia* Rafinesque – K, WH, Y]

Asimina triloba (Linnaeus) Dunal, Common Pawpaw, Indian-banana. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): alluvial forests, other moist, nutrient-rich forests; common (rare in FL). March-May; August-October. NJ, w. NY, and s. Ontario west to s. MI and e. NE, south to panhandle FL, s. LA, and ne. TX. [= RAB, C, F, FNA, G, K, S, W, WH, X, Y, Z]

APIACEAE Lindley 1836 or *UMBELLIFERAE* A.L. de Jussieu 1789
(Carrot Family) [also see *ARALIACEAE*]

A family of about 445 genera and about 3540 species of herbs (rarely shrubs or trees), cosmopolitan, but especially north temperate. *Hydrocotyle* is more closely related to Araliaceae, and has been transferred there (Chandler & Plunkett 2004). References: Mathias & Constance (1945)=MC.

[only a small fragment of the key to genera complete at this time]

1 Fruits (partly to fully mature) with thin-edged wings; flowers yellow, maroon, or white; central flower of each umbellet staminate and pedicelled; fruits all pedicelled in all umbellets ..... ***Thaspium***
1 Fruits ribbed (with rounded, cordlike ribs), lacking thin-edged wings; flowers yellow; central flower of each umbellet either staminate and pedicelled, or pistillate and sessile; fruits all pedicelled in some umbellets (those with a staminate central flower), or the central fruit sessile in some umbellets (those with a pistillate central flower) ..... ***Zizia***

Aegopodium Linnaeus (Goutweed)

A genus of 7 species of herbs of temperate Eurasia. References: Mathias & Constance (1945)=MC.

* ***Aegopodium podograria*** Linnaeus, Goutweed. Mt, Pd (GA, NC, VA), Cp (SC, VA): disturbed areas; rare, native of Europe. The cultivated forms encountered in our area are usually those with white-margined or variegated leaves. [= C, F, K, MC; > *Ae. podograria* var. *podograria* – RAB, G; > *Ae. podograria* var. *variegatum* Bailey – RAB, G]

Aethusa Linnaeus

References: Mathias & Constance (1945)=MC.

* *Aethusa cynapium* Linnaeus, Fool's-parsley, is introduced and naturalized in ne. United States, at least as far south as se. PA (Rhoads & Klein 1993) and Pocahontas County, WV. [= C, F, G, K, MC]

Ammi Linnaeus (Bishop's-weed)

A genus of about 4 species of herbs, distributed in Eurasia. References: Mathias & Constance (1945)=MC.

1 Lower leaves with elliptic to narrowly elliptic segments; fruits 1.5-2 mm long; rays not rigid and thickened at maturity; bracts not strongly reflexed in fruit ..... ***A. majus***
1 Lower leaves with filiform segments; fruits 2-2.8 mm long; rays rigid and thickened at maturity; bracts strongly reflexed in fruit ..... ***A. visnaga***

* ***Ammi majus*** Linnaeus, Bullwort. Cp (GA, SC): disturbed areas; rare, native of Mediterranean Europe. June. [= RAB, K, MC, S]

* ***Ammi visnaga*** (Linnaeus) Lamarck, Toothpick-plant. Cp (NC): dry sandy roadsides; rare, native of Mediterranean Europe. May-June. [= RAB, K, MC, S]

Ammoselinum Torrey & A. Gray (Sand-parsley)

A genus of 3 species of herbs, of sc. and sw. North America and temperate s. South America. References: Mathias & Constance (1945)=MC.

1 Umbels sessile; fruit glabrous (or slightly roughened) ..... ***A. butleri***
1 Umbels pedunculate; fruit roughened with well-developed teeth ..... ***[A. popei]***

* ***Ammoselinum butleri*** (Engelmann ex S. Watson) Coulter & Rose. Pd (NC): lawns, disturbed places; rare, native further south and west. March-April. Boufford (1977) reports the naturalization of this diminutive midwestern umbel on a grassy, weed-covered slope, and since reported from additional southeastern states, including MS (Bryson 1991) and AL (Keener 2007). [= GW, K, MC]

Ammoselinum popei Torrey & A. Gray, Sand-parsley, ranges from OK, TX, and NM south to ne. Mexico (Nuevo Léon); disjunct and apparently native in the Nashville Basin of c. TN. [= K, MC]

Anethum Linnaeus (Dill)

A monotypic genus, the single species apparently native to sw. Asia. References: Mathias & Constance (1945)=MC.

* ***Anethum graveolens*** Linnaeus, Dill, Dillweed. Mt, Pd (NC, VA): roadsides, disturbed areas, abandoned garden plots; rare, native of Mediterranean Europe. June-July. [= RAB, C, F, G, K, MC, S]

Angelica Linnaeus (Angelica)

A genus of about 110 species, herbs of the northern hemisphere. References: Mathias & Constance (1945)=MC.

1 Larger leaflets 3-6 cm long, 1-2.5 cm wide, obtuse at the apex; umbels **either** densely pubescent **or** glabrous; ovary and fruit **either** pubescent **or** glabrous; [collectively widespread in our area, in dry to mesic habitats].
  2 Umbels glabrous; ovary and fruit glabrous; leaf segments coarsely toothed ..... ***A. dentata***
  2 Umbels pubescent; ovary and fruit hispid; leaf segments finely toothed ..... ***A. venenosa***
1 Larger leaflets 8-15 cm long, 4-8 cm wide, acute to acuminate at the apex; umbels glabrous or sparsely pubescent; ovary and fruit glabrous or sparsely pubescent; [restricted to the Mountains in our area, in mesic habitats]
  3 Leaflets acute, the margin hyaline and mostly glabrous; [rare and possibly only introduced in our area] ..... ***A. atropurpurea***
  3 Leaflets acuminate, the margin ciliolate; [native] ..... ***A. triquinata***

*? ***Angelica atropurpurea*** Linnaeus, Purple Angelica. Mt (NC): moist roadsides and streambanks; rare, possibly native of nc. North America. May-June; July-August. [= RAB, C, G, K, MC, W; > *A. atropurpurea* var. *atropurpurea* – F]

Angelica dentata (Chapman) Coulter & Rose, Sandhill Angelica. Cp (FL, GA): sandhills, flatwoods; uncommon (rare in GA). Sw. GA, sc. GA, and e. Panhandle FL. [= K, MC, S, WH]

Angelica triquinata Michaux, Mountain Angelica, Filmy Angelica. Mt (GA, NC, VA): mesic forests at moderate to high elevations, grassy balds, brookbanks; common. August-September; September-October. PA south to sw. NC, se. TN, and n. GA, a Southern and Central Appalachian endemic. The nectar is very attractive, but apparently strongly intoxicating, to yellow jackets and hornets; on the grassy balds of Roan Mountain one can see thousands of umbels of *Angelica* densely coated by lethargic bees. [= RAB, C, F, G, K, MC, W; ? *A. curtisii* Buckley – S]

Angelica venenosa (Greenway) Fernald, Hairy Angelica. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry forests and woodlands, woodland borders, longleaf pine sandhills, hammocks; common (rare in FL). June-August; July-September. MA west to MN, south to panhandle FL, MS, and AR. Populations of this species in dry sandhill communities in the Fall Line Sandhills have a number of peculiar features: basal leaves often borne appressed against the ground, small leaflets, coarse and more equilateral toothing of the leaflets. These populations may be worthy of taxonomic recognition; they need further study. [= RAB, C, F, G, K, MC, W; ? *A. villosa* (Walter) Britton, Sterns, & Poggenburg – S]

Angelica lucida Linnaeus. Reported by Harvill et al. (1992) for Warren County, VA; more information is needed to substantiate this surprising record, presumably from cultivation. [= C, G, K, MC; = *Coelopleurum lucidum* (Linnaeus) Fernald – F] {not keyed}

Anthriscus Persoon (Chervil)

A genus of about 10 species, herbs, of Eurasia and mountains of Africa. References: Spalik (1996)=Z; Mathias & Constance (1945)=MC.

1 Fruit ovoid, 2.9-3.2 mm long, hispid with hooked hairs; [section *Anthriscus*] ..... ***A. caucalis***
1 Fruit lanceolate or linear, 6-10 mm long, glabrous.
  2 Beak of fruit (1-) 2-4 mm long; plant an annual; umbel rays pubescent; [section *Anthriscus*] ..... ***A. cerefolium***
  2 Beak of fruit ca. 1 mm long; plant a perennial; umbel rays glabrous (or nearly so); [section *Cacosciadium*] ..... ***A. sylvestris ssp. sylvestris***

* ***Anthriscus caucalis*** Bieberstein, Bur Chervil, Bur-parsley. Mt (NC), Pd (NC, SC, VA), Cp (NC, SC): disturbed areas; rare, native of Europe. April-May; May-June. First reported for South Carolina by Hill & Horn (1997). [= C, K, Z; = *A. scandicina* (Weber ex Wiggers) Mansfeld – RAB, F, G, MC]

* ***Anthriscus cerefolium*** (Linnaeus) Hoffmann, Garden Chervil. Pd (VA): cultivated in gardens, sometimes persistent or escaped; rare, native of Europe. May-July. [= C, F, G, K, MC, Z]

* ***Anthriscus sylvestris*** (Linnaeus) Hoffmann *ssp.* ***sylvestris***, Wild Chervil, Cow-parsley. Mt (TN, VA): moist disturbed areas; rare, native of Europe. May-July. This species has also been reported from the NC-TN state line, on Roan Mountain (Mellichamp, Matthews, & Smithka 1987, 1988); the population is actually entirely in TN. [= Z; < *A. sylvestris* – C, F, G, K, MC]

Apium Linnaeus (Celery)

A genus of about 25 species, herbs, of temperate and subtropical regions. References: Mathias & Constance (1945)=MC.

1 Involucel absent; fresh plant smelling of celery; stem solid ..... ***A. graveolens var. dulce***
1 Involucel present; fresh plant not smelling of celery; stem hollow ..... ***A. nodiflorum***

* ***Apium graveolens*** Linnaeus *var.* ***dulce*** (P. Miller) A.P. de Candolle, Celery. Cp (NC, SC): disturbed areas, escaped or persisting from cultivation; rare, native of Europe. June-July; July-August. [= K; < *A. graveolens* Linnaeus – RAB, C, F, G, MC; < *Celeri graveolens* (Linnaeus) Britton – S]

* ***Apium nodiflorum*** (Linnaeus) Lagasca y Segura, Fool's Watercress. Cp (SC): disturbed areas near old seaports; rare, native of Europe. [= RAB, K, MC; = *Ciclospermum nodiflorum* (Linnaeus) W.D.J. Koch – S]

Bupleurum Linnaeus (Hare's-ear, Thoroughwax)

A genus of about 190 species, herbs and shrubs, primarily Eurasian. References: Mathias & Constance (1945)=MC.

1 Upper leaves linear, sessile ..... ***B. gerardii***
1 Upper leaves ovate, perfoliate ..... ***B. rotundifolium***

* ***Bupleurum gerardii*** Allioni. Mt (VA): disturbed areas over limestone; rare, native of Eurasia. Also reported for c. TN (Cox, 2005, pers. comm..). [= *B. odontites* Linnaeus – K, apparently misapplied; = *B. fontanesii* Guss. ex Careul – C, G, MC, apparently misapplied]

* ***Bupleurum rotundifolium*** Linnaeus, Hare's-ear, Thoroughwax. Mt (VA), Pd (NC, VA): lawns, disturbed areas; rare, native of Eurasia. June. [= RAB, C, F, G, K, MC, S, W]

* *Bupleurum lancifolium* Hornemann. Reported as a waif for MD by Shetler & Orli (2000) and Reed (1964). [= K] {not yet keyed}

* *Bupleurum odontites* Linnaeus. Reported as a waif for MD by Shetler & Orli (2000) and Reed (1964). [= K; > *B. fontanesii* Guss. ex Careul – C, G, MC] {not yet keyed}

Carum Linnaeus (Caraway)

A genus of about 30 species, temperate. References: Mathias & Constance (1945)=MC.

* ***Carum carvi*** Linnaeus, Caraway. Mt (NC, VA): disturbed areas; rare, native of Eurasia. May-June. [= RAB, C, F, G, K, MC]

Centella Linnaeus (Centella, Coinleaf)

A genus of about 40 species, of warm temperate and tropical regions, centered in s. Africa. References: Mathias & Constance (1945)=MC.

Centella erecta (Linnaeus f.) Fernald, Centella, Coinleaf. Cp (GA, NC, SC, VA): savannas, pondshores, ditches, and a wide variety of other moist to wet habitats; common. June-August; July-September. DE south to FL, west to TX; West Indies, Mexico, Central America. *C. erecta* has sometimes been included in the pantropical *C. asiatica*, but the two taxa differ in morphology and chromosome number (*C. erecta* has n = 27, *C. asiatica* has n = 9). [= C, F, G, K, MC; < *C. asiatica* (Linnaeus) Urban – RAB, GW, misapplied; *?* *C. repanda* (Persoon) Small – S]

Chaerophyllum Linnaeus (Chervil)

A genus of about 35 species, herbs, of north temperate areas. References: Mathias & Constance (1945)=MC.

1 Ribs of fruit broad, the intervals between the ribs much narrower than the ribs.
  2 Fruit pubescent ..... ***Ch. tainturieri var. dasycarpum***
  2 Fruit glabrous ..... ***Ch. tainturieri var. tainturieri***
1 Ribs of fruit narrow, the intervals between the ribs equal to or wider than the ribs.
  3 Fruit glabrous, 6-10 mm long, 1.5-2 mm broad ..... ***Ch. procumbens var. procumbens***

3 Fruit densely puberulent, 4.5-6.5 mm long, 2-2.5 mm broad ..... ***Ch. procumbens var. shortii***

Chaerophyllum procumbens (Linnaeus) Crantz *var.* ***procumbens***, Common Spreading Chervil. Pd, Cp (NC, SC, VA), Mt (VA), province {GA}: alluvial forests; common (uncommon in NC, rare in GA and SC). Late March-April; April-May. NY and s. Ontario to MI, s. WI, and e. NE, south to GA, AR, and OK. [= RAB, C, F, G, K, MC; < *Ch. procumbens* – GW, W; = *Ch. procumbens* – S]

Chaerophyllum procumbens (Linnaeus) Crantz *var.* ***shortii*** Torrey & A. Gray, Short's Spreading Chervil. Mt (VA), Pd (SC): nutrient-rich mountain forests, alluvial forests; rare. March-April. W. PA west to IN, south to SC, TN, and LA. The validity of this variety needs additional study. [= RAB, C, F, G, K, MC; < *Ch. procumbens* – GW, W; = *Ch. shortii* (Torrey & A. Gray Bush – S]

Chaerophyllum tainturieri Hooker *var.* ***dasycarpum*** Hooker ex S. Watson, Southern Chervil. Cp (GA?, SC): disturbed areas; rare. March-April; April-May. E. SC south to s. AL and west to TX. The distinctiveness of this taxon needs further evaluation. [= K, MC; < *Ch. tainturieri* – RAB, GW; = *Ch. dasycarpum* (Hooker ex S. Watson) Nuttall ex Small – S]

Chaerophyllum tainturieri Hooker *var.* ***tainturieri***, Southern Chervil. Cp, Pd, Mt (GA, NC, SC, VA): roadsides, disturbed areas, fields; common. March-April; April-May. MD west to NE, south to FL, TX, and AZ. *Ch. texanum* Coulter & Rose is reported as a native in the Nashville Basin of TN (Chester, Wofford, & Kral 1997); it is usually now included in *Ch. tainturieri* var. *tainturieri*. [= K; < *Ch. tainturieri* – RAB, C, GW, W; > *Ch. tainturieri* var. *tainturieri* – F, G, MC; > *Ch. tainturieri* var. *floridanum* Coulter & Rose – F; > *Ch. texanum* Coulter & Rose – F, G, MC; > *Ch. teinturièri* – S, orthographic variant; > *Ch. floridanum* (Coulter & Rose) Bush – S]

* *Chaerophyllum bulbosum* Linnaeus, Parsnip Chervil. Waif in DC. [= C, G, K, MC] {not keyed}
* *Chaerophyllum temulem* Linnaeus, Rough Chervil, introduced, as a waif south to PA and NJ (Kartesz 1999). [= C, G, K, MC] {not keyed}

Ciclospermum Lagasca y Segura (Marsh-parsley)

A genus of 3 species, herbs, of tropical and warm temperate America. References: Mathias & Constance (1945)=MC.

Ciclospermum leptophyllum (Persoon) Sprague ex Britton & Wilson, Marsh-parsley. Cp (GA, NC, SC), Pd (GA, SC): freshwater marshes, disturbed areas, roadside ditches; uncommon. April-early June; June-July. Widespread in se. North America, from NC and OK south into tropical America. [= *Apium leptophyllum* (Persoon) F. Mueller ex Bentham – RAB, C, G, GW, MC; = *Cyclospermum leptophyllum* – K, orthographic variant; ? *Ciclospermum ammi* Lagasca y Segura – S]

Cicuta Linnaeus (Water-hemlock)

A genus of 8 species, herbs, north temperate in distribution. References: Mulligan (1980)=Z; Mathias & Constance (1945)=MC.

1 Flowers usually aborting (if present, the fruits 1.5-2 mm long); axils of upper leaves bearing clusters of bulbils; leaflets with narrowly linear segments, usually < 5 mm wide ..... ***C. bulbifera***
1 Flowers usually forming mature fruits 2-4 mm long; axils of leaves not bearing bulbils; leaflets lanceolate, usually > 6 mm wide.
  2 Dorsal and lateral corky ribs of the fruit much narrower than the oil tubes; fruit abruptly and unevenly constricted at the commissure ..... ***C. bolanderi***
  2 Dorsal and lateral corky ribs of the fruit equaling to slightly exceeding the width of the oil tubes; fruit restricted or not at the commissure, but not as above.
    3 Lateral ribs of the commissure flush against one another; leaflets lanceolate, 0.6-3 cm wide ..... ***C. maculata var. maculata***
    3 Lateral ribs of the commissure separated by a groove; leaflets ovate, up to 3.5-5 cm wide ..... ***C. mexicana***

Cicuta bolanderi S. Watson. Mt, Pd (NC), {GA}: marshes, bogs, seepages, ditches, swamp forests; rare. Scattered in distribution, from NJ, WI, and MN south to GA, TX, Mexico, and AZ. Further study is needed of the distinctiveness, distribution, and ecology of this species. [= K, MC; < *C. maculata* var. *maculata* – C, F, G; = *C. maculata* Linnaeus var. *bolanderi* (S. Watson) Mulligan – Z]

Cicuta bulbifera Linnaeus, Bulb-bearing Water-hemlock. Pd (VA), Cp (NC): marshes and swamps; rare (VA Rare). July-September. Newfoundland west to AK, south to MD, n. VA (?), OH, KY, IN, IL, IA, NE, MT, ID, and OR; disjunct (perhaps introduced only) in NC and FL. [= C, F, G, K, MC, Z]

Cicuta maculata Linnaeus *var.* ***maculata***, Water-hemlock. Cp, Pd, Mt (GA, NC, SC, VA): marshes, bogs, seepages, ditches, swamp forests; common. May-August; July-September. Nova Scotia west to Alaska, south to FL, CA, and Mexico. Two other varieties are more northern or western: var. *victorinii* (Fernald) Boivin of Québec and var. *angustifolia* Hooker of western North America. All parts of the plant, especially the tubers, are dangerously poisonous. [= *C. maculata* – RAB, GW, MC, S, W; < *C. maculata* var. *maculata* – C, F, G (also see var. *bolanderi*); < *C. maculata* var. *maculata* – K, Z (also see *C. mexicana*)]

Cicuta mexicana Coulter & Rose, Southern Water-hemlock. Cp (GA, NC, SC, VA), Pd, Mt (GA, NC?): marshes, bogs, seepages, ditches, swamp forests, floating vegetation mats; uncommon. May-August; July-September. Se. VA (GW), south to FL, and west to TX, south into Mexico (more inland records in our area and westward are of uncertain disposition). Though not recognized by Mulligan (1980), this taxon appears to warrant taxonomic recognition. It is a generally coarser plant than *C. maculata*. [= RAB, GW, MC; = *C. maculata* var. *curtissii* (Coulter & Rose) Fernald – F, G; = *C. curtissii* Coulter & Rose – S]

Conioselinum Hoffmann (Hemlock-parsley)

A genus of about 10 species, herbs, north temperate in distribution. References: Mathias & Constance (1945)=MC.

Conioselinum chinense (Linnaeus) Britton, Sterns, & Poggenburg, Hemlock-parsley. Mt (NC, VA): nutrient-rich seepage over cliffs and through boulderfields, at high elevations, known from seepage over cliffs and through boulderfields at about 1500 m on the north slope of Grandfather Mountain (Avery County, NC), and from a north-facing greenstone cliff-top seep at 1150 m on Stony Man, Page County (VA); rare. July-September. The specific epithet is a misnomer; the species is native to n. North America (the specific epithet a misnomer): south to PA, IN, and IA, and disjunct in VA and NC) and ne. Asia (e. Siberia), but not found in China (the epithet a mistake based on confusion between "Genesee," New York, and "Chinensem"). The single NC population was first discovered in 1842 by Asa Gray and John Carey, and not seen again until 1989. The VA population was first reported by Fleming & Ludwig (1996). The report of the species from Roan Mountain was found to be in error; see *Anthriscus* (Mellichamp, Matthews, & Smithka 1987, 1988). [= RAB, C, F, G, K, MC, S, W]

Conium Linnaeus (Poison-hemlock)

A genus of 6 species, herbs, north temperate and s. African in distribution. References: Mathias & Constance (1945)=MC.

* ***Conium maculatum*** Linnaeus, Poison-hemlock. Pd (GA, NC, SC, VA), Mt, Cp (NC, SC, VA): ditches, roadsides, streambanks, disturbed areas; common, native of Eurasia. May-June; June-July. All parts of the plant are highly toxic if ingested, causing respiratory failure in humans and other mammals. [= RAB, C, F, GW, K, MC, S, W]

Coriandrum Linnaeus (Coriander, Cilantro)

A genus of 3 species, herbs, sw. Asian in distribution. References: Mathias & Constance (1945)=MC.

* ***Coriandrum sativum*** Linnaeus, Coriander, Cilantro, Mexican-parsley, Chinese-parsley. Pd (NC, SC, VA), Mt (VA): disturbed areas, cultivated in gardens, sometimes persisting or escaped; rare, native of Eurasia. June-July. [= RAB, C, F, G, K, MC, S]

Cryptotaenia A.P. de Candolle (Honewort)

A genus of 6 species, herbs, in north temperate areas (and montane Africa). References: Mathias & Constance=MC.

Cryptotaenia canadensis (Linnaeus) A.P. de Candolle, Honewort. Mt, Pd, Cp (GA, NC, SC, VA): moist and nutrient-rich forests (alluvial, bottomland, slope, and cove forests); common (rare in Coastal Plain south of VA). May-June; June-August. New Brunswick and Québec to Manitoba, south to e. GA, sw. GA, panhandle FL, AL, and TX; also in Japan. [= RAB, C, F, GW, K, MC; = *Deringa canadensis* (Linnaeus) Kuntze – S]

Cynosciadium A.P. de Candolle

A genus of 2 species, of sc. North America. References: Mathias & Constance (1945)=MC.

Cynosciadium digitatum A.P. de Candolle. Wet places, ditches, blackland prairies. IL, sw. TN (Shelby County), and AL west to OK and TX. [= C, F, G, GW, K, MC, S]

Daucus Linnaeus (Wild Carrot, Queen-Anne's-lace)

A genus of about 22 species, herbs, of temperate and tropical areas, primarily Old World. References: Mathias & Constance (1945)=MC.

1 Involucral bracts scarious-margined, spreading or reflexed in fruit; spines of fruit not prominently barbed apically; umbel rays 10-65 mm long (at least some in a given inflorescence usually exceeding 3 cm); umbellets (10-) 20-numerous flowered; central flower of the umbel usually dark purple; plant a freely-branched biennial ..... ***D. carota***
1 Involucral bracts not scarious-margined, appressed-ascending in fruit; spines of fruit prominently barbed apically; umbel rays 5-26 mm long; umbellets 5-12 flowered; central flower of the umbel white; plant an unbranched (or rarely few-branched) annual ..... ***D. pusillus***

* ***Daucus carota*** Linnaeus, Queen-Anne's-Lace, Carrot, Wild Carrot. Pd, Mt, Cp (GA, NC, SC, VA): pastures, fields, roadsides, waste places; common, native of Europe. May-September. The cultivated carrot is a form with a fleshy taproot rich in carotene; the familiar field weed has a "carroty" flavor, but the root is woody and tan in color. [= RAB, C, F, G, K, MC, S, W]

Daucus pusillus Michaux, American Queen-Anne's-lace. Cp (GA, NC, SC, VA?), Pd (GA, SC, VA?), Mt (GA): pastures, fields, roadsides, waste places; uncommon. April-May; May-June. This native relative of *D. carota* is smaller and less branched. Widespread in Southeastern United States, north to NC and MO. It should be expected in the lower Piedmont of NC and in the Coastal Plain of se. VA, which it closely approaches. Robert Wright has collected this species as a waif in Henrico County, VA (R. Wright, 2002, pers. comm.). [= RAB, C, F, G, K, MC, S, W]

Erigenia Nuttall (Harbinger-of-spring, Pepper-and-salt)

A monotypic genus, an herb of e. North America. References: Buddell & Thieret (1985)=Z; Mathias & Constance (1945)=MC.

Erigenia bulbosa (Michaux) Nuttall, Harbinger-of-spring, Pepper-and-salt, Erigenia. Mt (GA, NC?, VA), Pd (VA): mesic, nutrient-rich forests, either over calcareous substrate or on very rich alluvial deposits (such as riverbanks); rare. February-April. S. PA, w. NY, s. Ontario, c. MI, and se. WI south to MD, DC, w. VA, e. TN, nw. GA, c. AL, n. MS, sw. AR, and se. KS. Reported a number of times from NC, perhaps never with documentation. Rodgers (1950) states "reported in mtns. of N.C. by Kephart and Hyams." The past or present existence of *Erigenia* in NC remains uncertain. It occurs in several counties of TN immediately adjacent to the NC line (Chester, Wofford, & Kral 1997). See Buddell & Thieret (1985) for a very interesting and entertaining account of this plant. [= RAB (excluded), C, F, G, K, MC, S, W, Z]

Eryngium Linnaeus 1753 (Eryngo)

A genus of about 250 species, herbs, tropical and temperate. References: Bell (1963)=Z; Mathias & Constance (1945)=MC.

1 Leaves thickly coriaceous, palmately lobed, the lobes and teeth tipped with stout spines ..... ***E. maritimum***
1 Leaves thin, fleshy, or subcoriaceous, entire, toothed, palmately lobed, or pinnately incised, the teeth or lobes (if present) unarmed or with weak spines.
  2 Inflorescence unbranched, the heads solitary on peduncles from the leaf axils of the prostrate to erect stem.
    3 Leaves pinnately lobed or dissected ..... ***E. divaricatum***
    3 Leaves entire, irregularly toothed (rarely with some irregular lobing).
      4 Heads subglobose or hemispherical when fully developed, about as wide as long; bracts subtending the head barely extending beyond the base of the head ..... ***E. baldwinii***
      4 Heads cylindrical, longer than wide; bracts subtending the head longer than the radius of the head, thus extending conspicuously beyond the base of the head ..... ***E. prostratum***
  2 Inflorescence branched, the heads in a cyme borne terminally on the erect stem.
    5 Basal and cauline leaves (all, or at least many of the cauline) definitely deeply lobed into 3 or more divisions, < 10 cm long.
      6 Heads blue; basal leaves serrate but not divided ..... ***[E. hookeri]***
      6 Heads greenish; basal leaves pinnately or pinnately-ternately divided.
        7 Plants slender, not fleshy, green; basal and cauline leaves 2-6 cm long, 3-5 (-7) pinnately parted; heads 5-8 mm in diameter; [native species of dry pinelands of the Coastal Plain of e. GA, s. AL, and FL] ..... ***E. aromaticum***
        7 Plants stout, fleshy, usually glaucescent; basal leaves 10-25 cm long and wide, pinnately or pinnate-ternately divided into > 7 segments, the cauline leaves similar but reduced in size and number of divisions; heads 10-15 mm in diameter; [rare ballast waif of disturbed ground] ..... ***[E. campestre]***
    5 Basal and cauline leaves unlobed (except sometimes the uppermost; note that bracts in the inflorescence are often lobed), 3-100 cm long.
      8 Blades of basal and lower cauline leaves 3-7 (-10) cm long, acute to obtuse apically, cordate to truncate basally, with a length/width ratio of 1.5-3 (-6) ..... ***E. integrifolium***
      8 Blades of basal and lower cauline leaves 10-100 cm long, acuminate to acute apically, clasping basally, with a length/width ratio of 5-50.
        9 Leaves parallel-veined, with marginal bristles; flowers greenish-white.
          10 Larger leaves > 1.5 cm wide; marginal bristles of leaves solitary ..... ***E. yuccifolium var. yuccifolium***
          10 Larger leaves < 1.5 cm wide; marginal bristles in fascicles of 1-2 (-4), those on the lower portion of the leaf usually in fascicles of 2-3 ..... ***E. yuccifolium var. synchaetum***
        9 Leaves evidently reticulate-veined, with or without marginal bristles; flowers blue.
          11 Styles 3.0-3.5 mm long at maturity, scarcely exceeding the bractlets (which subtend each flower); heads subglobose to hemispherical, 6-12 mm in diameter; middle cusp of the bractlets elongate, distinctly longer than the lateral cusps ..... ***E. aquaticum var. aquaticum***
          11 Styles 4.0-6.0 mm long at maturity, exceeding the bractlets; heads globose, 9-15 mm in diameter; middle cusp of the bractlets about equal in length to the lateral cusps ..... ***E. aquaticum var. ravenelii***

Eryngium aquaticum Linnaeus *var.* ***aquaticum***, Marsh Eryngo. Cp (GA, NC, SC, VA): tidal freshwater to brackish marshes; uncommon. July-September. NJ to ne. FL along the Atlantic coast, mostly in brackish marshes. [= RAB, K, MC, Z; < *E. aquaticum* – C, F, G; < *E. aquaticum* – GW; = *E. virginianum* Lamarck – S]

Eryngium aquaticum Linnaeus *var.* ***ravenelii*** (A. Gray) Mathias & Constance, Ravenel's Eryngo. Cp (GA, NC, SC): wet savannas, mostly or entirely over calcareous substrate; rare. July-September. Se. NC (Onslow and Pender counties) south to sw. GA and n. FL. McMillan (2003) suggests that it may warrant specific status distinct from *E. aquaticum*. [= RAB, K, MC, Z; < *E. aquaticum* – GW; = *E. ravenelii* A. Gray – S]

Eryngium aromaticum Baldwin, Fragrant Eryngo. Cp (GA): dry pinelands; uncommon. E. GA west to s. AL, south to FL. [= K, MC, S, Z]

Eryngium baldwinii Sprengel. Cp (GA): pinelands, temporary pools, ditches, other moist to wet sites; uncommon. Se. GA and sw. GA south to FL. [= GW, K, S, Z; = *E. baldwini* – MC, orthographic variant]

* ***Eryngium divaricatum*** Hooker & Arnott. Cp (NC): disturbed areas, introduced on ballast at Wilmington port; rare, native of South America. July-October. Not seen in recent years and probably not persistent. [= RAB, K, MC, S, Z]

Eryngium integrifolium Walter, Savanna Eryngo. Cp (GA, NC, SC), Mt (GA, NC, SC), Pd (GA, NC, SC, VA): savannas, pine flatwoods, seepages, other moist, nutrient-poor places; common (rare in Piedmont and Mountains). August-October. Se. VA (Greensvillle County) (Belden et al. 2004) and e. NC south to FL, west to OK and TX, inland in c. TN. [= RAB, K, MC, W, Z; > *E. integrifolium* – S; > *E. ludovicianum* Morong – S]

* ***Eryngium maritimum*** Linnaeus, Sea Holly. Cp (NC): ocean and soundside dunes; rare, presumably native of Europe, though perhaps adventive. July. [= RAB, C, G, K, MC, Z]

Eryngium prostratum Nuttall ex A.P. de Candolle, Spreading Eryngo. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC): moist ditches and lawns, other moist, open habitats; uncommon, definitely native further south, perhaps only rather recently spread north to our area. May-October. Se. VA south to FL, west to OK and TX. [= RAB, C, GW, K, MC, S, W, Z; > *E. prostratum* var. *prostratum* – F, G; > *E. prostratum* var. *disjunctum* Fernald – F, G]

Eryngium yuccifolium Michaux *var.* ***synchaetum*** A. Gray ex Coulter & Rose, Southern Rattlesnake-master. Cp (GA, NC, SC): wet savannas, especially those over calcareous clay soils; rare (NC Watch List). June-August. A Southeastern Coastal Plain endemic: se. NC to s. FL and west across the Gulf Coastal Plain, the exact range limits obscure. The distinction between the two varieties, seemingly clear in NC and elsewhere in states bordering the Atlantic, seems to become less straightforward further west, as in LA and AR. In NC it has been seen in Pender, Brunswick, Columbus, Bladen, and Robeson counties. [= RAB, K, MC, Z; < *E. yuccifolium* – GW; = *E. synchaetum* (Gray ex Coulter & Rose) Coulter & Rose – S]

Eryngium yuccifolium Michaux *var.* ***yuccifolium***, Northern Rattlesnake-master. Pd, Mt, Cp (GA, NC, SC, VA): diabase barrens and glades, olivine barrens, pine savannas, pine flatwoods over loamy or clay soils, other open sites with at least periodic moisture, generally in sites showing some prairie affinities; uncommon (VA Rare). June-August. Widespread in southeastern and midwestern North America, the exact range limits of the typic variety and var. *synchaetum* somewhat obscure. [= RAB, K, MC, Z; < *E. yuccifolium* – C, F, G, W; < *E. yuccifolium* – GW (also see *E. yuccifolium* var. *synchaetum*); = *E. aquaticum* – S, misapplied]

* *Eryngium campestre* Linnaeus, Field Eryngo. Ballast waif around ports, in AL (Mobile), MD, and NJ (Z; Kartesz 1999). [= K, MC, Z]

* *Eryngium foetidum* Linnaeus, Spiritweed. Listed by Kartesz (1999) as introduced in GA and FL, but the only reports are very early and anecdotal, and the species was excluded from the North American flora by Coulter & Rose (1900), with no subsequent documentation that would change that conclusion. Native of Mexico, Central America, South America, and West Indies. [= K, MC] {not keyed}

*? *Eryngium hookeri* Walpers. Ditches, other wet areas. MS and AR west to OK and TX, perhaps recently adventive in the eastward portions of that distribution, not credited as occurring east of TX in Matthias & Constance (1945). [= K, MC]

Falcaria Fabricius (Sickleweed)

A monotypic genus, an herb, of Eurasia. References: Mathias & Constance (1945)=MC.

* ***Falcaria vulgaris*** Bernhardi, Sickleweed. Mt (VA): disturbed areas; rare, native of Eurasia. July-September. [= C, F, K; = *F. sioides* (Wibel) Ascherson – G, MC]

Foeniculum P. Miller (Fennel)

A genus of 4-5 species, herbs, of Asia and Mediterranean Europe. References: Mathias & Constance (1945)=MC.

* ***Foeniculum vulgare*** P. Miller, Fennel. Cp, Mt (GA, NC, SC, VA), Pd (NC, SC, VA): fields, dredge spoil, old gardens, waste places, vacant lots, roadsides; uncommon (locally common), native of Mediterranean Europe. June-August; August-September. This is the common garden fennel, cultivated for its seeds, leaves, "bulbs" (finocchio), and ornamental appearance (especially bronze forms), widely used in Mediterranean cuisines. [= RAB, C, F, G, K, MC, W; = *Foeniculum foeniculum* (Linnaeus) Karsten – S]

Heracleum Linnaeus (Cow-parsnip, Hogweed)

A genus of about 65 species, herbs, north temperate (and tropical mountains). References: Mathias & Constance (1945)=MC.

Heracleum maximum W. Bartram, Masterwort, Cow-parsnip, American Hogweed. Mt (GA, NC, VA): forests, roadbanks, meadows, forest openings; uncommon (rare in GA). May-July; July-August. Labrador west to AK, south to PA, OH, IN, IL, MO, KS, NM, AZ, CA, and in the Appalachians south to w. NC, e. TN, and n. GA; also in e. Siberia. The synonymy reflects two questions, one nomenclatural, the other taxonomic. North American plants are very similar to European ones, leading some workers to treat our plants as a subspecies or variety of the European. If recognized as specifically distinct from European *H. sphondylium*, the nomenclatural question is whether to accept Bartram's (older) name as validly published. [= F, GW, K; = *H. lanatum* Michaux – RAB, C, G, MC, W; = *H. sphondylium* Linnaeus var. *lanatum* (Michaux) Dorn; *? H. sphondylium* Linnaeus ssp. *montanum* (Schleicher ex Gaudin) Briquet]

* *Heracleum mantegazzianum* Sommier & Levier, native to the Caucasus Mountains, has been introduced in ne. North America and is becoming established; it may eventually spread to our area. It is considerably larger and coarser even than *H. maximum* (not a paltry herb itself), reaching 5.5 m in height, the hollow stems to 15 cm in diameter, the lower leaves to 2.5 m long, and the umbels to 5 dm across. More modestly-sized individuals may be distinguished from *H. maximum* by wider oil tubes on the fruit [(0.6-) 0.8-1.0 mm wide vs. 0.3-0.5 (-0.8). [= K] {not keyed}

Ligusticum Linnaeus (Lovage)

A genus of 40-50 species, herbs, circumboreal and north temperate. References: Mathias & Constance (1945)=MC.

Ligusticum canadense (Linnaeus) Britton, Nondo, Angelico, American Lovage. Mt, Pd (GA, NC, SC, VA), Cp (NC): moist to dryish, nutrient-rich forests and woodlands; common (rare in Coastal Plain). June-July; August-September. S. PA south to c. GA and AL; also in s. MO and n. AR, centered in the Southern and Central Appalachians and the Ozarks-Ouachitas, but extending considerably into adjacent provinces, and even slightly into the Coastal Plain. A distinctive character is the straightish and toothless basal portion of each leaflet. [= RAB, C, F, G, K, MC, S, W]

Lilaeopsis Greene (Lilaeopsis)

A genus of about 13 species, herbs, warm temperate and tropical, of America, Australia, and New Zealand. References: Affolter (1985)=Z; Mathias & Constance (1945)=MC.

1 Leaves 7-30 (or more) cm long, often spatulate, up to 11 mm wide toward the apex, with (7-) 10-20 transverse septae; peduncles much shorter than the leaves ..... ***L. carolinensis***
1 Leaves 1-5 cm long, linear (rarely spatulate), 1-2 (-5) mm wide, with 4-8 (-10) transverse septae; peduncles about as long as or longer than the leaves ..... ***L. chinensis***

Lilaeopsis carolinensis Coulter & Rose, Carolina Lilaeopsis. Cp (GA, NC, SC, VA): freshwater marshes and pondshores, ditches, interdune ponds, shores of brackish to freshwater estuarine sounds and rivers; rare. May-June. Se. VA south to FL and west to LA; it is also found in s. South America, in Argentina, Brazil, and Paraguay. [= RAB, F, GW, K, S, Z; = *L. attenuata* (Hooker & Arnott) Fernald – C, G, MC]

Lilaeopsis chinensis (Linnaeus) Kuntze, Marsh Lilaeopsis. Cp (GA, NC, SC, VA): brackish and freshwater tidal marshes, especially in mud-flats in the intertidal zone; uncommon. May-June. Nova Scotia south to FL and west to TX (Brown & Marcus 1998). The epithet "*chinensis*" is a misnomer; the species is native to e. North America and has nothing to do with China. [= RAB, F, G, GW, K, MC, Z; = *L. lineata* (Michaux) Greene – S]

Oenanthe Linnaeus (Water-dropwort)

* ***Oenanthe javanica*** A.P. de Candolle, Water Celery, Water Parsley. Pd (VA): edge of a swamp forest; rare, native of Asia. [] {not yet keyed; synonymy incomplete}

Osmorhiza Rafinesque (Sweet Cicely, Wild Chervil)

A genus of about 10 species, herbs, of temperate North America, temperate South America, montane tropical Central and South America, and Asia (Wen et al. 2002). References: Lowry & Jones (1979)=Z; Mathias & Constance (1945)=MC; Wen et al. (2002).

1 Styles plus stylopodium 0.5-1.5 mm long; flowers 4-7 (-8) per umbellet; flowers 3-4 mm across; umbellets 3-5 (-6) per umbel, on rays 2-8 (-10) cm long, the umbel therefore relatively uncrowded; roots (and foliage) not strongly anise-scented ..... ***O. claytonii***
1 Styles plus stylopodium 2.0-3.5 mm long; flowers (7-) 9-18 per umbellet; flowers 5-6 mm across; umbellets 4-6 (-8) per umbel, on rays 1.5-5.0 (-7.5) cm long, the umbel therefore rather crowded; roots (and foliage) strongly anise-scented ..... ***O. longistylis***

Osmorhiza claytonii (Michaux) C.B. Clarke, Bland Sweet Cicely, Hairy Sweet Cicely. Mt (GA, NC, VA), Pd (NC, SC, VA), Cp (VA): cove forests, other moist fertile forests; common, rare in Piedmont and Coastal Plain (SC Rare). April-May; May-June. Nova Scotia and Québec west to Saskatchewan, south to NC, n. GA, AL, and AR. [= RAB, C, F, G, K, MC, W, Z; = *Osmorrhiza claytonii* – S, misspelling]

Osmorhiza longistylis (Torrey) A.P. de Candolle, Anise-root, Smooth Sweet Cicely. Pd (GA, NC, SC, VA), Mt, Cp (GA, NC, VA): moist, fertile forests; common, rare in Coastal Plain. April-May; May-June. Québec west to Saskatchewan, south to GA, TX, and CO. [= RAB, C, F, G, K, W, Z; > *O. longistylis* var. *brachycoma* Blake; > *O. longistylis* var. *longistylis* – F, MC; > *O. longistylis* var. *villicaulis* Fernald – F, MC; = *Osmorrhiza longistylis* – S, misspelling]

Oxypolis Rafinesque (Dropwort, Hog-fennel, Cowbane)

A genus of about 7 species, herbs, of temperate North America. References: Mathias & Constance (1945)=MC; Kral (1981); Tucker et al. (1983).

1 Leaves with 1-13 leaflets, the leaflets flat.
  2 Leaflets 1-3, entire, palmately disposed, parallel-veined ..... ***O. denticulata***
  2 Leaflets (5-) 7-11 (-13), pinnately disposed, usually toothed (rarely entire), net-veined ..... ***O. rigidior***
1 Leaves reduced to hollow, linear, nodose-septate quills, consisting of the petiole and leaflet-less rachis, undivided.
  3 Mature fruits with corky-thickened peripheral ribs, the fruit with a narrowly rectangular cross-section, about as thick near the ends of the ribs as at the center, 0.8-2 mm thick at the edge; plants with stoloniferous rhizomes 1-3 (-10) dm long; lower nodes often losing their leaves by flowering ; umbellets/umbel 5-9 (-12) ..... ***O. canbyi***
  3 Mature fruits with peripheral ribs progressively thinning away from the seed cavity, the fruit with a fusiform cross-section, distinctly thinner toward the ends of the ribs than at the center, 0.2 mm thick at the edge; plants with stout rhizomes or a caudex, not long stoloniferous; lower nodes generally retaining their leaves until flowering; umbellets/umbel 10-20
    4 Flowers white; segments of phyllodia cylindrical ..... ***O. filiformis***
    4 Flowers maroon; segments of phyllodia distinctly bulging ..... ***O. greenmanii***

Oxypolis canbyi (Coulter & Rose) Fernald, Canby's Cowbane. Cp (GA, NC, SC): clay-based Carolina bays and other depressional wetlands; rare. July-August; August-September. Sw. GA through SC to se. NC (mostly in the middle and inner Coastal Plain), and from e. MD to (formerly) DE. See Tucker et al. (1983) for detailed information on this rare species and a comparison of it to the more widespread *O. filiformis*. [= C, F, G, K, MC]

Oxypolis denticulata (Baldwin) J.R. Edmondson, Savanna Cowbane. Cp (FL, GA, NC, SC, VA): wet pine savannas, sandhill seepages; rare. September-October; October-November. Scattered from se. VA south to Panhandle FL; alleged occurrences in e. TX are based on misidentifications of narrow-leafleted forms of *O. rigidior* (Sorrie et al. 2003). Edmondson (2005) shows that the correct name for this species is *O. denticulata*. [= WH; = *O. ternata* (Nuttall) A. Heller – RAB, C, F, G, GW, K, MC, S]

Oxypolis filiformis (Walter) Britton, Water Dropwort. Cp (FL, GA, NC, SC): wet savannas, sandhill seepages; common (uncommon north of FL). July-August; August-September. Se. NC south to s. FL, west to se. TX; West Indies. [= RAB, GW, K, MC, S; = *O. filiformis* ssp. *filiformis* – WH]

Oxypolis rigidior (Linnaeus) Rafinesque, Cowbane, Pig-potato. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): bogs, seepages, swamps, wet meadows, streambanks; common (uncommon in FL). August-October; October-November. NY west to MN and south to n. FL and TX. It is very variable in the size and shape of the leaflets. [= RAB, C, G, GW, K, MC, W; > *O. rigidior* var. *rigidior* – F; > *O. rigidior* var. *ambigua* (Nuttall) Robinson – F; > *O. rigidior* – S; > *O. turgida* Small – S]

Oxypolis greenmanii Mathias & Constance. Cp (FL): depression ponds, wet pine flatwoods; rare. Endemic to Bay, Calhoun, and Gulf counties, FL. [= K; = *O. filiformis* (Walter) Britton ssp. *greenmanii* (Mathias & Constance) Judd – WH] {add synonymy}

Pastinaca Linnaeus (Parsnip)

A genus of about 14 species, herbs, of temperate Eurasia. References: Mathias & Constance (1945)=MC.

* ***Pastinaca sativa*** Linnaeus, Parsnip. Mt, Pd (NC, SC, VA), Cp (NC, VA): roadsides, fields; common, native of Europe. June-July; July-August. [= RAB, C, F, K, MC, S, W; > *P. sativa* var. *hortensis* Ehrhart – G; > *P. sativa* var. *sativa* – G]

Perideridia Reichenbach

A genus of about 13 species, mainly of w. North America. References: Mathias & Constance (1945)=MC.

Perideridia americana (Nuttall ex A.P. de Candolle) Reichenbach, Eastern Yampah. East to the Nashville Basin of c. TN (Davidson, Rutherford, Williamson, and Giles counties) (Chester, Wofford, & Kral 1997; Estes 2004). [= C, F, G, K, MC; = *Eulophus americanus* Nuttall ex A.P. de Candolle – S]

Petroselinum J. Hill (Parsley)

A genus of about 2 species, herbs, of Mediterranean Europe. References: Mathias & Constance (1945)=MC.

* ***Petroselinum crispum*** (P. Miller) Nyman ex A.W. Hill, Parsley, Garden Parsley. Cp (SC), Pd (GA, NC): commonly cultivated in gardens, rarely persistent or weakly escaped, native of Mediterranean Europe. June-July. [= RAB, C, F, G, K, MC; = *Apium petroselinum* Linnaeus – S]

Peucedanum Linnaeus (Masterwort)

APIACEAE

* *Peucedanum ostruthium* (Linnaeus) W.D.J. Koch, Masterwort. Naturalized in ne. United States from Europe. Reported from Carter County, TN (Chester, Wofford, & Kral 1997), and also is reported for scattered localities in PA (Rhoads & Klein 1993). [= C, K; = *Imperatoria ostruthium* Linnaeus – MC]

Pimpinella Linnaeus

A genus of about 150 species, herbs, of Europe and Africa.

* ***Pimpinella saxifraga*** Linnaeus, Burnet-saxifrage. Mt (VA): disturbed areas; rare, native of Eurasia. [= C, F, G; < *P. saxifraga* ssp. *saxifraga* – K, MC]

Polytaenia A.P. de Candolle

References: Mathias & Constance (1945)=MC.

Polytaenia nuttallii A.P. de Candolle, Prairie-parsley, ranges from MI west to NE, south to TX and NM, occurring as a disjunct eastward in prairie-like or glade situations in MS and c. TN (Chester, Wofford, & Kral 1998). [= C, F, G, K, MC; = *Pleiotaenia nuttallii* (A.P. de Candolle) Coulter & Rose – S]

Pseudotaenidia Mackenzie (Mountain Pimpernel)

A monotypic genus, an herb, endemic to the central Appalachians. Although this species has been traditionally separated into a monotypic genus, *Pseudotaenidia*; Cronquist (1982) has suggested that *Pseudotaenidia* be submerged in *Taenidia*. Cronquist's argument that the two monotypes are most closely related to one another is very likely correct, but the conclusion that they should be united in a single genus does not necessarily follow (particularly considering the narrow generic concepts used in the Apiaceae). References: Cronquist (1982)=Z; Mathias & Constance (1945)=MC.

Pseudotaenidia montana Mackenzie, Mountain Pimpernel, Shale-barren Pimpernel. Mt (VA): shale barrens and rocky woodlands over shale, greenstone, calcareous sandstone, and other calcareous and mafic rocks; rare (VA Watch List). May-June. A Central Appalachian endemic: w. VA and e. WV north to sc. PA. [= F, G, MC, W; = *Taenidia montana* (Mackenzie) Cronquist – C, K, Z]

Ptilimnium Rafinesque (Bishopweed, Harperella)

A genus of 5-8 species, herbs, temperate, of e. North America. References: Easterly (1957)=Z; Kral (1981a)=Y; Rose (1911)=X; Mathias & Constance (1945)=MC; Weakley & Nesom (2004)=Q; Kress, Maddox, & Roesel (1994).

1 Leaves reduced to hollow, linear, nodose-septate quills, consisting of the petiole and leaflet-less rachis, undivided.
  2 Leaves 8-30 cm long; plants 4-10 dm tall, not proliferating from the nodes (strictly annual); rays 10-25 mm long, 6-15 per inflorescence; pedicels 3.0-6.0 mm long; [of still water of Coastal Plain ponds] ..... ***Pt. nodosum***
  2 Leaves 4-12 (-15) cm long; plants 1-5 (-8) dm tall, proliferating from the nodes (thus adventitiously perennial); rays 1-9 mm long, 2-5 (-9) per inflorescence; pedicels 0.5-2.0 (-2.5) mm long; [of shoals, outcrops, and banks of rocky streams or rivers] ..... ***Pt. viviparum***
1 Leaves dissected into filiform or linear segments.
  3 Leaf segments verticillate on the rachis (4 or more segments at major nodes of each leaf); styles 1.5-3.0 mm long ..... ***Pt. costatum***
  3 Leaf segments alternate, opposite, or in whorls of 3 on the rachis; styles 0.2-1.5 mm long.
    4 Styles 0.5-1.5 mm long; fruits 1-2 mm long ..... ***[Pt. nuttallii]***
    4 Styles 0.2-0.5 mm long; fruits 1.4-4.2 mm long.
      5 Fruits 2.7-4.2 mm long; umbellets usually 5-7 per umbel; flowers usually 5-7 (-8) per umbellet; bracts subtending the umbels and umbellets with 1 (-3) linear segments; leaf segments of mid-stem leaves 15-30 (40), capillary to linear, 0.5-1.9 mm wide; flowering May-early June; fruiting late May-July ..... ***Pt. ahlesii***
      5 Fruits 1.4-2.0 mm long; umbellets usually 10 or more per umbel; flowers usually 10 or more per umbellet; bracts subtending the umbel and umbellets with (1-) 3-5 linear segments; leaf segments of mid-stem leaves 50 or more, capillary, usually < 0.5 mm wide (except in submersed leaves); flowering June-August, fruiting July-September ..... ***Pt. capillaceum***

Ptilimnium ahlesii Weakley & Nesom, Carolina Bishopweed, Coastal Bishopweed. Cp (GA, NC, SC): tidal freshwater marshes; rare. May-June; Late May-July. This species, recognized but not validly named by H.E. Ahles, ranges from se. NC (Onslow, New Hanover, and Brunswick counties) south through SC to e. GA. The lowermost leaves (withering prior to fruiting) sometimes lack leaflets and thus closely approach the quill-leaves of *Pt. fluviatile* and *Pt. nodosum*, corroborating Easterly's combination of *Harperella* into *Ptilimnium*. [= Q; < *Pt. capillaceum* – RAB; = *Pt. macrospermum* – K, nomen nudum]

Ptilimnium capillaceum (Michaux) Rafinesque, Eastern Bishopweed, Atlantic Bishopweed. Cp, Pd (GA, NC, SC, VA): ditches, marshes, other wet places; common. June-August; July-September. MA, NY, and MO south to FL and TX. [= RAB, C, F, G, GW, K, MC, Q, S, W, Z; < *Pt. capillaceum* – RAB]

Ptilimnium costatum (Elliott) Rafinesque, Big Bishopweed. Cp (NC), Pd, Mt (GA): tidal freshwater marshes (NC), wet prairies (GA), bottomland hardwood forests (GA); rare. July-August. Se. NC south to GA, and west to IL, MO, and TX; it is

rare and disjunct through much of that range. It has the potential to be a great deal larger and coarser than any other member of the genus, but individuals will be encountered no larger than a fairly robust plant of *Pt. species 1* or *Pt. capillaceum*. [= RAB, C, F, G, GW, K, MC, Q, S, Z]

Ptilimnium nodosum (Rose) Mathias, Pond Harperella. Cp (GA, SC): upland depression ponds, seepage on granite outcrops; rare. June. Known only from a few sites in SC and c. GA. See *Pt. viviparum* for comments. [= RAB, GW, MC, Z; < *P. nodosum* (Rose) Mathias – C, K, Y (also see *Pt. fluviatile*); = *Harperella nodosa* Rose – S, X]

Ptilimnium viviparum (Rose) Mathias, Atlantic River Harperella. Pd (NC, VA): rocky riverbeds; rare. July-August. Some authors, such as C, K, and Kral (1981a) prefer to include *Pt. fluviatile* and *Pt. viviparum* in *Pt. nodosum*, but recent electrophoretic and morphologic data suggest the existence of 3 taxa: *Pt. viviparum* of w. MD, e. WV, VA, and c. NC, *Pt. fluviatile* of n. AL and AR, and *Pt. nodosum* of SC and GA. See Maddox & Bartgis (1990) and Kress, Maddox, & Roesel (1994) for additional information. Further electrophoretic and morphologic studies are underway. Belden et al. (2004) provide details on the Virginia occurrence in Aquia Creek, Stafford County. [= MC; < *Pt. fluviatile* (Rose) Mathias – RAB, G, GW, Z; < *Pt. nodosum* (Rose) Mathias – C, K, Y; = *Pt. viviparum* (Rose) Mathias – F; < *Harperella fluviatilis* Rose – S; = *Harperella vivipara* Rose – X]

Ptilimnium fluviatile (Rose) Mathias, Gulf River Harperella. Similar to *Pt. viviparum*. N. AL and AR. [= *Pt. fluviatilis* – MC, orthographic variant; < *Pt. fluviatile* (Rose) Mathias – RAB, G, GW, Z; < *Pt. nodosum* (Rose) Mathias – C, K, Y; < *Harperella fluviatilis* Rose – S, X] {not yet keyed}

Ptilimnium nuttallii (A.P. de Candolle) Britton, Midwestern Bishopweed, ranges from KY, MO, and KS south to se. TN (Chester, Wofford, & Kral 1997), AL, LA, and e. TX. [= C, F, G, GW, K, MC, Q, S, Z]

Sanicula Linnaeus (Sanicle, Snakeroot)

A genus of about 40 species, herbs, nearly cosmopolitan. References: Pryer & Phillippe (1989)=Z; Mathias & Constance (1945)=MC. Key based in part on Z.

Identification notes: *Sanicula* species cannot be reliably determined from sterile plants. Fruits or flowers are required for identification of *Sanicula* species. An important character is the length of the styles in relation to the calyx and/or to the bristles on the fruit. In the longer-styled species, the styles are slender and curved outward, sometimes enmeshed in the bristles, but distinctly longer than them or than the calyx. In the shorter-styled species, the styles are straight to slightly curved, shorter than or about as long as the bristles, and more or less included in the calyx. In most species the calyx is inconspicuous, but consists of 5 deltoid to narrowly triangular (or even subulate) calyx lobes, 0.4-2.0 mm long, at the summit of the schizocarp (the fruit).

1 Styles 1.5× or more as long as the calyx; umbellets dimorphic – some contain both perfect and staminate flowers, while others contain staminate flowers only (except sometimes *S. canadensis* var. *grandis*, which may have polygamous umbellets only).
  2 Calyx lobes 0.4-0.7 mm long, deltoid, flexible or weak in texture, the apices acute to obtuse; petals yellowish green, much longer than the calyx ..... ***S. odorata***
  2 Calyx lobes 0.7-2.0 mm long, narrowly triangular to subulate, rigid in texture, the apices acute-acuminate; petals white or greenish-white, equal to or slightly longer than the calyx.
    3 Styles about 1.5× as long as the calyx, inconspicuously exserted from between the calyx lobes and recurved; umbellets usually polygamous (rarely some staminate only); polygamous umbellets with 6-18 flowers (3 perfect and 3-15 staminate); fruit with a short but distinct pedicel 0.5-1.0 mm long; bases of fruit bristles dilated but not bulbous, often minutely papillose ..... ***S. canadensis* var. *grandis***
    3 Styles > 2× as long as the calyx, conspicuously exserted from the calyx and recurved; umbellets dimorphic, some polygamous and others staminate only; polygamous umbellets with 12-120 flowers (3-4 perfect and the remainder staminate); fruits sessile to subsessile; bases of fruit bristles prominently bulbous, with a minutely warty-reticulate surface pattern ..... ***S. marilandica***
1 Styles shorter than (or rarely as long as) the calyx; umbellets usually monomorphic (all containing both perfect and staminate flowers), with staminate flowers 1-7 per umbellet.
  4 Sepals on mature fruit connivent, forming a beak-like structure equaling or usually exceeding the adjacent fruit bristles, the tips of the sepals subulate and incurved; pedicels of staminate flowers 3-8 mm long; [mostly of the Mountains in our area, rarely in the Piedmont of VA] ..... ***S. trifoliata***
  4 Sepals on mature fruit somewhat spreading, loose, inconspicuous and immersed in the adjacent fruit bristles, the tips of the sepals acute or narrowly acute, straight; pedicels of staminate flowers 1-2 (-3) mm long; [collectively widespread in our area].
    5 Plant a perennial, from thickened, cordlike roots; umbellets with 7-9 flowers (3 perfect and 4-6 staminate) ..... ***S. smallii***
    5 Plant a biennial, from slender, fibrous roots; umbellets with 4-6 flowers (3 perfect and 1-3 staminate).
      6 Larger leaves mostly 8-15 cm across; leaf teeth weak, hyaline; [widespread in our area, mostly not in the Coastal Plain south of VA]. ..... ***S. canadensis* var. *canadensis***
      6 Larger leaves mostly 3-8 cm across, thick in texture; leaf teeth stiff, sharp, and prominently whitened; [of the Coastal Plain in our area] ..... ***S. canadensis* var. *floridana***

Sanicula canadensis Linnaeus *var.* ***canadensis***, Canada Sanicle, Black Snakeroot. Mt, Pd, Cp (GA, NC, SC, VA): dry-mesic to mesic forests; common. April-May; June-July. VT and s. Ontario west to MN and SD, south to Panhandle FL and e. TX. [= F, G, Z; < *S. canadensis* – RAB, C, MC, W; < *S. canadensis* var. *canadensis* – K; = *S. canadensis* – S]

Sanicula canadensis Linnaeus *var.* ***floridana*** (Bicknell) H. Wolff, Florida Sanicle, Florida Snakeroot. Cp (GA, NC, SC, VA): dry-mesic to mesic, sandy forests, often associated with *Fagus grandifolia* (and southward *Magnolia grandiflora*); uncommon? April-May; June-July. Se. VA south to c. peninsular FL, west to s. MS, in the Coastal Plain. Additional differences between var. *floridana* and var. *canadensis* should be investigated. They may not be worthy of taxonomic differentiation. [= F, G; < *S. canadensis* – RAB, C, MC; < *S. canadensis* var. *canadensis* – K; = *S. floridana* Bicknell – S]

Sanicula canadensis Linnaeus *var.* ***grandis*** Fernald, Large Sanicle. Mt? (NC?, VA?): {attributed to our area in various floras, possibly incorrectly; confirmation needed from herbarium work, and information on habitats, rarity, phenology}. VT and

n. NY west to s. Ontario, WI, se. MN, and n. IA, south to PA, WV, n. KY, c. IL, and allegedly south in the Mountains to VA and/or NC. [= F, K, Z; < *S. canadensis* – RAB, C, MC, W]

Sanicula marilandica Linnaeus, Maryland Sanicle. Mt, Cp (GA, NC, SC, VA), Pd (NC, SC, VA): mesic to dry-mesic nutrient-rich forests; (common, uncommon in Coastal Plain). May-June; July-August. Québec and Newfoundland west to BC, south to Panhandle FL, se. LA, NM, and WA. The Coastal plain populations (designated as var. *petiolulata* by Fernald) are disjunct from the main range of distribution, occur in rather different (more acidic) habitats, and warrant additional study. The primary morphological difference indicated by F is that var. *petiolulata* has "the leaflets of 1 or 2 lower cauline leaves on petiolules 1.5-5 cm long" (vs. sessile or short-petiolulate). [= RAB, C, K, MC, W, Z; > *S. marilandica* var. *marilandica* – F, G; > *S. marilandica* var. *petiolulata* Fernald – F, G; = *S. marylandica* – S, orthographic variant]

Sanicula odorata (Rafinesque) K.M. Pryer & L.R. Phillippe, Clustered Sanicle, Clustered Snakeroot. Mt, Pd, Cp (GA, NC, SC, VA): mesic to dry-mesic nutrient-rich forests; uncommon. May-June; June-July. Nova Scotia and Québec west to MN and e. SD, south to Panhandle FL and e. TX. [= K, Z; = *S. gregaria* Bicknell – RAB, C, F, G, MC, S, W]

Sanicula smallii Bicknell, Southern Sanicle, Small's Sanicle. Pd, Cp, Mt (GA, NC, SC, VA): mesic to dry-mesic forests; common (uncommon in Coastal Plain). April; May-June. C. VA, sw. VA, KY, se. MO, south to Panhandle FL, se. LA, c. LA, and e. TX. [= RAB, C, F, G, K, MC, S, W]

Sanicula trifoliata Bicknell, Beaked Sanicle, Large-fruited Sanicle. Mt (GA, NC, SC, VA), Pd (VA): cove forests, other mesic, nutrient-rich forests; common (rare in Piedmont) (GA Special Concern). May; June-July. Québec and VT west to s. WI and se. MN, south to n. VA, w. NC, n. GA, c. TN, c. IL, and ne. IA. [= RAB, C, F, G, K, MC, S, W, Z]

Scandix Linnaeus (Venus'-comb)

A genus of about 15-20 species, herbs, temperate, of Eurasia. References: Mathias & Constance (1945)=MC.

* ***Scandix pecten-veneris*** Linnaeus, Venus'-comb, Shepherd's-needle. Pd (GA, NC, SC): roadsides, fields, disturbed areas; rare, native of Mediterranean Europe. March-April. [= RAB, C, G, K, MC, S]

Sium Linnaeus (Water-parsnip)

A genus of about 14 species, herbs, of the northern hemisphere. References: Mathias & Constance (1945)=MC.

Sium suave Walter, Water-parsnip. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): freshwater marshes, brackish marshes, swamp forests; uncommon (rare in Piedmont and Mountains). June-August; August-October. Newfoundland west to Alaska and Siberia, south to Panhandle FL, n. penisular FL, and CA. The plant can be very coarse, up to 3 m in height and the stem to 5 cm in diameter. The taxonomic status of *Sium floridanum* Small, known from se. VA south to GA, needs additional investigation; it is probably just a depauperate shade form. [= RAB, C, K, W, WH; > *S. suave* – F, G, GW, MC; > *S. floridanum* Small – F, G, GW, MC, S; > *S. cicutaefolium* Schrank – S]

Smyrnium Linnaeus 1753

References:

* ***Smyrnium perfoliatum*** Linnaeus. Found in a mesic forest in Cherokee County, AL, apparently introduced via seed in nursery material (Keener 2007).

Spermolepis Rafinesque (Spermolepis)

A genus of 5 species, herbs, of North America, Argentina, and Hawaii. References: Mathias & Constance (1945)=MC.

1 Ovary and fruit with hooked bristles ..... ***S. echinata***
1 Ovary and fruit smooth or tubercled.
  2 Primary rays of the umbel widely spreading to weakly ascending, not greatly differing in length ..... ***S. divaricata***
  2 Primary rays of the umbel strongly ascending, differing conspicuously in length ..... ***S. inermis***

Spermolepis divaricata (Walter) Rafinesque ex Seringe, Southern Spermolepis, Roughfruit Spermolepis. Cp (FL, GA, NC, SC, VA), Pd (GA, SC): sandy roadsides, disturbed areas; common. April-May; May-June. VA south to s. FL, west to TX, and north in the interior to KS and MO. Apparently native in our area, though weedy in behavior, and perhaps introduced only in VA. [= RAB, C, G, GW, K, MC, S, WH]

* ***Spermolepis echinata*** (Nuttall ex A.P. de Candolle) Heller, Bristlefruit Spermolepis, Hooked Spermolepis. Cp (FL, GA, SC, VA): sandy roadsides, disturbed areas; common (rare in GA, SC, VA), native of sc. United States. April; May. [= RAB, C, F, G, K, MC, S, WH]

Spermolepis inermis (Nuttall ex A.P. de Candolle) Mathias & Constance, Western Spermolepis. Mt (GA), Cp (NC*): calcareous prairies in the Mountains (GA), disturbed areas in the Coastal Plain (NC); rare (GA Rare), northeastward in our area native of sc. United States. April; May. [= RAB, C, F, G, K, MC; *? S. patens* (Nuttall ex A.P. de Candolle) B.L. Robinson – S]

Taenidia (Torrey & A. Gray) Drude (Yellow Pimpernel)

A monotypic genus (unless *Pseudotaenidia* is included), an herb, temperate, of e. North America. References: Mathias & Constance (1945)=MC. [also see *Pseudotaenidia*]

Taenidia integerrima (Linnaeus) Drude, Yellow Pimpernel. Pd, Mt (GA, NC, SC, VA), Cp (VA): in rocky, dry to dry-mesic forests and woodlands over mafic or calcareous rock, such as diabase, amphibolite, calcareous siltstone, calcareous shale, or limestone; common (uncommon in NC and SC). April-May; May-June. Widespread in e. North America, south to c. GA. [= RAB, C, F, G, K, MC, S, W]

Thaspium Nuttall (Meadow-parsnip)

A genus of 3-4 species, herbs, temperate, of e. North America. References: Mathias & Constance (1945)=MC; Cooperrider (1985)=Z; Coulter & Rose (1900)=Y.

[Note: because *Thaspium* and *Zizia* are often confused when not in fruit, a combined key emphasizing vegetative characters has been provided; it may also be helpful to use the key to genera, and if a clear answer is obtained, then use the *Thaspium-Zizia* combined key, skipping taxa of the "wrong" genus]

1 Leaves 3-4-ternate, the very numerous ultimate segments 1-3 mm wide; petals white (fading to yellowish tan in older herbarium material)..... ***Thaspium pinnatifidum***
1 Leaves simple, 3-foliolate, or 2-3-ternate, the final leaflets or segments > 5 mm wide; petals yellow, maroon, or pale yellow.
  2 Basal leaves 2-ternate or more divided.
    3 Leaflets coarsely and rather lacerately serrate or incised, many of the teeth at least 2 mm long as measured on the shorter side; umbel rays 8-10, < 3.5 cm long even in fruit; petals pale to creamy yellow ..... ***Thaspium barbinode***
    3 Leaflets finely to coarsely serrate, but not lacerate or incised, few if any of the teeth > 2 mm long as measured on the shorter side; umbel rays mostly either more in number or longer; petals golden yellow.
      4 Teeth of the leaflets fine, averaging (4-) 5-10 per cm of margin, acuminate (the 2 sides making an angle of about 45 degrees); umbel rays (8-) 10-18, in fruit 2.5-4 (-5) cm long; basal leaves many-foliolate, the leaflets mostly acuminate; fruit ca. 2× as long as wide ..... ***Zizia aurea***
      4 Teeth of the leaflets coarse, averaging (1-) 2-3 (-4) per cm of margin, acute to obtuse (the 2 sides making an angle of about 90 degrees); umbel rays 4-10 (-12), the longest to 11 cm long in fruit (some on a plant at least 5 cm long); basal leaves 3-5 (-7)-foliolate, the leaflets mostly rounded to obtuse at the apex; fruit 1-1.5× as long as wide ..... ***Zizia trifoliata***
  2 Basal leaves simple or 3-foliolate.
    5 Teeth of the leaflets coarse, averaging 2-3 (-4) per cm of margin, the long side of most of the teeth 2-10 mm long; basal leaves mostly 3-foliolate (or more divided); middle and upper stem leaves equally or more divided than the basal leaves (the most divided leaves usually those of the mid-stem) ..... ***Zizia trifoliata***
    5 Teeth of the leaflets fine, averaging 4-10 per cm of margin, the long side of most of the teeth 0.5-2 (-4) mm long; basal leaves simple (and cordate) or 3-foliolate; middle and upper stem leaves 3-foliolate (rarely simple).
      6 Teeth relatively acute, without a well-developed callous tip and a thickened, translucent border (use 10×); lower portion of stem puberulent, the upper nodes also usually puberulent (use 10×); leaf margins often ciliolate; umbel rays 7-15; flowers golden yellow... ***Zizia aptera***
      6 Teeth relatively obtuse, with a well-developed callous tip and a thickened, translucent border (use 10×); lower portion of stem glabrous, the upper nodes sometimes minutely roughened; leaf margins glabrous and hyaline; umbel rays 4-10 (-11); flowers maroon or golden yellow.
        7 Flowers golden yellow ..... ***Thaspium trifoliatum var. aureum***
        7 Flowers dark maroon ..... ***Thaspium trifoliatum var. trifoliatum***

Thaspium barbinode (Michaux) Nuttall. Mt, Pd, Cp (GA, NC, SC, VA): moist forests; common. April-May; July-August. NY and Ontario west to MN, south to panhandle FL and OK. The hispid, purple-tinged leaf sheath is a good additional character for this species. [= RAB, S, W; = *Th. barbinode* var. *barbinode* – F, Y; < *Th. barbinode* – C, G, K, MC, Z (also see *Th. chapmanii*)]

Thaspium pinnatifidum (Buckley) A. Gray. Mt (GA, NC): forests and woodlands over calcareous rock, such as limestone, dolostone, or calcareous siltstone); rare (GA Rare, NC Rare). May-June; June-July. KY south to w. NC, e TN (Chester, Wofford, & Kral 1997), and n. AL. The report from VA is of unknown documentation. The distribution and rarity of this plant is complicated because of confusion with *Th. chapmanii*. [= RAB, C, F, G, K, MC, S, W, Y, Z]

Thaspium trifoliatum (Linnaeus) A. Gray *var.* ***aureum*** (Linnaeus) Britton. Mt, Pd, Cp (NC, SC, VA), {provinces (GA)}: moist forests; uncommon (rare in Coastal Plain). April-May; July-August. NY west to MN, south to SC, AL, AR, and se. KS. Various workers have differed on the characters used to separate two varieties in *T. trifoliatum*. RAB and C separate the two strictly on petal color; F, however, allows var. *aureum* to sometimes have purple petals, seeming to regard the critical differences to be var. *aureum*'s generally more robust size and larger fruits (4.5 mm long vs. 3-4 mm long). It is presently not clear how two varieties should be separated, or, indeed, if varieties are warranted. Though the ranges overlap, var. *aureum* is generally more

northern and western, var. *trifoliatum* more southern and eastern. [= K, S, Y; = *T. trifoliatum* var. *flavum* Blake – RAB, C, F, MC, W, Z; < *T. trifoliatum* – G]

Thaspium trifoliatum (Linnaeus) A. Gray *var.* ***trifoliatum***. Mt, Pd, Cp (NC, SC, VA), {provinces (GA)}: moist forests; common (rare in Coastal Plain). April-May; July-August. NJ, PA, and MO, south to panhandle FL and LA. [= RAB, C, F, K, MC, S, W, Y, Z; < *T. trifoliatum* – G]

Thaspium chapmanii (Coulter & Rose) Small. Mt, Pd (GA), Cp (FL, GA): calcareous bluffs; rare. Sw. PA, s. Ontario, s. MI, sw. WI, and s. MN south to Panhandle FL and e. TX. [= *T. barbinode* var. *angustifolium* Coulter & Rose – F; < *Th. barbinode* (Michaux) Nuttall – C, G, K, MC, Z; > *Th. barbinode* var. *angustifolium* – Y; > *Th. barbinode* var. *chapmanii* Coulter & Rose – Y] {not yet keyed; etc.}

Torilis Adanson (Hedge-parsley, Bur-parsley)

A genus of about 15 species, herbs, temperate, of the Old World. References: Mathias & Constance (1945)=MC.

1 Rays reduced or absent, < 5 mm long, the inflorescence therefore compact, appearing like a head; inflorescences opposite the leaves, on peduncles 0-1 (-2) cm long; mericarps dimorphic, one with spines, the other tuberculate..... ***T. nodosa***
1 Rays and pedicels well-developed, > 5 mm long, the inflorescence therefore open, distinctly and obviously an umbel; inflorescences opposite the leaves and terminal, on peduncles (1-) 3-16 cm long; mericarps monomorphic, both with spines.
  2 Involucral bracts 0-1; fruits 3-4 mm long (not including the spines); spines straight or nearly so, with a minute hook at the tip ... ***T. arvensis***
  2 Involucral bracts >2, generally 1 per ray; fruits 2-2.5 mm long (not including the spines); spines curved, not hooked at the tip... ***T. japonica***

* ***Torilis arvensis*** (Hudson) Link, Spreading Bur-parsley, Field Hedge-parsley. Mt (GA, NC, VA), Cp (GA, SC, VA), Pd (GA, NC, SC, VA): roadsides, fields, disturbed areas; uncommon, native of Europe. May-June. [= RAB, C, MC, W; ? *T. japonica* – F, G, misapplied; > *T. arvensis* ssp. *arvensis* – K]

* ***Torilis japonica*** (Houttuyn) A.P. de Candolle. (VA): {habitat}; rare, native of Eurasia, naturalized south to se. PA and VA. [= K, MC; ? *T. anthriscus* (Linnaeus) Gmelin]

* ***Torilis nodosa*** (Linnaeus) Gaertner, Knotted Bur-parsley. Cp (GA?, NC, SC): disturbed areas; rare, native of Mediterranean Europe. May. [= RAB, G, K, MC, S]

Trepocarpus Nuttall ex A.P. de Candolle

A monotypic genus, an herb, temperate, of se. United States. References: Mathias & Constance (1945)=MC.

Trepocarpus aethusae Nuttall ex A.P. de Candolle. Pd (SC), ?? (GA): rich moist forests, sometimes weedy in disturbed soils; rare (GA Rare). May-June. C. SC south to panhandle FL and AL, west to e. TX, north in the interior to w. TN, w. KY, AR, and se. OK. Nelson (1993) states that despite "something of a reputation as a rarity," *Trepocarpus* is "a reasonably successful weed." [= RAB, C, GW, K, MC]

Zizia W.D.J. Koch (Golden-Alexanders)

A genus of about 4 species, herbs, temperate, of North America. References: Mathias & Constance (1945)=MC; Cooperrider (1985)=Z.

[see combined key to *Thaspium* and *Zizia* under *Thaspium*]

Zizia aptera (A. Gray) Fernald, Heartleaf Golden-Alexanders. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests, openings, and woodland edges; common (rare in Coastal Plain). April-May; July-August. NY west to British Columbia, south to GA, panhandle FL, MO, and CO. [= RAB, F, G, GW, K, MC, W, WH, Z; > *Z. aptera* var. *aptera* – C; = *Z. cordata* W.D.J. Koch ex A.P. de Candolle – S]

Zizia aurea (Linnaeus) W.D.J. Koch, Common Golden-Alexanders. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests; common (rare in Coastal Plain). April-May; June-July. New Brunswick west to Saskatchewan, south to sw. GA, panhandle FL, and e. TX. [= RAB, C, F, G, GW, K, MC, S, W, WH, Z]

Zizia trifoliata (Michaux) Fernald, Mountain Golden-Alexanders. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests, woodlands, and woodland borders; common (rare in Coastal Plain). April-May; July-August. VA and WV west to AR, south to n. peninsular and panhandle FL. [= RAB, C, F, G, GW, K, W, WH; > *Z. trifoliata* – MC; > *Z. latifolia* Small – MC, S; > *Z. bebbii* (Coulter & Rose) Britton – S]

APOCYNACEAE A.L. de Jussieu 1789 (Dogbane Family)

As here circumscribed including the Asclepiadaceae, a family of about 480 genera and about 4800 species, lianas, shrubs, herbs, and trees, widespread in tropical and temperate areas. There appears to be overwhelming evidence favoring the combination of

the Asclepiadaceae into the Apocynaceae; see, for instance, Rosatti (1989), Sennblad & Bremer (1996), and many others. References: Rosatti (1989); Liede (1997a).

1 Plant a twining herbaceous or woody vine.
  2 Leaves ovate, cordate at the base, < 2.5× as long as wide.
    3 Plants in flower.
      4 Petals white; gynostegial corona nearly as long to longer than the corolla lobes ..... ***Cynanchum laeve***
      4 Petals brown, yellow, yellow-green, cream, or maroon (white in *Matelea baldwyniana*); gynostegial corona < half the length of the corolla lobes.
        5 Corolla lobes glabrous on the outer surface, very stiff in texture; dorsal anther appendages laminar; carpels smooth and angled ..... ***Gonolobus***
        5 Corolla lobes glandular-puberulent on the outer surface, herbaceous in texture; dorsal anther appendages absent; carpels muricate. ..... ***Matelea***
    3 Plants in fruit.
      6 Follicles muricate ..... ***Matelea***
      6 Follicles smooth and angled.
        7 Leaves deeply cordate, tapering steadily to an acuminate apex ..... ***Cynanchum laeve***
        7 Leaves cordate, broadly rounded, tapering abruptly to an acute, obtuse, or apiculate apex ..... ***Gonolobus***
  2 Leaves ovate, lanceolate, or linear, not cordate at the base, > 1.5× as long as wide
    8 Leaves linear, the margins parallel
      9 Leaves petiolate; calyx lobes deltoid, obtuse, ca. 1 mm long; leaves petiolate, not reflexed, often caducous; follicle 1-3 mm in diameter; [of se. SC and south] ..... ***Cynanchum scoparium***
      9 Leaves sessile; calyx lobes lanceolate, acute, (1.3-) 1.5-2.5 mm long; leaves sessile, reflexed, persistent; follicle 6-7 mm in diameter; [of ne. NC and south] ..... ***Seutera angustifolia***
    8 Leaves ovate to lanceolate.
      10 Flowers brownish-purple, with a corona of narrow segments; fruit 10-15 cm long, > 5 mm in diameter; leaves obtuse to acute at the tip (rarely slightly acuminate) ..... ***[Periploca]***
      10 Flowers white to creamy yellow, lacking a corona; fruit 10-25 cm long, 1-2 mm in diameter; leaves acuminate at the tip ..... ***Trachelospermum***
1 Plant an erect or trailing herb or shrub.
  11 Plant a woody shrub.
    12 Plant rhizomatous, suffrutescent, < 4 dm tall; leaves narrowly to broadly ovate; flowers blue, lavender, or white ..... ***Vinca***
    12 Plant erect, > 4 dm tall; leaves either lanceolate or elliptic; flowers yellow, white, pink, or red.
      13 Flowers yellow; shrub 4-12 dm tall, with only a few wand-like branches; [very rare waif in our area] ..... ***Angadenia***
      13 Flowers white, pink, or red; shrub 10-40 dm tall, much branched from the base; [commonly cultivated in our area (and sometimes persistent), particularly near the coast] ..... ***Nerium***
  11 Plant an herb.
    14 Flowers with conspicuous corona; follicles not paired; seeds with coma present ..... ***Asclepias***
    14 Flowers lacking corona; follicles paired (occasionally single by abortion); seeds with coma absent (*Catharanthus, Amsonia*) or present (*Apocynum*).
      15 Leaves alternate (rarely a few on a plant subopposite) ..... ***Amsonia***
      15 Leaves opposite.
        16 Flower < 8 mm across; paired follicles pendent, 10-22 cm long; seeds with coma; mature plants normally > 7 dm tall ... ***Apocynum***
        16 Flower > 20 mm across; paired follicles erect, 1.5-2.5 cm long; seeds lacking coma; mature plants 2-6 dm tall ..... ***Catharanthus***

Amsonia Walter 1788 (Blue-stars)

A genus of about 20 species, herbs, of temperate North America and Japan. References: Woodson (1928)=Z.

1 Corolla glabrous on the outer surface; stem pubescent (*A. ciliata*) or glabrous (*A. rigida*); [of the Coastal Plain from se. and sc. NC southward].
  2 Leaves elliptic; [of seasonally flooded depression wetlands and moist pinelands] ..... ***A. rigida***
  2 Leaves linear to lanceolate; [of dry, sandy habitats, such as sandhills].
    3 Leaves strongly heteromorphic, the lower leaves lanceolate, 4-10 mm wide (mostly 4-15× as long as wide), the upper about 1 mm wide; inflorescence barely held above the foliage ..... ***A. ciliata var. ciliata***
    3 Leaves slightly or not at all heteromorphic, the lower leaves linear, 1-3 mm wide (mostly 15-30× as long as wide), the upper < 1 mm wide; inflorescence usually held well above the foliage ..... ***A. ciliata var. tenuifolia***
1 Corolla pubescent on the outer surface; stem glabrous; [more widespread in our area].
  4 Follicles pubescent ..... ***A. ludoviciana***
  4 Follicles glabrous.
    5 Leaf blades ovate to oblong-lanceolate, 3-6 cm wide ..... ***A. tabernaemontana var. tabernaemontana***
    5 Leaf blades lanceolate to linear-lanceolate, 1-3 cm wide.
      6 Inflorescence dense, many-flowered; leaves pubescent (glabrate in age) ..... ***A. tabernaemontana var. gattingeri***
      6 Inflorescence loose, few-flowered; leaves glabrous, glaucous beneath ..... ***A. tabernaemontana var. salicifolia***

Amsonia ciliata Walter *var.* ***ciliata***, Broadleaf Sandhills Blue-stars. Cp (FL, GA, NC, SC): sandhills; uncommon (rare in NC). April; September-October. Se. NC south to n. FL, west to AL. [= K, S, Z; < *A. ciliata* – RAB, WH]

Amsonia ciliata Walter *var.* ***tenuifolia*** (Rafinesque) Woodson, Threadleaf Sandhills Blue-stars. Cp (FL, GA, NC, SC): sandhills; uncommon (rare in NC). April; September-October. Se. and sc. NC south to c. peninsular FL, west to AL. [= K; < *A. ciliata* – RAB, WH; = *A. ciliata* var. *filifolia* Wood – F, G, S; = *A. ciliata* var. *tenuifolium* – Z, misspelling]

Amsonia ludoviciana Vail, Louisiana Bluestar. Pd (GA): open woodlands around outcrops of Lithonia granitic gneiss; rare. So far as is known, endemic to LA, MS and GA; not native or naturalized in SC, contrary to Kartesz (1999). [= GW, K, S, Z]

Amsonia rigida Shuttleworth ex Small, Stiff Bluestar, Pond Bluestar. Cp (FL, GA): seasonally flooded depression wetlands and moist pinelands; uncommon. S. GA to n. peninsular FL, west to s. MS. [= GW, K, S, Z; < *A. tabernaemontana* – WH]

Amsonia tabernaemontana Walter *var.* ***gattingeri*** Woodson. Mt (GA): rich forests, rocky forests, riverside scours; rare. IL, MO, and se. KS south to ne. TX, and apparently disjunct in the Interior Low Plateau of sc. KY, c. TN (Chester, Wofford, & Kral 1997), and in n. GA. Kartesz (1999) shows a more restricted distribution, with this taxon endemic to TN and KY. [= F, K, Z; < *A. tabernaemontana* – C, GW, W; < *A. salicifolia* Pursh – S]

Amsonia tabernaemontana Walter *var.* ***salicifolia*** (Pursh) Woodson, Willowleaf Blue-stars. Mt (GA, NC, SC), Pd, Cp (NC, SC, VA): floodplain forests, moist, rich slope forests; common (uncommon in VA). April; August-September. Se. VA west to s. IN, IL, and MO, south to GA and TX. The varieties, while strikingly different in their extreme expressions, have nearly the same distribution and do intergrade; they may not be worthy of recognition. [= RAB, G, K, Z; < *A. tabernaemontana* – C, GW, W; < *A. salicifolia* Pursh – S (also see var. *gattingeri*]

Amsonia tabernaemontana Walter *var.* ***tabernaemontana***, Wideleaf Blue-stars. Mt (GA, NC, SC), Pd, Cp (GA, NC, SC, VA): floodplain forests, moist, rich slope forests; common (uncommon in VA, uncommon in Mountains). April; August-September. Se. VA west to s. IL, MO, and KA, south to GA, LA, and e. OK. [= RAB, G, K, Z; < *A. tabernaemontana* – C, GW, W; = *A. amsonia* (Linnaeus) Britton – S]

Angadenia Miers 1878 (Pineland Allamanda)

A genus of 2 species, of Florida and the West Indies.

* ***Angadenia berteroi*** (Alphonse de Candolle) Miers, Pineland Golden-trumpet, Pineland Allamanda, Lice-root. Cp (NC): disturbed, acid, peaty soil; rare, native of s. FL, the Bahamas, Cuba, and Hispaniola. The only record in our area is from an agricultural experiment station near Wenona, Washington County, NC (Hayes 1946), where presumably introduced via cattle; the species has probably not persisted in our area. [= K; > *Rhabdadenia corallicola* Small – S]

Apocynum Linnaeus 1753 (Dogbane, Indian-hemp)

A genus of about 12 species, herbs, of temperate e. and c. Asia and North America. References: Woodson (1930)=Z.

1 Corolla 5-10 mm long, pink or white with pink veins, the lobes spreading or recurved.
  2 Leaves drooping; corolla ca. 3× as long as the calyx lobes ..... ***A. androsaemifolium***
  2 Leaves spreading; corolla ca. 2× as long as the calyx lobes ..... ***A. ×floribundum***
1 Corolla 3-6 mm long, white, greenish, or yellowish, the lobes erect or slightly outcurved.
  3 Leaves of the main stem with petioles 5-10 mm long; leaf base cuneate to rounded; [widespread in our area] ..... ***A. cannabinum***
  3 Leaves of the main stem sessile or on petioles to 3 mm long; leaf base rounded or cordate; [of VA and WV northward] ..... ***A. sibiricum***

Apocynum androsaemifolium Linnaeus, Spreading Dogbane. Mt (GA, NC, VA), Pd (GA, VA): forests, woodlands, roadsides, pastures; common. June-August; September-October. Newfoundland to British Columbia south to w. NC, c. GA, TX, and AZ. [= RAB, C, F, K, S, W; > *A. androsaemifolium* var. *androsaemifolium* – G, Z; > *A. androsaemifolium* var. *glabrum* Macoun – G; > *A. androsaemifolium* var. *incanum* A. deCandolle – Z]

Apocynum cannabinum Linnaeus, Hemp Dogbane, Indian-hemp. Cp, Pd, Mt (GA, NC, SC, VA): forests, woodlands, roadsides, pastures; common. May-July; September-October. Québec, Manitoba, and WA south to FL, TX, CA. [= RAB, C, S, W; > *A. cannabinum* var. *cannabinum* – F, G; > *A. cannabinum* var. *pubescens* (Mitchell) Woodson – F, G, Z; > *A. cannabinum* var. *nemorale* (G.S. Miller) Fernald – F; > *A. cannabinum* var. *glaberrimum* A. de Candolle – G, Z; > *A. cannabinum* var. *greeneanum* (Béguinot & Belosersky) Woodson – Z; < *A. cannabinum* – K]

Apocynum ×floribundum Greene (pro sp.) [***A. androsaemifolium*** × ***cannabinum***]. Mt (NC, VA): forests, woodlands, roadsides, pastures; uncommon. June-July; September-October. Sometimes occurring in populations seemingly lacking one or both parents. [= C, K; = *A. medium* Greene – RAB, F, S, W; > *A. medium* var. *medium* – Z]

Apocynum sibiricum Jacquin. Mt, Pd, Cp (VA): forests, woodlands, riverside scour areas, roadsides, pastures; uncommon. July-September; September-October. Newfoundland and British Columbia south to e. VA, w. VA, WV, and MO. *A. sibiricum* var. *cordigerum* has been found in Kent County, MD (Steury, Tyndall, & Cooley 1996). [= C, W; > *A. sibiricum* var. *sibiricum* – F, G; > *A. sibiricum* var. *cordigerum* (Greene) Fernald – F, G; < *A. cannabinum* – K; > *A. hypericifolium* Aiton var. *hypericifolium* – Z; > *A. hypericifolium* Aiton var. *cordigerum* (Greene) Béguinot & Belosersky – Z]

Asclepias Linnaeus 1753 (Milkweed)

A genus of about 100 species, herbs, temperate and tropical, of North and Central America. References: Woodson (1954)=Z.

1 Sap clear; leaves alternate; corolla orange to yellow ..... **Key A**

1 Sap milky; leaves opposite, subopposite, or whorled; flowers orange, red, white, cream, green, pink, or purple.
  2 Leaves linear, > 10× as long as wide.....**Key B**
  2 Leaves lanceolate, ovate, or elliptic, < 1-5 (-10)× as long as wide.
    3 Leaves sessile, subsessile, or with petioles to 3 mm long.....**Key C**
    3 Leaves with petioles 5-20 mm long.
      4 Plants in flower.....**Key D**
      4 Plants in fruit (or sterile).....**Key E**

Key A – milkweeds with clear sap and alternate leaves

1 Leaves cuneate at the base; leaves usually obovate to oblanceolate (widest beyond the middle); [s. NH west to OH, south to panhandle FL and e. TX widespread eastward].....***A. tuberosa* var. *tuberosa***
1 Leaves cordate to hastate at the base; leaves usually lanceolate, ovate, or elliptic (widest at or below the middle).
  2 Leaf margins flat; leaves widest towards the base; [PA, WV, KY, TN, MS westward].....***[A. tuberosa* var. *interior]***
  2 Leaf margins usually crisped; leaves widest near the middle; [of se. Coastal Plain, se. VA south to s. FL, west to s. MS].....***A. tuberosa* var. *rolfsii***

Key B – milkweeds with milky sap, with linear leaves opposite, subopposite, or whorled

1 Leaves **either** mostly in whorls of 3-6 (sometimes some nodes with merely opposite leaves), **or** subopposite (the leaves more-or-less paired but separated by 0.5-3 mm); corolla whitish or greenish, usually suffused with rose-purple (especially at the tips of the corolla lobes).
  2 Leaves mostly in whorls of 3-6 (sometimes some nodes with merely opposite leaves); leaves 1.5-7 cm long, 1-2 mm wide; seeds ca. 5 mm long, the coma ca. 2.5 cm long.....***A. verticillata***
  2 Leaves subopposite (the leaves more-or-less paired but separated by 0.5-3 mm); leaves (3-) 5-18 cm long, (1-) 2-10 mm wide; seeds ca. 7-11 mm long, the coma 3-5 cm long; [of Coastal Plain pinelands].
    3 Umbel 1, terminal; corona 5-7 mm in diameter; horns present, about as long as the hood; hoods ca. 2-4 mm long, surpassing the anther heads; [of dry pinelands].....***A. michauxii***
    3 Umbels 1-4, terminal and from upper nodes; corona 2-3 mm in diameter; horns absent; hoods ca. 2 mm long, surpassed by the anther heads; [**either** of wet pinelands of the Coastal Plain **or** dry glades or woodlands].
      4 Pedicels with spreading hairs; umbels 2-10, each with up to 30-100 flowers; leaves minutely scabrous; [of dry glades or woodlands, known from the Mountains of nw. GA, e. TN, w. WV westward].....***A. hirtella***
      4 Pedicels with incurved hairs; umbels 1-6, each with 10-30 flowers; leaves glabrous or nearly so; [of wet pinelands of the Coastal Plain].....***A. longifolia***
1 Leaves opposite; corolla as above, or creamy yellow, purple, or orange-red.
  5 Leaves 2.5-4.5 cm long, puberulent beneath, sessile; corolla lobes erect, creamy yellow to dull or greenish white, 7-10 mm long; plant 1-4 dm tall; [of dryish pinelands of the Coastal Plain].....***A. pedicellata***
  5 Leaves 5-20 cm long, glabrous or glabrate beneath (rarely puberulent), sessile to petiolate; corolla lobes reflexed, either orange-red or usually with at least some purple (rarely merely whitish or greenish), 3-7 mm long (except 8-11 mm long in the orange-red *A. lanceolata*); plant 1-15 dm tall; [collectively of various habitats].
    6 Leaves with petioles 1-10 mm long; leaves 5-15 mm wide; plants 5-15 dm tall.
      7 Petiole 4-10 mm long; corolla pink (rarely white), the lobes 3-5.5 mm long; hoods 1-2 mm long; horns longer than the hoods; [mostly of the Mountains and Piedmont].....***A. incarnata* var. *incarnata***
      7 Petiole 1-3 mm long; corolla orange-red, the lobes 8-11 mm long; hoods 5-6 mm long; horns slightly shorter than the hoods; [of the Coastal Plain].....***A. lanceolata***
    6 Leaves with petioles 0-1 mm long; leaves 1-7 mm wide; plants 1-7 dm tall.
      8 Leaves 1-2 mm wide; each hood with 2 erect, acuminate, marginal teeth on the inner side (adjoining the anther heads).....***A. cinerea***
      8 Leaves 3-7 mm wide; each hood truncate, lacking prominent marginal teeth.
        9 Umbel 1, terminal; corona 5-7 mm in diameter; horns present, about as long as the hood; hoods ca. 2-4 mm long, surpassing the anther heads; [of dry pinelands].....***A. michauxii***
        9 Umbels 1-4, terminal and from upper nodes; corona 2-3 mm in diameter; horns absent; hoods ca. 2 mm long, surpassed by the anther heads; [**either** of wet pinelands of the Coastal Plain **or** dry glades or woodlands].
          10 Pedicels with spreading hairs; umbels 2-10, each with up to 30-100 flowers; leaves minutely scabrous; [of dry glades or woodlands, east to nw. GA, TN, and WV].....***A. hirtella***
          10 Pedicels with incurved hairs; umbels 1-6, each with 10-30 flowers; leaves glabrous or nearly so; [of wet pinelands of the Coastal Plain].....***A. longifolia***

Key C – milkweeds with milky sap, with sessile, nonlinear leaves

1 Leaves 2-5 cm long, 0.3-1.0 cm wide; corolla lobes erect, creamy yellow to greenish white, 7-10 mm long; plant 1-4 dm tall; [of dryish pinelands of the Coastal Plain of NC and SC].....***A. pedicellata***
1 Leaves 3-30 cm long, 0.5-11 cm wide (not simultaneously < 5 cm long and < 1 cm wide); corolla lobes reflexed, either orange-red, purple, pink, or green, 5-15 mm long; plant 2-10 dm tall; [collectively of various habitats, including dryish pinelands of the Coastal Plain].
  2 Leaves cordate-clasping at base, 3-10 cm wide, 1-2× as long as wide; stem and leaves glabrous and usually also glaucous.
    3 Plant erect, 4-10 dm tall; corolla lobes 7-11 mm long; inflorescence solitary, terminal (rarely a second from an upper node); corona 5-8 mm across; [widespread].....***A. amplexicaulis***
    3 Plant prostrate or decumbent, 2-7 dm tall; corolla lobes 5-6.5 mm long; inflorescences 2-6 from upper nodes; corona 3-5 mm across; [of dry pinelands of the Coastal Plain].....***A. humistrata***
  2 Leaves cuneate to rounded at base, 1-6 cm wide, (1-) 1.5-6× as long as wide; stem and leaves pubescent to glabrate.
    4 Corolla lobes 12-15 mm long, greenish-yellow; flowers 3-6 (-8) per umbel.....***A. connivens***

4 Corolla lobes 6-9 mm long, reddish-purple or pale green; flowers > 7 per umbel.
5 Leaves lanceolate, acuminate at the apex; corolla reddish purple, the lobes 7-9 mm long; [of Coastal Plain wetlands]..... ***A. rubra***
5 Leaves orbicular to oblong, rounded at the apex; corolla pale green, the lobes 6-7 mm long; [of dry habitats primarily in the Piedmont and Mountains (rarely in the Coastal Plain)]..... ***A. viridiflora***

Key D – milkweeds with milky sap, with petiolate, nonlinear leaves, in flower

1 Corolla greenish, either pale green or yellowish green.
2 Leaves subopposite; corolla lobes 13-15 mm long..... ***A. viridis***
2 Leaves opposite; corolla lobes 6-10 mm long.
3 Corona 2-3 mm across; corolla lobes pale green, 6-7 mm long; [of various provinces, primarily of the Piedmont]..... ***A. viridiflora***
3 Corona 5-9 mm across; corolla lobes yellowish green, 9-10 mm long; [strictly of the Coastal Plain, of NC and SC, and southward].
4 Hoods ca. 6 mm long, about 2× as long as the anther heads; stem and leaves densely tomentulose..... ***A. obovata***
4 Hoods ca. 4 mm long, scarcely exceeding the anther heads; stem and leaves softly puberulent..... ***A. tomentosa***
1 Corolla pink, purple, or white.
5 Hoods about as long as the anther heads; horns 1.5-2× as long as the hood, exserted well beyond the hood.
6 Hood opening truncate, the hood therefore beaker-shaped; corolla lobes 8-12 mm long; [primarily of mesic forests of the Mountains]..... ***A. exaltata***
6 Hood opening very oblique, the hood therefore scoop-shaped; corolla lobes 2.5-6 mm long; [primarily of wetlands of various provinces].
7 Plants 3-5 dm tall; corolla lobes usually white (rarely slightly pink); leaves glabrous beneath; [of the Coastal Plain of SC]..... ***A. perennis***
7 Plants 5-15 dm tall; corolla lobes rose to purple (rarely white); leaves pubescent to glabrate beneath; [collectively widespread].
8 Stems and leaves sparsely pubescent to glabrescent; leaves narrow, the base obtuse to truncate, the apex long-acuminate; plants usually much branched..... ***A. incarnata var. incarnata***
8 Stems and leaves moderately to densely pubescent; leaves broader, the base rounded to subcordate, the apex acute to short-acuminate; plants usually relatively strict..... ***A. incarnata var. pulchra***
5 Hoods distinctly longer than the anther heads; horns 0.5-1× as long as the hood, not conspicuously exserted beyond the hood.
9 Lower leaf surface pubescent over the surface.
10 Hood margin irregular but not with a sharp tooth; corolla purplish-rose; plants 4-10 dm tall..... ***A. purpurascens***
10 Hood margin with a single, ascending, triangular tooth; corolla rose or greenish-white; plants (5-) 8-20 dm tall..... ***A. syriaca***
9 Lower leaf surface glabrous to sparsely pubescent along the midvein only.
11 Hood opening very oblique, the hood therefore scoop-shaped, and also with 2 prominent lateral teeth; corolla pink to greenish (rarely white); plants 2-5 dm tall..... ***A. quadrifolia***
11 Hood opening truncate and constricted, and lacking prominent teeth; corolla white (often pink at the "waist"); plants 3-12 dm tall..... ***A. variegata***

Key E – milkweeds with milky sap, with petiolate, nonlinear leaves, in fruit (or sterile)

1 Leaves subopposite..... ***A. viridis***
1 Leaves opposite (or apparently whorled in *A. quadrifolia*).
2 Follicle pendant; seeds without a coma; [of swamp forests of SC and southward]..... ***A. perennis***
2 Follicle erect; seeds with a coma; [collectively widespread].
3 Leaf-bearing nodes 3-4, the upper and lower opposite, the middle with a whorl of 4 leaves..... ***A. quadrifolia***
3 Leaf-bearing nodes 3-many, all opposite.
4 Follicle slightly to strongly muricate..... ***A. syriaca***
4 Follicle smooth.
5 Lower leaf surface glabrous, or pubescent on the midrib only..... ***A. exaltata***
5 Lower leaf surface pubescent.
6 Leaves lanceolate, 4-10× as long as wide.
7 Leaves coriaceous, 3-10 cm long, 1.5-4.5 cm wide; corolla pale green; [of dry upland situations]..... ***A. viridiflora***
7 Leaves herbaceous, 6-15 cm long, 2-7 cm wide; corolla rose; [of moist to wetland situations].
8 Stems and leaves sparsely pubescent to glabrescent; leaves narrow, the base obtuse to truncate, the apex long-acuminate; plants usually much branched..... ***A. incarnata var. incarnata***
8 Stems and leaves moderately to densely pubescent; leaves broader, the base rounded to subcordate, the apex acute to short-acuminate; plants usually relatively strict..... ***A. incarnata var. pulchra***
6 Leaves ovate to elliptic, 1.5-4× as long as wide.
9 Stem moderately to densely pubescent; plants 1.5-5 (-7) dm tall; [of xeric pinelands of the Coastal Plain of NC, SC, and southward].
10 Stem and leaves densely tomentulose; leaves mucronate..... ***A. obovata***
10 Stem and leaves softly puberulent; leaves apiculate..... ***A. tomentosa***
9 Stem glabrous to pubescent in lines only; plants 2-12 dm tall; [collectively of various habitats throughout our area].
11 Lower leaf surface densely puberulent; [primarily of moist to wet habitats]..... ***A. purpurascens***
11 Lower leaf surface slightly pubescent; [primarily of moist to dry habitats].
12 Leaves 4-9 cm wide, acuminate at the apex..... ***A. variegata***
12 Leaves 1-6 cm wide, mostly obtuse at the apex..... ***A. viridiflora***

Asclepias amplexicaulis J.E. Smith, Clasping Milkweed. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): sandhills, other dry woodlands of various types; common. May-July; June-August. NH and NY west to MN, IA, and KS, south to c. peninsular. FL, west to e. TX. [= RAB, C, F, G, K, S, W, WH, Z]

Asclepias cinerea Walter, Carolina Milkweed. Cp (FL, GA, SC): pine savannas; common (uncommon in GA, rare in SC). June-July; August-September. Se. SC south to n. peninsular FL, west to panhandle FL. [= RAB, K, S, WH, Z]

Asclepias connivens Baldwin, Largeflower Milkweed. Cp (FL, GA, SC): wet pine flatwoods; common (rare in SC). July-August. Se. SC (McMillan et al. 2002) south to s. FL, west to Santa Rosa County, FL. [= GW, K, WH, Z; = *Anantherix connivens* (Baldwin) Feay – S]

Asclepias exaltata Linnaeus, Tall Milkweed. Mt (GA, NC, SC, VA), Pd (VA): moist forests, slopes, and forest margins; common (rare in VA Piedmont). June-July; August-September. ME and s. Ontario west to MN and IA, south to n. GA, e. and c. TN (Chester, Wofford, & Kral 1997), KY, and IL. [= RAB, C, F, G, K, S, W, Z]

Asclepias hirtella (Pennell) Woodson, Barrens Milkweed. Mt (GA): limestone glades, prairies; rare (GA Special Concern). W. WV (Mason County), KY, e. TN (Bradley County) (Chester, Wofford, & Kral 1997), and nw. GA (Jones & Coile 1988). It is a species of midwestern prairies and barrens that closely resembles *A. longifolia.* [= C, F, K, Z; = *Asclepias longifolia* Michaux var. *hirtella* (Pennell) Farmer & Bell; = *Acerates hirtella* Pennell – S]

Asclepias humistrata Walter, Fleshy Milkweed. Cp (FL, GA, NC, SC), Pd (GA): sandhills; common. May-June; June-July. E. NC south to s. FL, west to e. LA. [= RAB, K, S, WH, Z]

Asclepias incarnata Linnaeus *var.* ***incarnata,*** Western Swamp Milkweed. Mt (VA), Pd (VA), Cp (FL, VA): swamps, marshes, especially over limestone or calcareous shale; uncommon (rare in VA). July-September; August-October. ME and s. Québec west to Manitoba, south to VA, s. TN (Chester, Wofford, & Kral 1997), AR, TX, and CO; disjunct from n. FL south to s. FL; disjunct in TX, NM, and UT. The distribution is peculiar. [= C, F, G, GW; = *Asclepias incarnata* ssp. *incarnata* – RAB, K, W, Z; = *Asclepias incarnata* – S; < *Asclepias incarnata* – WH]

Asclepias incarnata Linnaeus *var.* ***pulchra*** (Ehrhart ex Willdenow) Persoon, Eastern Swamp Milkweed. Mt, Pd, Cp (GA, NC, SC, VA): marshes, bogs, swamps; common (rare in SC). July-September; August-October. Nova Scotia and ME south to e. NC, w. SC, GA, and e. TN (Chester, Wofford, & Kral 1997). [= C, F, G, GW; = *Asclepias incarnata* ssp. *pulchra* (Ehrhart ex Willdenow) Woodson – RAB, K, W, Z; = *Asclepias pulchra* Ehrhart ex Willdenow – S]

Asclepias lanceolata Walter, Few-flower Milkweed. Cp (FL, GA, NC, SC, VA): swamps, fresh to slightly brackish marshes, wet pine savannas; common (uncommon in GA, NC, and SC, rare in VA). June-August; August-September. NJ south to s. FL, west to e. TX. [= RAB, C, GW, K, S, WH, Z; > *Asclepias lanceolata* var. *lanceolata* – F, G; > *Asclepias lanceolata* var. *paupercula* (Michaux) Fernald – F, G]

Asclepias longifolia Michaux, Savanna Milkweed, Longleaf Milkweed. Cp (FL, GA, NC, SC, VA): wet pine savannas; uncommon (rare in NC and VA). May-June; June-July. DE south to s. FL, west to e. TX. [= RAB, C, F, GW, K, WH, Z; = *Acerates longifolia* (Michaux) Elliott – G; ? *Acerates floridana* (Lamarck) A.S. Hitchcock – S]

Asclepias michauxii Decaisne, Michaux's Milkweed. Cp (FL, GA, SC): pine savannas; uncommon. May. S. SC south to peninsular FL, west to e. LA. [= RAB, K, S, WH, Z]

Asclepias obovata Elliott, Pineland Milkweed. Cp (FL, GA, SC): sandhills; uncommon. June-September. Se. SC south to panhandle FL, west to AR and TX. [= RAB, K, S, WH, Z]

Asclepias pedicellata Walter, Stalked Milkweed, Savanna Milkweed. Cp (FL, GA, NC, SC): dry pine savannas; uncommon (rare north of FL). July-August. Se. NC south to s. FL and Panhandle FL. This species generally occurs in small populations of widely scattered individuals; populations of more than 50 individuals are rare. [= RAB, GW, K, WH, Z; = *Podostigma pedicellata* (Walter) Vail – S]

Asclepias perennis Walter, Smoothseed Milkweed, Swampforest Milkweed. Cp (FL, GA, SC): swamp forests; common (rare north of FL). June-August; August-September. E. SC south to c. peninsular FL, west to e. TX, north in the interior to s. IN and s. IL. [= RAB, C, F, G, GW, K, S, WH, Z]

Asclepias purpurascens Linnaeus, Purple Milkweed. Mt, Pd (NC, VA), Cp (VA), {GA}: openings in moist bottomlands and swamp forests, perhaps mostly on soils derived from mafic soils; uncommon (rare in GA and NC). June. NH and s. Ontario west to WI, IA, and KS, south to NC, nw. TN (Chester, Wofford, & Kral 1997), KY, AR, and OK. [= RAB, C, F, G, K, S, W, Z]

Asclepias quadrifolia Jacquin, Fourleaf Milkweed. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): moist to dryish forests and forest margins, most common on mafic and calcareous substrates; common. May-June; August-September. NH and NY west to IN, south to NC, n. GA, n. AL, and c. TN; also from w. IL west to MO, south to AR and OK. [= RAB, C, F, G, K, S, W, Z]

Asclepias rubra Linnaeus, Red Milkweed. Cp (FL, GA, NC, SC, VA), Pd (GA, VA): pocosin ecotones, wet pine savannas, sandhill seeps, seepage swamps; uncommon (rare in GA and VA). June-July; July-September. Se. NY (Long Island), se. PA, and NJ south to wc. GA and w. Panhandle FL, west to e. TX. *A. laurifolia* is alleged to differ in sessile, cordate-clasping leaf bases (vs. petioled and rounded), purplish-pink flowers (rather than orange-red), and other characters (see Small 1933); it may warrant recognition and needs additional study. [= RAB, C, F, G, GW, K, WH, Z; > *A. rubra* – S; > *A. laurifolia* Michaux – S; > *A. rubra* var. *rubra*; > *A. rubra* var. *laurifolia* (Michaux) Harper]

Asclepias syriaca Linnaeus, Common Milkweed. Mt, Pd (NC, SC, VA), Cp (NC, VA): pastures, roadsides, disturbed areas; common (rare in Coastal Plain of NC, rare in SC). June-August; July-September. New Brunswick and ME west to s. Manitoba and ND, south to SC, GA, c. TN (Chester, Wofford, & Kral 1997), AR, OK, and KS. This species is apparently expanding its range southward; see Wyatt et al. (1993) and Wyatt (1996) for discussion. [= RAB, C, K, S, W, Z; > *Asclepias syriaca* var. *syriaca* – F, G]

Asclepias tomentosa Elliott, Sandhills Milkweed. Cp (FL, NC, SC): sandhills; uncommon (rare in NC). June; July. Sc. NC south to s. FL, west to c. TX. [= RAB, K, Z; ? *Asclepias aceratoides* M.A. Curtis – S]

Asclepias tuberosa Linnaeus *var.* ***rolfsii*** (Britton ex Vail) Shinners, Sandhills Butterfly-weed. Cp (FL, GA, NC, SC, VA): sandhills; common (uncommon north of FL, rare in VA). May-August; August-September. Se. VA south to s. FL, west to s. MS. The first occurrence in Virginia is discussed by Belden et al. (2004). [= *Asclepias tuberosa* ssp. *rolfsii* (Britton ex Vail) Woodson – RAB, K, Z; = *Asclepias rolfsii* Britton ex Vail – S; < *Asclepias tuberosa* – WH]

Asclepias tuberosa Linnaeus *var.* ***tuberosa,*** Common Butterfly-weed. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): woodland margins, roadsides, pastures; common (rare in FL). May-August; August-September. S. NH west to OH, south

to Panhandle FL and e. TX. [= C; = *Asclepias tuberosa* ssp. *tuberosa* – RAB, G, K, Z; < *Asclepias tuberosa* – F, S, W, WH; >< *Asclepias tuberosa* – S; > *Asclepias decumbens* Linnaeus - S]

Asclepias variegata Linnaeus, White Milkweed. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): upland forests and woodlands; common (uncommon in VA Mountains, uncommon in FL). May-June; July-September. CT west to OH, s. IN, s. IL, se. MO, and se. OK, south to panhandle FL, LA, and e. TX. [= RAB, C, F, G, K, W, WH, Z; = *Biventraria variegata* (Linnaeus) Small – S]

Asclepias verticillata Linnaeus, Whorled Milkweed. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): barrens, thin soils of rock outcrops (especially mafic rocks), thin woodlands, sandhills; uncommon. June-September; September-October. E. MA west to ND and Manitoba, south to s. FL, TX, NM, and AZ. [= RAB, C, F, G, K, S, W, Z]

Asclepias viridiflora Rafinesque, Green Milkweed. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (GA, VA): open woodlands, woodland edges, barrens, glades, especially over mafic or calcareous rocks, and also in disturbed areas; uncommon (rare in FL). June-August; August-September. CT west to s. Ontario, Manitoba, ND, and MT, south to NC, SC, GA, Panhandle FL, AL, LA, TX, n. Mexico, NM, and AZ. [= RAB, C, K, W, WH, Z; > *Asclepias viridiflora* var. *viridiflora* – F; > *Asclepias viridiflora* var. *lanceolata* (Ives) Torrey – F; = *Acerates viridiflora* (Rafinesque) Pursh ex Eaton – G, S]

Asclepias viridis Walter, Green Antelope-horn. Cp (FL, GA, SC), Mt (GA): prairies, dry woodlands, calcareous hammocks; rare. S. SC south to s. FL, west to TX; and from OH, w. WV, and KY west to NE, south to se. TN, c. TN (Chester, Wofford, & Kral 1997), nw. GA, c. AL, c. MS, AR, TX, and OK. [= K, WH, Z; = *Asclepiodora viridis* (Walter) A. Gray – S]

* ***Asclepias curassavica*** Linnaeus, Scarlet Milkweed. Cp (LA): disturbed areas; rare, native of tropical America, cultivated as an ornamental and sometimes slightly persistent. Kartesz (1999) reports it for TN. [= K, WH, Z] {not yet keyed}

Asclepias curtissii A. Gray, Curtiss's Milkweed. Cp (FL): scrub; rare. Endemic to FL, from Clay County south to s. peninsular FL. [= K, WH, Z; = *Oxypteryx curtissii* (A. Gray) Small – S] {not yet keyed}

Asclepias feayi Chapman ex A. Gray, Feay's Milkweed. Cp (FL): sandhills, scrubby pine flatwoods; rare. Endemic to FL, from Clay County south to s. peninsular FL. [= K, WH, Z; = *Asclepiodella feayi* (Chapman ex A. Gray) Small – S] {not yet keyed}

Asclepias tuberosa Linnaeus var. *interior* (Woodson) Shinners, Midwestern Butterfly-weed. East to MS, TN, KY, WV (Kartesz 1999). [= C; < *A. tuberosa* – F, S; = *A. tuberosa* Linnaeus ssp. *interior* Woodson – G, K, Z]

Asclepias viridula Chapman, Southern Milkweed. Cp (FL, GA): wet longleaf pine savannas and flatwoods, seepage slopes, pitcherplant bogs; uncommon (rare in GA). April-July. GA and AL south to ne. FL and Panhandle FL. See Chafin (2000) for additional information. [= GW, K, S, Z] {not yet keyed}

Catharanthus G. Don 1836 (Rosy-periwinkle)

A genus of about 8 species, herbs, 7 endemic to Madagascar and 1 endemic to India. References: van Bergen (1996)=Z; Snoeijer (1996).

* ***Catharanthus roseus*** (Linnaeus) G. Don, Rosy-periwinkle, Madagascar Periwinkle, Cayenne Jasmine. Cp (GA, NC, SC): disturbed areas, persistent after cultivation or as a waif or "throwout" after cultivation; rare, native of Madagascar, now a pantropical weed. May-October. *C. roseus* is the source of a powerful anti-leukemia drug. [= K, S, Z; = *Vinca rosea* Linnaeus – RAB]

Cynanchum Linnaeus 1753 (Swallow-wort)

A genus of about 400 species, vines and lianas, primarily of tropical and warm temperate portions of the New World and Old World. *Ampelamus* was retained as a genus by Liede (1997a), but later results suggest that it is not distinct from some other portions of *Cynanchum* (Liede & Täuber 2002). However, *Cynanchum* itself is strongly polyphyletic and will be broken up; further taxonomic and nomenclatural changes are likely. *C. laeve* will probably remain in *Cynanchum* s.s. (which is primarily Old World in distribution), while *C. scoparium* will likely shift to *Orthosia*. References: Liede (1997b); Liede & Meve (1997); Liede (1997a); Krings (2001)=Z; Liede & Täuber (2002).

1 Leaves cordate ..... ***C. laeve***
1 Leaves linear.
  2 Calyx lobes lanceolate, acute, (1.3-) 1.5-2.5 mm long; leaves sessile, reflexed, persistent; follicle 6-7 mm in diameter; [of ne. NC and south] ..... ***[see Seutera angustifolia]***
  2 Calyx lobes deltoid, obtuse, ca. 1 mm long; leaves petiolate, not reflexed, often caducous; follicle 1-3 mm in diameter; [of se. SC and south] ..... ***C. scoparium***

Cynanchum laeve (Michaux) Persoon, Sandvine, Honeyvine, Bluevine. Cp (FL, GA, NC, SC), Pd (SC, VA), Mt (GA, VA): bottomlands and disturbed areas; uncommon (rare in FL). July-August; October. Widespread (but rather scattered and irregular) in e. North America, from se. PA and KS south to sw. GA, Panhandle FL, and c. TX. [= RAB, GW, K, W; = *Ampelamus laevis* (Michaux) Krings – WH, Z; = *Ampelamus albidus* (Nuttall) Britton – C, F, G; = *Gonolobus laevis* Michaux – S]

Cynanchum scoparium Nuttall, Leafless Swallow-wort. Cp (FL, GA, SC): coastal hammocks; rare (SC Rare). Se. SC south to s. FL, west to s. MS. Liede (1997b) indicates that this species will likely be transferred to *Orthosia* Decaisne in de Candolle, a large group primarily of the Caribbean, Central America and n. South America, but she refrains from the new combination pending further studies. [= RAB, K; = *Amphistelma scoparia* (Nuttall) Small – S; ***Orthosia sp.***]

* *Cynanchum louiseae* J.T.Kartesz & Gandhi, Black Swallow-wort. Reported for many states in ne. United States, south to MD, KY, TN. Native of Europe. [= K; = *Vincetoxicum nigrum* (Linnaeus) Moench – C; = *Cynanchum nigrum* (Linnaeus) Persoon – F] {not yet keyed}

Gonolobus Michaux 1803 (Anglepod)

A genus of about 100 species, vines, primarily tropical. Liede (1997a), Lipow & Wyatt (1998), and others recognize *Gonolobus* as separate from *Matelea*. References: Krings (in prep.)=U; Rosatti (1989)=Z; Lipow & Wyatt (1998)=Y; Drapalik (1969)=X; Krings & Xiang (2005)=V; Reveal & Barrie (1992); Krings & Xiang (2004).

1 Upper surface of corolla lobes uniformly colored, olive green on anthesis, glabrous; laminar dorsal anther appendage yellow, apex rounded or truncate; [of c. KY, e. TN, nw. AL westward] ..... ***[G. suberosus var. granulatus]***
1 Upper surface of corolla lobes multi-colored, generally dark maroon to brownish near the base and green to yellowish near the tips on anthesis (or uniformly yellowish-green to neon green in rare mutants), pubescent or glabrous; laminar dorsal anther appendage darkly purplish or maroonish tinted, apex bilobed to emarginate; [of se. VA south to c. peninsular FL, west to s. MS and inland to nw. GA] ..... ***G. suberosus var. suberosus***

Gonolobus suberosus (Linnaeus) R. Brown ***var. suberosus***, Eastern Anglepod. Cp, Pd (GA, NC, SC, VA), Mt (GA, NC): mesic to wet forests and thickets; uncommon. June-August; September-November. Se. VA south to s. peninsular FL, west to s. MS, inland to nw. GA and c. KY. Rosatti (1989) and Drapalik (1969) have expressed considerable doubt about whether two species should be recognized; their view, supporting the recognition of a single species in our area, is followed here for now. However, studies by Krings & Xiang (2004, 2005) suggest that 2 entities can be circumscribed at the varietal level. Drapalik (1969) considered the basionym "*suberosa*" as not applicable to *Matelea* of North America; Reveal & Barrie (1992) lectotypified the name, resulting in it applying to our material. It has priority over "*gonocarpus*." [= U, V; > *Matelea gonocarpa* (Walter) Shinners – RAB, C, W; > *Matelea suberosa* (Linnaeus) Shinners – RAB, C, W; > *Gonolobus gonocarpus* (Walter) Perry – F, G; > *Gonolobus suberosus* (Linnaeus) R. Brown – F, Y; < *Matelea gonocarpos* (Walter) Shinners – K; < *Vincetoxicum gonocarpos* Walter – S; > *Vincetoxicum suberosum* (Linnaeus) Britton – S; = *Matelea gonocarpa* – X; = *Gonolobus gonocarpus* – Z]

Gonolobus suberosus (Linnaeus) R. Brown var. *granulatus* (Scheele) Krings & Q.-Y. Xiang, Western Anglepod. C. KY, e. TN, nw. AL, and MS west to c. OK and c. TX. [= U, V; > *Gonolobus suberosus* (Linnaeus) R. Brown – Y; < *Matelea gonocarpos* (Walter) Shinners – K; >< *Vincetoxicum gonocarpos* Walter – S; >< *Vincetoxicum suberosum* (Linnaeus) Britton – S; >< *Matelea gonocarpa* – X; >< *Gonolobus gonocarpus* – Z]

Matelea Aublet 1775 (Spinypod)

A genus of about 180 species, vines, primarily tropical and restricted to the New World. References: Drapalik (1969)=Z.

1 Plant a prostrate herb, usually not twining, with stems 0.2-0.6 (-1.1 m) long at maturity; leaf blades 2-4 (-6) cm long; cymes sessile; flowers (2-) 3-4 (-5) per inflorescence; upper (inner) surface of the petals pubescent; [of xeric sandhills, from e. GA southward] ..... ***M. pubiflora***
1 Plant a twining herbaceous vine, with stems 1-2 m long at maturity; leaf blades 7-27 cm long; cymes borne on peduncles; flowers (2-) 9-19 (-53) per inflorescence, except *M. alabamensis*, with (1-) 4-5) (-12) flowers per inflorescence; upper (inner) surface of the petals glabrous; [of various habitats, but more mesic, collectively widespread in our area].
  2 Inflorescence with 1-12 flowers, averaging 4-5; corolla light green, reticulated with darker green; corona disc-shaped, lacking 5 pairs of appendages; [of mesic slopes of s. GA southward and westward] ..... ***M. alabamensis***
  2 Inflorescence with 2-53 flowers, averaging 9-19; corolla white, yellow, rose, or maroon (or greenish and reticulate in *M. flavidula*); corona cup-shaped, with 5 pairs of upright appendages alternating with 5 corona lobes; [collectively widespread].
    3 Corolla lobes in a horizontal plane or slightly reflexed; flower buds ovoid, < 1.5× as long as wide; corolla lobes 1.5-2.6× as long as wide.
      4 Corolla dark maroon (rarely maroon-yellow or yellow), not reticulate with darker veins; paired corona appendages always higher than the alternating corona lobes ..... ***M. carolinensis***
      4 Corolla green, green-yellow, or yellow (rarely rosy or olive-maroon), reticulate with darker green veins; paired corona appendages about as high as the alternating corona lobes ..... ***M. flavidula***
    3 Corolla lobes ascending; flower buds conical, > 2× as long as wide; corolla lobes 2.4-6.2× as long as wide.
      5 Corolla white (or fading or drying cream); corona 2.2-2.7 mm in diameter, cream or creamy-yellow; [of sw. GA westward] ..... ***M. baldwyniana***
      5 Corolla rose or maroon (rarely cream); corona 2.6-4.0 mm in diameter, rose to dark maroon (rarely green, cream, or orange); [primarily of the Mountains and Piedmont].
        6 Corolla lobes 2.4-3.6 (-4.0)× as long as wide, the widest part above the sinus; corolla dark maroon ..... ***M. decipiens***
        6 Corolla lobes (3.2-) 4.0-6.2× as long as wide, the widest part at the sinus; corolla rose to light maroon (rarely dark maroon, green, or cream) ..... ***M. obliqua***

Matelea alabamensis (Vail) Woodson, Alabama Milkvine, Alabama Spinypod. Cp (GA): open forests on river bluffs, mesic margins of sandridges; rare (GA Threatened). April-June. Sw. and apparently se. GA, Panhandle FL, and s. AL. [= K, Z; *Cyclodon alabamense* (Vail) Small – S]

Matelea baldwyniana (Sweet) Woodson, White Spinypod. Cp (GA): dry to mesic bluffs over calcareous rocks; rare? Panhandle FL and sw. GA west to MO, AR, and OK. Drapalik (1969) discusses the probability that the name *M. baldwyniana* is based on material of *M. flavidula*. [= K, Z; = *Odontostephana baldwiniana* (Sweet) Alexander – S]

Matelea carolinensis (Jacquin) Woodson, Carolina Spinypod. Pd, Cp (GA, NC, VA), Mt (GA, VA): moist to dry, nutrient-rich forests; common (uncommon in VA Piedmont, rare in VA Mountains). April-June; July-October. DE, MD, KY, and s. MO south to GA and MS. [= RAB, C, K, W; = *Gonolobus carolinensis* (Jacquin) R. Brown ex J.A. Schultes – F, G; = *Odontostephana carolinensis* (Jacquin) Alexander – S]

Matelea decipiens (Alexander) Woodson, Deceptive Spinypod. Pd (GA, NC, VA), Cp (NC): woodlands and thickets, generally over mafic (in the Piedmont) or calcareous rocks (in the Coastal Plain); rare (NC Rare, VA Rare). April-June; August-October. VA south to nc. GA, AL, and e. TX, north in the interior to s. IL and MO. [= RAB, C, K; = *Gonolobus decipiens* (Alexander) Perry – F, G; = *Odontostephana decipiens* Alexander – S]

Matelea flavidula (Chapman) Woodson, Yellow Spinypod. Cp (GA, SC), Pd? (NC?): moist, nutrient-rich forests; rare (NC Watch List). May-June; August-October. E. NC (?) and e. SC south to panhandle FL, apparently rare throughout its range. [= RAB, K; = *Odontostephana flavidula* (Chapman) Alexander – S]

Matelea obliqua (Jacquin) Woodson, Northern Spinypod, Limerock Milkvine. Mt (GA, NC, VA), Pd (VA): in forests, woodlands, or thickets over calcareous rocks; uncommon (GA Special Concern, NC Watch List). June; August-November. PA west to OH, IN, and MO, south to w. NC, nw. GA (Jones & Coile 1988), and TN. [= RAB, C, K, W; = *Gonolobus obliquus* (Jacquin) R. Brown ex J.A. Schultes – G; > *G. obliquus* – F; > *G. shortii* A. Gray – F; > *Odontostephana obliqua* (Jacquin) Alexander – S; > *O. shortii* (A. Gray) Alexander – S]

Matelea pubiflora (Dcne.) Woodson, Trailing Milkvine. Cp (GA): sand ridges, sandhills; rare (GA Rare). Late May-early August; mid-June-late September. E. GA (Jones & Coile 1988) south to ne. FL (Wunderlin 1998). [= K, Z; = *Edisonia pubiflora* (Dcne.) Small – S]

Nerium Linnaeus 1753 (Oleander)

A monotypic genus, a shrub, of Mediterranean Europe.

* ***Nerium oleander*** Linnaeus, Oleander. Cp (GA, NC, SC): frequently cultivated, especially on barrier islands (because of its salt resistance), sometimes persistent; rare, native of Mediterranean Europe. [= K, S]

Periploca Linnaeus 1753 (Silkvine)

* *Periploca graeca* Linnaeus, Silkvine, is sometimes cultivated and escaped or persistent; it is reported for various states in e. North America, as in Knox County, TN (Chester, Wofford, & Kral 1997). July-August. [= RAB, C, K]

Seutera Reichenbach 1828 (Swallow-wort)

A genus of 2-3 species (as newly circumscribed by Fishbein & Stevens), of tropical and subtropical se. United States, West Indies, and Baja California. Liede & Meve (2003) follow a broader circumscription, including *Seutera* in *Funastrum*, but Fishbein & Stevens (2005) argue that *Seutera* is discordant as a component of *Funastrum*. References: Fishbein & Stevens (2005)=Y; Liede & Meve (2003)=Z; Liede & Meve (1997).

Seutera angustifolia (Persoon) Fishbein & W.D. Stevens, Swallow-wort. Cp (GA, NC, SC): coastal hammocks, edges of marshes, generally or always on barrier islands; uncommon. June-July; July-October. E. NC (Dare County) south to s. FL, west to TX; Bahamas and West Indies. See Krings (2005) for a discussion of typification. [= Y; = *Cynanchum angustifolium* Persoon – GW, K; = *C. palustre* (Pursh) Heller – RAB; = *Lyonia palustris* (Pursh) Small – S; = *Funastrum angustifolium* (Persoon) Liede & Meve – Z]

Trachelospermum Lemaire 1851 (Climbing Dogbane)

A genus of about 20 species, vines, of se. Asia (India to Japan), except the single species of se. United States.

Identification notes: Sometimes mistaken at a glance for *Gelsemium* (both woody vines with opposite lanceolate leaves), but in the field the milky sap of *Trachelospermum* provides an immediate identifying characteristic.

Trachelospermum difforme (Walter) A. Gray, Climbing Dogbane. Cp, Pd (GA, NC, SC, VA): bottomlands, swamp forests, marshes; common (uncommon in VA Piedmont). May-July; July-September. DE south to n. FL, west to e. TX, north in the interior to MO and IN. See Krings (2003) for a discussion of nomenclature. [= RAB, C, F, G, GW, K, S]

Vinca Linnaeus 1753 (Vinca, Periwinkle)

A genus of 7 species of Europe, n. Africa, and c. Asia.

APOCYNACEAE

1 Leaves ovate, broadest near the base, cordate or subcordate-rounded at the base, 2-4 cm wide, thin in texture and deciduous to semi-evergreen; leaf margins ciliate; flowers 3-5 cm across ..... ***V. major***
1 Leaves lanceolate or elliptic, broadest near the middle, rounded to cuneate at the base, 1-1.5 cm wide, thick in texture and evergreen; leaf margins not ciliate; flowers 2-3 cm across ..... ***V. minor***

* ***Vinca major*** Linnaeus, Greater Periwinkle. Cp, Pd, Mt (GA, NC, SC, VA): disturbed areas, suburban woodlands, around old house sites, persistent and spreading from cultivation; uncommon, native of Europe. Late February-May; June-July. [= RAB, C, F, G, K, S, W]

* ***Vinca minor*** Linnaeus, Common Periwinkle. Pd, Cp, Mt (GA, NC, SC, VA): disturbed areas, around old house sites and especially old cemeteries, persistent and spreading from cultivation; common, native of Europe. April-May; June-July. [= RAB, C, F, G, K, S, W]

AQUIFOLIACEAE Bartling 1830 (Holly Family)

A monogeneric family of about 500 species, nearly cosmopolitan.

Ilex Linnaeus 1753 (Holly, Winterberry, Gallberry)

A genus of 400-500 species, mostly trees and shrubs, cosmopolitan and widespread in tropical and temperate areas, especially Asia and America. The genus *Nemopanthus* is clearly best subsumed into *Ilex*. References: Godfrey (1988)=Y; Krakow (1989)=Z; Powell et al. (2000)=X; Wunderlin & Poppleton (1977).

Identification notes: Some of our species can be superficially similar to various shrubs and trees of the Rosaceae, in their alternate toothed leaves borne on spur shoots.

1 Leaves coriaceous, evergreen.
  2 Leaves with well-developed apical (and usually also) marginal spines 2-6 mm long.
    3 Flowers in 1-few-flowered axillary cymes, on growth of the same year; [native trees of a wide variety of habitats]
      4 Leaves dark green above, 1.5-5.0 cm long, 1.0-2.5 cm wide; [of FL] ..... ***I. opaca var. arenicola***
      4 Leaves somewhat yellowish green above, 3-12 cm long, 2.0-5.5 cm wide; [widespread in our area] ..... ***I. opaca var. opaca***
    3 Flowers in axillary clusters, on branches of the previous year; [alien shrub, rarely naturalized, especially in suburban areas] ..... ***I. cornuta***
  2 Leaves with margins either entire, crenate, serrate, or with marginal spinose prickles < 1 mm long (the apex sometimes mucronate, but not stiff and spinose).
    5 Leaves crenate from base to apex, 0.5-4.5 cm long; calyx and corolla 4-lobed.
      6 Fruits black; [alien shrub, rarely naturalized, especially in suburban areas] ..... ***I. crenata***
      6 Fruits red or yellow; [native shrub of the Coastal Plain, sometimes planted and naturalized elsewhere] ..... ***I. vomitoria***
    5 Leaves entire, crenate (if so, only beyond the midpoint), serrate, or with marginal spinose prickles, 2-10 cm long; calyx and corolla 4-lobed or 5-9-lobed; fruits red, yellow, or black.
      7 Fruits black; calyx and corolla 5-9-lobed; leaves crenate near the tip or with a few marginal spinose prickles, or entire, with dark punctate dots beneath.
        8 Leaves 1.5-3× as long as wide, with a few, irregularly spaced, marginal spinose prickles (or commonly entire), generally about 2-3 cm wide ..... ***I. coriacea***
        8 Leaves 3-4× as long as wide, crenate in the apical 1/2 to 1/3 (or rarely entire), generally about 1 cm wide (almost never > 2 cm wide) ..... ***I. glabra***
      7 Fruits red or yellow; calyx and corolla 4-lobed; leaves entire (or with spinose serrations), lacking dark punctate dots beneath.
        9 Leaves oblanceolate, oblong, or elliptic, 3-12 cm long, (8-) 15-40 mm wide, 2-4× as long as wide; petioles (3-) 5-15 mm long; leaf apex acute, obtuse, or rounded; branchlets strongly ascending, most of them forming an angle of < 45 degrees to the branch ..... ***I. cassine var. cassine***
        9 Leaves lanceolate to narrowly oblong, 2-4 cm long, 3-8 mm wide, 3-7× as long as wide; petioles 1-3 (-5) mm long; leaf apex acute to acuminate; branchlets ascending to spreading, most of them forming angles greater than 45 degrees to the branch, and often at right angles ..... ***I. myrtifolia***
1 Leaves membranous, deciduous.
  10 Leaves entire, or nearly so; [of moist to wet sites, from WV northward] ..... ***I. mucronata***
  10 Leaves toothed; [collectively widespread in our area].
    11 Leaves oblanceolate or obovate, broadest above the middle, 8-30 (-45) mm wide, narrowly cuneate basally, mostly 2-3× as long as wide.
      12 Pedicels of fruits and pistillate flowers 2-6 mm long; pedicels of staminate flowers (2-) 4-8 (-16) mm long; leaves mostly gray green, often revolute, especially toward the base; pubescence of the lower leaf surface tomentose, primarily on or near the midrib; leaf margins rarely ciliate.
        13 Leaves 2-4.8 cm long, 0.6-1.5 cm wide; fruits 4-5 mm in diameter; sepals usually ciliate; [plant apparently endemic to the Suwanee River drainage of sc. GA and e. panhandle FL] ..... ***I. decidua var. curtissii***
        13 Leaves 4.5-8.5 (-10) cm long, 1.5-3 cm wide; fruits (4-) 5-8 (-9) mm in diameter; sepals not ciliate; [plant widespread in our area, in the Coastal Plain, Piedmont, and rarely Mountains of our area] ..... ***I. decidua var. decidua***
      12 Pedicels of fruits and pistillate flowers (5.5-) 10-30 mm long; pedicels of staminate flowers (10-) 15-25 mm long; leaves rarely revolute; pubescence of the lower leaf surface strigose, distributed on the surface; leaf margins often ciliate.
        14 Upper leaf surface with trichomes throughout; sepals ciliate; leaf blades entire to shallowly crenate ..... ***I. cuthbertii***
        14 Upper leaf surface glabrous, or with trichomes confined to the veins or their vicinity; sepals eciliate; leaf blades crenate to distinctly serrate ..... ***I. longipes***

11 Leaves elliptic or ovate, broadest near the middle, (10-) 20-55 mm wide, rounded to broadly cuneate basally, mostly 1-2.5× as long as wide.
15 Veins on undersurface of leaf blades reticulate, defining areoles; fruit surface dull; fruiting pedicels 6-14 mm long (averaging about 10 mm); [of blackwater floodplains and clay-based Carolina bays of the Coastal Plain] ..... ***I. amelanchier***
15 Veins on undersurface of leaf blades obscure, not defining areoles; fruit surface shiny; fruiting pedicels either (8-) 10-30 mm long or 2-9 mm long (averaging either < 6 mm or > 15 mm long); [collectively of various habitats, widespread in our area].
16 Fruiting pedicels (8-) 10-30 mm long; fruit (7-) 8-12 mm in diameter, bright cherry-red; [of bogs and very moist forests of the Mountains] ..... ***I. collina***
16 Fruiting pedicels 2-9 mm long; fruit 5-9 (-12) mm in diameter, red to orange; [collectively of various habitats, widespread in our area].
17 Nutlets (5-) 6-8 per fruit, smooth on the back; staminate flower clusters on peduncles 2-6 mm long; pistillate flowers with entire corolla lobes; flowers mostly in axils of leaves on normal shoots.
18 Sepals glabrous (in flower or fruit), acute ..... ***I. laevigata***
18 Sepals ciliate (in flower or fruit), obtuse ..... ***I. verticillata***
17 Nutlets 4-5 per fruit, with striate ridges on the curved back; staminate flower clusters sessile or very short-peduncled (0-2 mm long); pistillate flowers with ciliate corolla lobes; flowers mostly in axils of leaves on lateral short-shoots.
19 Leaves 2-9 (-10.5) cm long, elliptic to broadly ovate, often nearly round, the apex abruptly to gradually acuminate, the marginal teeth usually inconspicuous; petioles of mature leaves usually < 1 cm long; fruits 5-9 mm in diameter; plant a shrub to 6 m tall; [of the Coastal Plain, Piedmont, and Mountains] ..... ***I. ambigua***
19 Leaves 6-16 cm long (the largest, at least, > 8 cm long), narrowly to broadly ovate, the apex long acuminate to attenuate, the marginal teeth rather coarse; petioles of mature leaves usually > 1 cm long; fruits 9-12 mm in diameter; plant shrub or small tree to 10 m tall; [of the Mountains and upper Piedmont] ..... ***I. montana***

Auxiliary Key to Deciduous *Ilex* of Moist to Wet Habitats of the Mountains

[Note: trichotomous lead]
1 Fruits bright cherry-red, broader than long, (7-) 8-12 mm in diameter, borne on stalks 9-20 mm long, primarily in the axils of leaves on spur shoots; bark of 2-3 year old twigs usually light tan; calyx (persistent on fruit) 4 (-5) lobed; nutlets 4 (-5) per fruit, with bony white longitudinal striations on the back, the furrows between the striations very shallow if developed at all; petiole with a deeply U- to V-shaped channel on its upper side (made by the decurrent leaf edges), with dark ascending trichomes in the channel; leaves variable, but mostly 3-6 cm wide and about 1.5× as long as wide, usually abruptly short-acuminate; [plant of bogs, seepages, streambanks, and (rarely) moist forests, mostly at high elevations] ..... ***I. collina***
1 Fruits duller red, longer than broad, 5-8 mm in diameter, borne on stalks 1-6 mm long, primarily in the axils of leaves on spur shoots; bark of 2-3 year old twigs usually brown, gray, or purplish; calyx (persistent on fruit) 4-6 lobed; nutlets 4-6 per fruit, with longitudinal ridges, the furrows between the ridges about as deep as the distance between the ridges; petiole with U-shaped channel on its upper side, with white appressed trichomes in the channel; leaves variable, but mostly 3-7 cm wide and about 2× as long, usually long-acuminate; [plant of moist forests and (rarely) bog edges] ..... ***I. montana***
1 Fruits duller red, longer than broad, 5-7 mm in diameter, borne on stalks 1-6 mm long, primarily in the axils of leaves on normal shoots with elongate internodes; bark of 2-3 year old twigs usually brown, gray, or purplish; calyx (persistent on fruit) (4-) 5-6 lobed; nutlets (4-) 5-6 per fruit, smooth and unmarked on the back; petiole nearly terete in cross-section (or very shallowly channeled on the upper surface); leaves variable, but mostly 2-3.5 (-5) cm wide and about 2× as long, usually merely acute; [plant of bogs and other wetlands] ..... ***I. verticillata***

Ilex ambigua (Michaux) Torrey, Carolina Holly. Cp (FL, GA, NC, SC), Pd, Mt (GA, NC, SC): sandy upland forests, dry slope forests, rarely in pocosin ecotones in the fall-line sandhills region; common. April-June; August-September. Ne. NC, se. TN, n. AR, and se. OK south to c. peninsular FL, s. MS, and se. TX; disjunct in the Sierra Madre Oriental and Chiapas, Mexico. The various taxa that have been distinguished in this complex may have some merit, though a detailed study by Krakow (1989) did not show a clear basis for their recognition. *I. buswellii* Small, strictly of xeric habitats of the Coastal Plain from se. NC southward, has the larger leaves 2-3.5 (-4) cm long and 0.7-1.7 (-2.5) cm wide. *I. ambigua* (*sensu stricto*) is distributed in the Coastal Plain, Piedmont and low Mountains, and has leaves 3-9 (-10.5) cm long and 1.7-6 cm wide. *I. beadlei* of the low Mountains and Piedmont has leaves 7-9 (-10.5) cm long and 2-6 cm wide. [= K, Z; = *I. ambigua* var. *ambigua* – RAB, W, Y; > *I. montana* var. *mollis* (A. Gray) Britton – C, F; > *I. montana* var. *beadlei* (W.W. Ashe) Fernald – G; > *I. ambigua* – S; > *I. beadlei* W.W. Ashe – S; > *I. buswellii* Small – S; > *I. ambigua* (Michaux) Torrey var. *monticola* (A. Gray) Wunderlin & Poppleton – Y, misapplied; > *I. beadlei* var. *laevis* W.W. Ashe; > *I. caroliniana* Trelease ex Small; > *I. mollis* A. Gray]

Ilex amelanchier M.A.Curtis ex Chapman, Sarvis Holly. Cp (FL, GA, NC, SC): banks of blackwater creeks and rivers, clay-based Carolina bays; rare. April-May; October-November. A Southeastern Coastal Plain endemic: se. NC south to the FL Panhandle and west to se. LA (reports from se. VA appear to be based on confusion of material). The fruits are sometimes persistent until the following spring; the species is perhaps most conspicuous in the winter, when the dull red fruits can be easily seen. [= RAB, C, F, G, GW, K, S, Y, Z]

Ilex cassine Linnaeus *var. cassine*, Dahoon, Cassena. Cp (GA, NC, SC): blackwater stream swamps, pocosins, nearly always in very acid peaty or sandy sites; common (rare north of GA). May-June; October-November. Primarily a Southeastern Coastal Plain endemic: se. NC south to s. FL and west to se. TX; also in Cuba and Mexico. *I. cassine* var. *cassine* is variable in leaf shape, sometimes approaching *I. myrtifolia*. Some populations in our area show intergradation with or poor differentiation from *I. myrtifolia*, lending some credibility to their treatment as varieties. Var. *latifolia* Aiton occurs in FL. [= K; < *I. cassine* var. *cassine* – RAB; < *I. cassine* – GW, S, Y]

Ilex collina Alexander, Long-stalked Holly. Mt (NC, VA): in peats of bogs and seepages, on banks of cold, high elevation streams (less commonly on moist, rocky slopes in northern hardwood forests or mixed spruce-hardwood forests) at moderate to high elevations (1100-1800m); rare. May-June; (August-) September-October. A Southern Appalachian endemic: e. and c. WV, sw. VA, w. NC, and e. TN (Sevier County) (Boetsch & Nielsen 2003). The affinities of this species are with *Ilex montana* and *I. verticillata*, not with *Ilex* (*Nemopanthus*) *mucronata* (Baas 1984). See Clark (1974) and Boetsch & Nielsen (2003) for additional

information about this species. *I. collina* often occurs with or in close proximity to the similar *I. montana* and *I. verticillata*; the long fruiting pedicels will separate fruiting plants readily. [= K; = *Nemopanthus collinus* (Alexander) R.C. Clark – C, W; < *I. longipes* – F, G]

Ilex coriacea (Pursh) Chapman, Big Gallberry, Sweet Gallberry. Cp (FL, GA, NC, SC, VA), Pd (GA): pocosins, more restricted to wet, peaty sites than *I. glabra*; common (rare in VA). April-May; September-October. A Southeastern Coastal Plain endemic: se. VA south to c. peninsular FL and west to e. TX. [= RAB, C, F, G, GW, K, S, Y]

* ***Ilex cornuta*** Lindley, Chinese Holly, Burford Holly. Pd (NC, VA): escaped into forests in suburban areas; rare, native of China. Escaped from suburban plantings in AL, NC, and KY (Clark et al. 2005). [= K]

* ***Ilex crenata*** Thunberg, Japanese Holly. Mt (NC), Pd (NC, VA): planted as a landscaping shrub, rarely escaped into forests in suburban areas; rare, native of Japan. First reported for NC by Pittillo & Brown (1988). [= K]

Ilex cuthbertii Small, Cuthbert Holly. Cp, Pd (GA, SC): upland circumneutral woodlands and forests; rare. Endemic to an area along the Fall Line in SC and adjacent GA (Krakow 1989). Perhaps best treated as a variety of *I. longipes*, but the combination has not yet been made. [= K; >< *I. cuthbertii* – S (as to type, not as to range); = *I. longipes* var. *cuthbertii* (Small) G.A. Krakow, in prep. – Z]

Ilex decidua Walter *var.* ***curtissii*** Fernald, Suwanee Possum-haw, Curtiss's Holly. Cp (FL, GA): floodplains and moist forests in the Suwanee River drainage; rare. Mid-March-mid-April; September-October. Apparently endemic to the Suwannee River drainage of s. GA and n. FL. [= Z; < *I. decidua* – GW, K, Y; = *I. curtissii* (Fernald) Small – S]

Ilex decidua Walter *var.* ***decidua***, Possum-haw. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): floodplain forests, less commonly on mesic (or even dry), upland slopes; common. March-May; September-October. MD south to panhandle FL, west to TX on the Coastal Plain, extending also to adjacent provinces (the Piedmont and rarely Mountains in our area), and extending north in the interior to c. TN, w. KY, s. IL, c. MO, se. KS, and e. OK; also disjunct (as a variety) in the Sierra Madre Oriental of e. Mexico. The Mexican material was recognized by Krakow (1989) at the varietal level, but has not been formally named; it is known from a single collection from Nuevo Leon, Mexico. [= Z; < *I. decidua* var. *decidua* – RAB; < *I. decidua* – C, F, G, GW, K; > *I. decidua* var. *decidua* – Y (also including *I. cuthbertii*)]

Ilex glabra (Linnaeus) A. Gray, Little Gallberry, Inkberry. Cp (FL, GA, NC, SC, VA), Pd (GA, NC): savannas, pine flatwoods, pocosin margins, swamps, primarily in wetlands, but extending upslope even into sandhills; common (rare in lower Piedmont). May-June; September-November. Nova Scotia and ME south to FL, west to TX. [= RAB, C, F, G, GW, K, S, Y]

Ilex laevigata (Pursh) A. Gray, Smooth Winterberry. Cp (NC, SC, VA): pocosins, other wet, acidic sites, such as in small blackwater stream swamps; uncommon. April-May; September-October. ME and NY south to SC, mostly near the coast. [= RAB, C, F, G, GW, K, S]

Ilex longipes Chapman ex Trelease, Georgia Holly, Chapman's Holly. Pd (GA, NC, SC), Cp (FL, GA), Mt (GA): upland forests; uncommon (rare in NC and SC). April-May; September-October. Sc. NC, sc. TN (Chester, Wofford, & Kral 1997), and wc. AR south to panhandle FL, s. MS, and se. TX. [= GW, K, S; = *I. decidua* var. *longipes* (Chapman ex Trelease) Ahles – RAB, Y; < *I. longipes* – F, G (apparently also including *I. collina*); = *I. longipes* var. *longipes* – Z]

Ilex montana Torrey & A. Gray ex A. Gray, Mountain Holly. Mt (GA, NC, SC, VA), Pd (NC, VA): mesic forests, rarely bogs or bog edges; common (uncommon in upper Piedmont). April-June; August-September. W. MA and w. NY south to n. GA and n. AL, essentially an Appalachian endemic. The range of this species is sometimes stated or shown as broader, extending into the Coastal Plain in our area, and as far south as n. FL, LA, and e. TX, but these reports are based on misidentifications, primarily of the "*beadlei*" component of *I. ambigua*. [= K, Z; = *I. ambigua* var. *montana* (Torrey & A. Gray ex A. Gray) Ahles – RAB; = *I. montana* var. *montana* – C, F, G; = *I. monticola* A. Gray – S; = *I. ambigua* var. *monticola* (A. Gray) Wunderlin & Poppleton – W]

Ilex mucronata (Linnaeus) M. Powell, V. Savolainen, & S. Andrews, Nemopanthus. Mt (WV): bogs and moist, high-elevation forests; rare. Newfoundland west to Ontario and MN, south to MD, WV, OH, IN, and IL (and allegedly in VA, according to Fernald 1950). It can be separated vegetatively from other hollies in the mountain regions of w. VA (*I. montana*, *I. collina*, *I. opaca*, and *I. verticillata*) by its smaller, narrower, entire (or nearly so) leaves, 2-5 (-6) cm long, 1-2.5 cm wide. Doubts as to the distinctiveness of *Nemopanthus* from *Ilex* have now been unequivocally answered (Powell et al. 2000; Manen, Boulter, & Naciri-Graven 2002). [= X; = *Nemopanthus mucronatus* (Linnaeus) Trelease – C, F, G, K]

Ilex myrtifolia Walter, Myrtle Holly. Cp (FL, GA, NC, SC): limesink (doline) ponds, wet savannas; common (uncommon north of FL). May-June; October-November. A Southeastern Coastal Plain endemic: se. NC south to n. peninsular FL and west to e. LA. See *I. cassine* for comments about these two taxa. [= GW, K, S, Y; = *I. cassine* var. *myrtifolia* (Walter) Sargent – RAB]

Ilex opaca Aiton *var.* ***arenicola*** (Ashe) Ashe, Scrub Holly. Cp (FL): scrub; rare. Baker and Clay counties (ne. FL) south to c. peninsular FL. [= K; = *I. cumulicola* Small – S; = *I. arenicola* Ashe]

Ilex opaca Aiton var. ***opaca***, American Holly, Christmas Holly. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): in a wide variety of forests, ranging from xeric to wetland; common. April-June; September-October. MA (? Nova Scotia and ME), IL, MO, and OK south to s. peninsular FL and TX. This is our only species that becomes a medium to large tree. Var. *arenicola* (Ashe) Ashe is endemic to xeric sands of sand pine scrub in c. peninsular FL. [= GW, K, Y; < *I. opaca* – RAB, C, F, G, W; = *I. opaca* – S]

Ilex verticillata (Linnaeus) A. Gray, Winterberry. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): bogs, pocosins, swampy forests; common. April-May; September-November. Newfoundland west to MN, south to FL and TX. [= RAB, GW, K, S, W, Y; > *I. verticillata* var. *padifolia* (Willdenow) Torrey & A. Gray ex S. Watson – C, F, G; > *I. verticillata* var. *verticillata* – C, F, G]

Ilex vomitoria Aiton, Yaupon. Cp (FL, GA, NC, SC, VA), Pd (GA, *NC): maritime forests, other dry sandy forests; common in the Coastal Plain (restricted to the outer Coastal Plain northwards), uncommon in VA, rare elsewhere, where probably introduced (rare in VA, rare in Piedmont). March-May; October-November. Widespread in the Southeastern United States, primarily on the Coastal Plain, from e. VA (from Northampton County south) south to c. peninsular FL and west to se.

TX. *I. vomitoria* from the Deep South often has much smaller leaves than plants in our area. In NC and VA, yaupon is nearly restricted to maritime habitats, on the barrier islands and in a narrow band on the mainland, in forests with substantial maritime influence. *I. vomitoria* is increasingly popular as an ornamental shrub, and is persistent or establishing in suburban woodlands. [= RAB, C, F, G, GW, K, S, Y]

ARALIACEAE A.L. de Jussieu 1789 (Ginseng Family)

A family of about 47 genera and 1325 species, trees, shrubs, vines, and rarely herbs, mainly tropical in distribution. *Hydrocotyle* is more closely related to Araliaceae than to Apiaceae, and is transferred here (Chandler & Plunkett 2003). References: Frodin & Govaerts (2003); Graham (1966); Smith (1944).

1 Plant a woody vine; [tribe *Schefflereae*] ..... ***Hedera***
1 Plant an herb, shrub, or tree.
  2 Leaves simple, peltate or cordate, roundish (if lobed, with 3-5 rounded lobes), 0.3-10 cm wide; rhizomatous, creeping herbs.... ***Hydrocotyle***
  2 Leaves compound with 3-many leaflets (or simple and then with 5-7 pointed lobes in *Kalopanax*), > 10 cm wide; herbs, shrubs, or trees; [tribe *Aralieae*].
    3 Leaves simple, palmately lobed ..... ***[Kalopanax]***
    3 Leaves compound
      4 Leaves 2-3× compound, at least the final order of division pinnate; leaves either 1 from a subterranean stem or 2-many, alternate on an aboveground stem; inflorescence compound, consisting of (2-) 3-many umbels, either on a separate peduncle from the rhizome or in a terminal panicle or raceme; fruit purple or black ..... ***Aralia***
      4 Leaves 1× palmately compound, leaflets 3-7; leaves 3-5 in a whorl at the summit of the stem (*Panax*) or many, clustered on spur shoots (*Eleutherococcus*); inflorescence of a single, simple umbel borne terminally on the stem; fruit red to yellow (*Panax*) or black (*Eleutherococcus*).
        5 Plant a shrub, with prickles; fruit black ..... ***[Eleutherococcus]***
        5 Plant an herb, lacking prickles; fruit red or yellow ..... ***Panax***

Aralia Linnaeus (Aralia)

A genus of about 30-70 species, herbs, shrubs, vines, and trees, primarily of e. North America, e. Asia, and se. Asia. Wen (1998) has suggested that *A. nudicaulis* may need to be removed from the genus *Aralia* in order to maintain both *Aralia* and *Panax* as monophyletic genera. References: Smith (1982)=Z; Wen et al. (1998); Wen (1993); Wen (1998); Smith (1944)=Y; Frodin & Govaerts (2003)=X.

1 Plant a shrub or small tree, 3-6 (-10) m tall, definitely woody; stem armed throughout with prickles, those on the stem stout, broad-based, and distributed to the summit of the stem; leaves usually armed with prickles on the axes and the main veins; [section *Dimorphanthus*] ..... ***A. spinosa***
1 Plant an acaulescent herb or stout, suffruticose herb, not at all to somewhat woody at the base; stem unarmed (or in *A. hispida* bristly with thin prickles on the lower stem only); leaves unarmed.
  2 Plant an acaulescent herb, the solitary leaf and scapose inflorescence arising from a subterranean rhizome; inflorescence a raceme of (2-) 3 (-7) umbels; [section *Nanae*] ..... ***A. nudicaulis***
  2 Plant a caulescent herb, the leaves several and alternate, the inflorescence terminal on the leafy stem; inflorescence a raceme or panicle of (2-) 5-many umbels.
    3 Stem bristly toward its base; inflorescence a raceme or weak panicle of (2-).5-25 umbels; [section *Hispidae*] ..... ***A. hispida***
    3 Stem unarmed; inflorescence a compound panicle of 15-many umbels; [section *Aralia*] ..... ***A. racemosa***

Aralia hispida Ventenat, Bristly Sarsaparilla. Mt (NC?, VA): rocky woodlands, cliffs, and clearings, primarily over acidic rocks (such as quartzite, granite, and sandstone); rare (NC Watch List, VA Rare). June-August. Labrador and Newfoundland west to Manitoba, south to w. VA, w. NC (?), WV, OH, IN, IL, and MN. This species appears to be strongly dependent on disturbance, such as fire, appearing in great numbers following fire where previously rare or apparently absent. F and Y credit this species to w. NC; the documentation is not known to me, and the species was not treated by RAB. Doug Rayner (pers. com. 2002) reports a site record of it in Polk County, NC. [= C, F, G, K, S, W, X, Y, Z]

Aralia nudicaulis Linnaeus, Wild Sarsaparilla. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (VA): upland forests and woodlands, rocky places, most typically in rather dry places, such as ridgetop forests; common (uncommon in Piedmont, rare in Coastal Plain) (GA Special Concern). May-July. Labrador and Newfoundland west to British Columbia, south to e. VA, c. NC, ne. GA, w. TN, IL, MO, NE, CO, and ID. [= RAB, C, F, G, K, S, W, X, Y, Z]

Aralia racemosa Linnaeus, Spikenard, Hungry-root. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (VA): rich woodlands, trail margins and roadsides; uncommon (rare in Coastal Plain, locally common in Mountains of far sw. VA). June-August. New Brunswick and Québec west to MN and SD, south to NC, n. GA, AL, MS, MO, and e. KS. The related *A. bicrenata* Wooton & Standley (sometimes treated as a subspecies of *A. racemosa*) occurs in AZ, NM, TX, and n. Mexico. [= RAB, C, F, G, S, W, X, Y, Z; = *A. racemosa* ssp. *racemosa* – K]

Aralia spinosa Linnaeus, Devil's-walking-stick, Hercules's-club, Prickly-ash. Cp, Pd, Mt (GA, NC, SC, VA): disturbed pocosins and bottomlands, disturbed areas, moist to dry forests and woodlands; common. June-September. NJ west to s. IN, IL, and IA, south to FL and e. TX. Smith (1982) discusses the juvenile (prickly) and adult (unarmed) leaf phases of *A. spinosa*. [= RAB, C, F, G, GW, K, S, W, X, Y, Z]

Eleutherococcus Maximowicz (Fiveleaf Aralia)

A genus of about 38 species, shrubs, of e. Asia. References: Frodin & Govaerts (2003)=Z.

* *Eleutherococcus sieboldianus* (Makino) Koidz., Fiveleaf Aralia, native to e. Asia, is reported as introduced and apparently naturalized in Randolph County, WV, scattered locations in PA (Rhoads & Klein 1993), OH, and n. KY (Clark et al. 2005). [= Z; < *Eleutherococcus pentaphyllus* (Siebold & Zuccarini) Nakai – K, misapplied; = *Acanthopanax sieboldianus* Makino]

Hedera Linnaeus (Ivy)

A genus of 5-15 species, vines, distributed from Mediterranean Europe west to e. Asia. References: Graham (1966)=Y; Stace (1997)=Z; Staff of the Bailey Hortorium (1976)=X; Ackerfield & Wen (2002)=Q; Frodin & Govaerts (2003)=V.

Identification notes: The leaves of *Hedera* are dimorphic, sometimes confusing observers; "juvenile" leaves (those of the sterile branches) are about as wide as long and (in *H. helix*) palmately 3-5-lobed, those of the fertile branches (uncommonly seen and much less familiar) are obovate or elliptic.

1 Trichomes scale-like, 0.1-0.4 mm, those on the leaves, petioles, and young stems with rays fused basally for 1/4 to 1/2 their length; juvenile leaves orbicular, little or not at all lobed, the larger 15-25 cm wide ..... ***H. colchica***
1 Trichomes stellate, 0.5-1.0 mm, those on the leaves, petioles, and young stems with rays fused basally for < 1/8 their length; juvenile leaves slightly to deeply lobed, the larger 5-15 cm wide.
  2 Hairs of young stems, leaves, and petioles whitish, the rays erect (at a right angle to the leaf surface); juvenile leaves usually < 8 cm wide, usually dark green and often also marbled with white, often lobed > ½ the way to the base; [often strongly climbing] ..... ***H. helix var. helix***
  2 Hairs of young stems, leaves, and petioles yellowish-brown to rusty-brown, the rays not erect (parallel to the leaf surface); juvenile leaves often > 8 cm wide, usually medium green (rarely also marbled with white), usually lobed < ½ the way to the base; [usually not climbing] .. ***H. hibernica***

* ***Hedera colchica*** (K. Koch) K. Koch, Persian Ivy. Pd (NC), Cp (SC): persistent after cultivation, perhaps not naturalized; rare, native of the Caucasus. [= K, Q, V, X, Z]

* ***Hedera helix*** Linnaeus *var.* ***helix***, Common Ivy, English Ivy. Cp, Pd, Mt (GA, NC, SC, VA): persistent, established, and spreading around old home sites, in suburban woodlands and waste areas; uncommon, native of Europe. June-July. Var. *helix* is diploid, n = 24. Hundreds of cultivars, varying greatly in habit and leaf size, lobing, and marbling are grown; see for instance, Staff of the Bailey Hortorium (1976) for a partial listing and brief descriptions. [= X, Y; < *H. helix* – RAB, C, F, G, K, S, W; = *H. helix* ssp. *helix* – Q, V, Z]

* ***Hedera hibernica*** (G. Kirchner) Carrière, Atlantic Ivy, Irish Ivy. Pd (NC, SC): persistent, established , and spreading around old home sites, in suburban woodlands and waste areas; uncommon, native of Europe. June-July. Var. *hibernica* is tetraploid, n = 48. [= Q, V; = *H. helix* Linnaeus var. *hibernica* G. Kirchner – X, Y; < *H. helix* – RAB, C, F, G, K, S, W; = *H. helix* ssp. *hibernica* (G. Kirchner) D. McClint. – Z]

Hydrocotyle Linnaeus (Water-pennywort)

A genus of about 130 species, herbs, cosmopolitan (especially Australia). Molecular analyses have clarified that the affinities of *Hydrocotyle* lie with the Araliaceae rather than the Apiaceae (Downie et al. 1998; Chandler & Plunkett 2004). References: Mathiuas & Constance (1945)=MC.

1 Leaves not peltate, a sinus extending to the attachment of the petiole.
  2 Central leaf lobe notably more distinct than the other lobes (the sinuses on either side extending 1/3 to 3/4 of the way to the petiolar attachment); stems and petioles fleshy ..... ***H. ranunculoides***
  2 Central leaf lobe not more distinct than the other lobes (the sinuses on either side extending 1/10 to 1/4 the way to the petiolar attachment); stems and petioles filiform.
    3 Fruiting umbels on peduncles 1-3 mm long; leaves 10-50 mm wide; [native of bogs, spray cliffs, and other wetlands] ..... ***H. americana***
    3 Fruiting umbels on peduncles 9-24 mm long; leaves 5-30 mm wide; [alien of lawns and other disturbed habitats].
      4 Leaves 5-lobed, 15-30 mm wide ..... ***H. bowlesioides***
      4 Leaves 7-lobed, 5-13 mm wide ..... ***H. sibthorpioides***
1 Leaves peltate, lacking a sinus extending to the attachment of the petiole.
  5 Inflorescence umbellate; leaves 1-4 (-7) cm wide ..... ***H. umbellata***
  5 Inflorescence verticillate or umbellate-verticillate (when first developing sometimes appearing merely umbellate); leaves 1-15 cm wide.
    6 Inflorescence compound, the main inflorescence axis with nodes which produce verticels or umbels of pedicellate flowers, the inflorescence nodes also producing branches which themselves produce verticels or umbels of flowers; leaves (1-) 4-15 cm wide ..... ***H. bonariensis***
    6 Inflorescence verticillate, all the flowers borne sessile or on pedicels on the unbranched inflorescence axis; leaves 1-6 cm wide.
      7 Flowers and fruits pedicellate, the pedicels 1-10 mm long ..... ***H. prolifera***
      7 Flowers and fruits sessile or subsessile ..... ***H. verticillata***

Hydrocotyle americana Linnaeus, American Water-pennywort. Mt (NC, VA), Pd (VA): bogs, marshes, seepages, cliffs and ledges where wet by seepage or spray from waterfalls, sometimes roadside ditches; uncommon, rare south of VA (NC Watch

List, SC Rare). June-September. Widespread in ne. North America, south to w. NC, SC, e. and c. TN, and IN. [= RAB, C, G, GW, K, MC, S, W]

Hydrocotyle bonariensis Lamarck, Dune Water-pennywort. Cp (GA, NC, SC, VA): dunes and moist sandy areas; uncommon, rare in VA (VA Rare). April-September. Widespread in South and Central America, north in North America to the Southeastern Coastal Plain, VA to FL and TX. [= RAB, GW, K, MC, S]

* ***Hydrocotyle bowlesioides*** Mathias & Constance. Cp (GA): lawns; rare, native of Costa Rica and Panama (naturalized in South America, se. United States, and New Zealand). See Anderson (1983) for discussion of the species' occurrence in Thomasville, Thomas Co. GA. [= K, MC; = *H. sibthorpioides* Lamarck var. *oedipoda* O. Degener & Greenwood]

Hydrocotyle prolifera Kellogg. Cp (GA, NC, SC, VA): swamp forests, pools; uncommon. May-July. Widespread in North, Central, and South America. [= K; = *H. verticillata* Thunberg var. *triradiata* (A. Richard) Fernald – RAB, C, G, GW, MC; < *H. verticillata* var. *verticillata* – F, more broadly circumscribed; > *H. australis* Coulter & Rose – S; > *H. canbyi* Coulter & Rose – S]

Hydrocotyle ranunculoides Linnaeus f., Swamp Water-pennywort. Cp (GA, NC, SC, VA), Mt, Pd (VA): stagnant to (less commonly) swiftly flowing waters of swamps pools, backwaters, blackwater streams; common. April-July. Widespread in North, Central, and South America. [= RAB, C, F, G, GW, K, MC, S, W]

* ***Hydrocotyle sibthorpioides*** Lamarck, Lawn Water-pennywort. Pd, Cp (GA, NC, VA): lawns; rare, native of Asia and Africa. March-September. Apparently becoming more common as a lawn weed. [= RAB, C, F, G, K, MC]

Hydrocotyle umbellata Linnaeus, Marsh Water-pennywort. Cp, Pd (GA, NC, SC, VA): moist areas; common (rare in lower Piedmont only). April-September. Widespread in North, Central, and South America. [= RAB, C, F, G, GW, K, MC, S]

Hydrocotyle verticillata Thunberg. Cp (GA, NC, SC, VA), Pd (GA, SC): swamp forests, pools; uncommon. May-July. Widespread in North, Central, and South America. [= S; = *H. verticillata* var. *verticillata* – RAB, C, G, GW, K, MC; < *H. verticillata* var. *verticillata* – F, more broadly circumscribed]

Kalopanax Miquel 1863

A monotypic genus, a medium-sized trees, of e. Asia. References: Frodin & Govaerts (2003)=Z.

* *Kalopanax septemlobus* (Thunberg ex A. Murray) Koidzumi, Castor Aralia. Introduced in ne. United States, apparently naturalizing in s. MD and n. VA (Fort Belvoir, Fairfax County) (E. Wells, pers. comm., 2006). [= K; > *K. septemlobus* ssp. *lutchuensis* (Nakai) H. Ohashi – Z; > *K. septemlobus* ssp. *septemlobus* – Z; = *Kalopanax pictus* (Thunberg) Nakai]

Panax Linnaeus (Ginseng)

Panax is a genus of ca. 14 species, herbs, 12 of e. Asia and 2 of e. North America. Wen & Zimmer (1996) and Choi & Wen (2000) studied the phylogeny of *Panax* using molecular techniques. *P. trifolius* does not appear to be closely related to any of the other species, and is interpreted as a basal component of the genus. *P. quinquefolius* is most closely related to *P. ginseng* C.A. Meyer and *P. japonicus* C.A. Meyer. References: Smith (1944)=Z; Frodin & Govaerts (2003)=Y; Wen & Zimmer (1996); Choi & Wen (2000).

1 Leaflets (3-) 5, petiolulate, the petiolules (0.7-) 1-2.5 cm long; larger leaflets 6-15 cm long, 3.5-7 cm wide, mostly about 2× as long as wide, the apex acuminate; fruit bright red when ripe ..... ***P. quinquefolius***

1 Leaflets 3 (-5), sessile or subsessile; larger leaflets 4-8 cm long, 0.5-2.5 cm wide, mostly about 3× as long as wide, the apex obtuse to acute; fruit yellow-green when ripe ..... ***P. trifolius***

Panax quinquefolius Linnaeus, Ginseng, Sang, American Ginseng. Mt, Pd (GA, NC, SC, VA), Cp (GA, NC, VA): cove forests, mesic hardwood forests, generally in nutrient-rich forests though tending to avoid the richest coves; uncommon. May-June; August-October. Québec west to MN and SD, south to e. VA, e. NC, nc. SC, GA, c. AL, LA, and OK. *P. quinquefolius* is gathered in quantity throughout its range for the herbal trade; most of the North American harvest is shipped to China, where it is prized for medicinal uses. Dried roots command prices in excess of $500 per kilogram; in our area, "sang" is a multimillion dollar industry. Formerly abundant and occurring in large populations, *P. quinquefolius* has been reduced in most of its range to small populations of scattered individuals, a classic example of a "predator-prey" relationship. Collection and trade in ginseng is monitored and regulated in most states. In NC, it is illegal for ginseng dealers to buy ginseng from collectors before September; this allows the plants to mature fruits prior to collection. Schlessman (1985) discusses the floral biology of *P. quinquefolius*. [= RAB, C, F, G, K, S, W, Y, Z]

Panax trifolius Linnaeus, Dwarf Ginseng. Mt (GA, NC, VA), Pd (NC, VA), Cp (VA): cove forests, bottomland forests, other nutrient-rich forests; uncommon, rare south of VA. April-June; August-October. Nova Scotia and Québec west to MN, south to PA, e. VA, c. NC, nc. GA, ec. TN, IN, and IA. [= RAB, C, F, G, K, S, W, Y, Z]

ARISTOLOCHIACEAE A. L. de Jussieu 1789 (Birthwort Family)

A family of about 6-12 genera and 600 species, vines, shrubs, and herbs, of tropical, subtropical, and warm temperate regions. References: Barringer & Whittemore in FNA (1997); Ohi-Toma et al. (2006); Neinhuis et al. (2005); Huber in Kubitzki, Rohwer, & Bittrich (1993).

1 Acaulescent herb; calyx tube straight, radially symmetrical; stamens 12; [subfamily *Asaroideae*].
2 Leaves deciduous, pubescent, paired ..... ***Asarum***
2 Leaves evergreen, glabrous, not paired ..... ***Hexastylis***
1 Twining vine or caulescent herb; calyx tube bent, bilaterally symmetrical; stamens 6; [subfamily *Aristolochioideae*, tribe *Aristochieae*].
3 Woody, twining vine; leaves 8-35 cm wide; [subtribe *Isotrematinae*] ..... ***Isotrema***
3 Low, erect or ascending herb; leaves 0.7-6.5 cm wide.
4 Leaf blade as wide as long, or wider than long; leaf venation palmate; [subtribe *Aristolochiinae*] ..... ***[Aristolochia]***
4 Leaf blade narrower than long; leaf venation pinnate; [subtribe *Isotrematinae*] ..... ***Endodeca***

Aristolochia Linnaeus (Birthwort) [see *Endodeca* and *Isotrema*]

A genus of about 300 species, herbs and vines, once *Endodeca*, *Isotrema*, and *Pararistolochia* are excluded (Huber in Kubitzki 1993). Recent work has clarified that *Aristolochia* s.l. comprises 4 main clades, each of which is distinctive molecularly, morphologically, and in karyotype. These can be (as here) recognized as genera, or alternatively as four subgenera, grouped into two genera (*Aristolochia* including *Pararistolochia*, and *Isotrema* including *Endodeca*), as suggested by Ohi-Toma et al. (2006). References: Barringer in FNA (1997); Ohi-Toma et al. (2006); Kelly & González (2003); Huber in Kubitzki, Rohwer, & Bittrich (1993).

* *Aristolochia clematitis* Linnaeus, Birthwort, native of Europe, is naturalized in se. PA (Rhoads & Klein 1993) and MD (Barringer in FNA 1997). [= C, FNA, K]

Asarum Linnaeus (Wild Ginger)

See *Hexastylis* for discussion of generic limits. References: Whittemore, Mesler, & Lu in FNA (1997); Huber in Kubitzki, Rohwer, & Bittrich (1993).

1 Calyx lobes 10-35 mm long, spreading to ascending from the base, acuminate to caudate, the tubular tips 4-20 mm long ..... ***A. canadense* var. *canadense***
1 Calyx lobes 5-10 (-12) mm long, strongly reflexed, often more-or-less appressed back against the calyx tube, acute or acuminate, the tubular tips 0-4 mm long ..... ***A. canadense* var. *reflexum***

Asarum canadense Linnaeus *var.* ***canadense***, Common Wild Ginger. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): rich deciduous forests in circumneutral soils; common (uncommon in Piedmont in NC and SC, uncommon in VA Coastal Plain, rare in Coastal Plain in NC and SC). April-May. New Brunswick and Québec west to MN, south to NC, AL, and n. LA. The varieties have often been ignored, but have some merit; they deserve further attention. *A. canadense* Linnaeus var. *acuminatum* Ashe is alleged to differ in having long-caudate calyx lobes 15-35 mm long (vs. 10-25 mm long), the tubular portion 10-20 mm (vs. 4-10) mm long. [= C, G; < *A. canadense* – RAB, FNA, K, W; > *A. canadense* Linnaeus var. *acuminatum* Ashe – F; > *A. canadense* var. *ambiguum* (Bicknell) Farwell – F; > *A. canadense* var. *canadense* – F; > *A. canadense* – S; > *A. acuminatum* (Ashe) Bicknell – S; > *A. rubrocinctum* Peattie – S]

Asarum canadense Linnaeus *var.* ***reflexum*** (Bicknell) B.L. Robinson. Mt (NC, VA?): rich deciduous forests in circumneutral soils; rare? April-May. CT west to s. Manitoba, south to w. NC, KY, and MO. [= C, F, G; < *A. canadense* – RAB, FNA, K, W; = *A. reflexum* Bicknell – S]

Endodeca Rafinesque 1828 (Turpentine-root)

A genus of 2 (or more?) species, of eastern and sc. North America. This genus is morphologically distinctive within *Aristolochia* (in the broad sense), and forms a clade with *Isotrema* distinctive from *Aristolochia* s.s. (Ohi-Toma et al. 2006). References: Barringer in FNA (1997); Ohi-Toma et al. (2006); Kelly & González (2003); Neinhuis et al. (2005); Huber in Kubitzki, Rohwer, & Bittrich (1993).

Endodeca serpentaria (Linnaeus) Rafinesque, Turpentine-root, Virginia Snakeroot. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry to mesic forests, perhaps more restricted to mesic situations over acidic substrate, ranging into drier situations over calcareous or mafic substrates; common. May-June; June-July. CT and NY west to IL, MI, and MO, south to c. peninsular FL and TX. The tremendous variation in this species needs further study. Plants with sparingly pubescent, thin-textured, linear to lanceolate leaves have been called *Aristolochia hastata*. Plants with broadly ovate, densely pubescent leaves have been called *Aristolochia convolvulacea*. These may represent merely morphologic extremes of a polymorphic complex; alternatively, some taxonomic recognition of such plants as distinct from *A. serpentaria* may be warranted. [= *Aristolochia serpentaria* Linnaeus – RAB, C, FNA, G, K, W, WH; > *A. serpentaria* var. *hastata* (Nuttall) Duchartre – F; > *A. serpentaria* var. *serpentaria* – F; > *A. hastata* Nuttall – S; > *A. convolvulacea* Small – S; > *A. serpentaria* – S]

Hexastylis Rafinesque 1825 (Heartleaf)

ARISTOLOCHIACEAE

A genus of 10 species, herbs, of se. North America. Barringer (1993) and Kelly (1997, 1998) have recently employed a broad definition of *Asarum*, including *Hexastylis*. Over the last half-century various students of the group (emphasizing a range of fields of evidence) have arrayed themselves for and against the recognition of *Hexastylis* as a genus distinct from *Asarum*. A cladistic analysis (Kelly 1997, 1998) showed distinctive clades which could be interpreted as evidence for the recognition of *Hexastylis* (including the Asian *Heterotropa*), though the author preferred to recognize 2 subgenera. I choose here to follow the more traditional (at least in our area) separation of *Hexastylis* from *Asarum*, until and unless stronger evidence is presented for their combination. Electrophoretic and morphologic studies currently in progress validate the taxonomy presented, insofar as results are available (R. Wyatt, pers. comm.). References: Whittemore & Gaddy in FNA (1997); Gaddy (1987a)=Z; Blomquist (1957)=Y; Barringer (1993)=X; Gaddy (1987b); Gaddy (1986); Gaddy in Wofford (1989); Sugawara (1987); Huber in Kubitzki, Rohwer, & Bittrich (1993). Key adapted from FNA, Gaddy in Wofford (1989), and Gaddy (1987a).

Identification notes: A difficult genus, *Hexastylis* is made more frustrating by the fact that nearly all diagnostic features relate to the shape and size of the fleshy and brittle calyx – characters which are difficult to describe and are largely lost when specimens are pressed. The difficulty of identifying herbarium specimens has sometimes been (apparently) used as a justification for reducing (often drastically, as in C) the number of taxa recognized. To those familiar with this genus in the field, however, the taxa here recognized form geographically distinctive populations. Size and (to a lesser degree) shape of individual flowers show considerable variation and can be altered by environmental factors; individual flowers or plants can be difficult to identify if taken out of context. Populations, however, are readily identifiable. The photograph (Figure 1) in Gaddy (1987a) of the flowers of all species other than *H. arifolia* and *H. speciosa* is highly recommended as an aid to identification.

1 Style extension bifid to stigma; leaves triangular to ovate-sagittate or subhastate, portions of the sides of nearly all leaves straight or concave; leaves mottled, the paler areas between the veins.
  2 Calyx abruptly contracted near the middle, the lower portion narrowly cuplike, abruptly expanded into a much broader upper half; calyx tube with internal raised reticulations; calyx lobes spreading; [endemic near Montgomery, AL]..... *[H. speciosa]*
  2 Calyx gradually contracted to a smooth waist just below the calyx lobes; calyx tube smooth internally; calyx lobes spreading or erect; [collectively widespread in our area].
    3 Calyx lobes erect, 2-4 mm long, 2-4 mm wide at base; [of the Mountains westward]..... ***H. arifolia* var. *ruthii***
    3 Calyx lobes spreading, 2.5-8 mm long, 3-9 mm wide at base; [of the Coastal Plain, Piedmont, and eastern Mountains].
      4 Calyx tube 13-18 mm long, 6-10 mm wide; [of the Coastal Plain, Piedmont, and Mountains of s. VA, NC, SC, GA, and westward through AL and MS to se. LA]..... ***H. arifolia* var. *arifolia***
      4 Calyx tube 20-25 mm long, 10-12 mm wide; [of the lower Gulf Coastal Plain, of sw. GA, FL Panhandle, s. AL, s. MS, and se. LA]... ***H. arifolia* var. *callifolia***

1 Style extension notched or divided at the apex, not bifid to the stigma; leaves rounded, with cordate base, all portions of the sides of the leaves convex; leaves mottled or unmottled, if mottled, the paler areas along the veins.
  5 Inner surface of calyx lobes pilose with whitish hairs; plant rhizomatous, the rhizomes long-creeping..... ***H. lewisii***
  5 Inner surface of calyx lobes puberulent; plant clumped or short-creeping.
    6 Calyx tube broadly urceolate-campanulate or rhombic-ovate (broadest near the middle).
      7 Calyx tube urceolate-campanulate; calyx lobes 10-22 mm wide at base.
        8 Leaves scattered along the length of the rhizome; [of Coastal Plain and lower Piedmont of GA and AL]..... ***H. shuttleworthii* var. *harperi***
        8 Leaves clustered at the tip of the rhizome; [of the Mountains and upper Piedmont of NC, SC, and GA]..... ***H. shuttleworthii* var. *shuttleworthii***
      7 Calyx tube rhombic-ovate (broadest near the middle); calyx lobes 3-8 mm wide at base.
        9 Internal ridged reticulation an open network raised < 1 mm or absent..... ***H. contracta***
        9 Internal ridged reticulation a close network raised 1.5-2 mm..... ***H. rhombiformis***
    6 Calyx tube cylindrical to narrowly cylindro-urceolate.
      10 Calyx tube cylindrical to narrowly cylindro-urceolate; calyx lobes 2-4 mm long, erect to slightly spreading..... ***H. virginica***
      10 Calyx tube cylindrical, calyx lobes 4-15 mm long, moderately spreading to reflexed.
        12 Calyx tube longer than wide.
          13 Calyx tube orifice 8-12 mm wide; floral opening > 1/2 the lobe length; calyx lobes 6-17 mm wide; ovary superior; leaves typically not variegated..... ***H. heterophylla***
          13 Calyx tube 4-8 mm wide; floral opening < 1/2 the lobe length; calyx lobes 4-7 mm wide; ovary half-inferior; leaves typically variegated..... ***H. naniflora***
        12 Calyx tube about as wide as long (at widest point) or wider than long, flared.
          14 Tube about as wide as long; opening width < the lobe length..... ***H. heterophylla***
          14 Tube wider at flare than long; opening width > the lobe length..... ***H. minor***

Hexastylis arifolia (Michaux) Small var. ***arifolia***, Little Brown Jug, Arrowleaf Heartleaf. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC): dry to mesic deciduous forests; common (rare in VA). March-May. Se. VA, sw. VA, se. TN, and n. AL south to Panhandle FL, s. MS, and se. LA, primarily on the Coastal Plain and Piedmont. [= C, FNA, K, W, Y, Z; < *H. arifolia* – RAB; = *Asarum arifolium* Michaux – F; = *H. arifolia* – G, S; < *Asarum arifolium* Michaux – WH; = *Asarum arifolium* var. *arifolium* – X]

Hexastylis arifolia (Michaux) Small *var.* ***callifolia*** (Small) Blomquist. Cp (FL?, GA): mesic forests; rare. March-May. Sw. GA and Panhandle FL (?) west to se. LA, in the lower East Gulf Coastal Plain. [= FNA, K, Y, Z; = *H. callifolia* (Small) Small – S; = *Asarum callifolium* Small; < *Asarum arifolium* Michaux – WH; = *Asarum arifolium* Michaux var. *callifolium* (Small) Barringer – X]

Hexastylis arifolia (Michaux) Small var. ***ruthii*** (Ashe) Blomquist, Appalachian Little Brown Jug. Mt (GA, NC, VA): upland forests, ultramafic outcrop barrens; uncommon (rare in VA). March-June. A Southern Appalachian endemic: sw. VA, se. KY, w. NC, e. TN, n. AL, and n. GA. Perhaps warranting species status. At the Buck Creek olivine barren (Clay County, NC) this species carpets several hundred hectares, in association with *Packera paupercula* var. *appalachiana, Thalictrum*

macrostylum, and *Sporobolus heterolepis.* [= C, FNA, K, W, Y, Z; < *H. arifolia* – RAB; = *Asarum ruthii* Ashe – F; = *H. ruthii* (Ashe) Small – G, S; = *Asarum arifolium* var. *ruthii* (Ashe) Barringer – X]

Hexastylis contracta Blomquist, Mountain Heartleaf. Mt (NC, VA): on acidic soils in deciduous forests with *Kalmia latifolia* and *Rhododendron maximum*; rare. May-June. Endemic to the Cumberland Plateau of TN (Chester, Wofford, & Kral 1997) and KY, with a few disjunct populations in the Blue Ridge of NC and in the Ridge and Valley of sw. VA (Washington County) (J. Townsend, pers.comm. 2006). [= RAB, FNA, K, W, Y, Z; < *H. virginica* – C; < *Asarum contractum* (Blomquist) Barringer – X (also see *H. rhombiformis*)]

Hexastylis heterophylla (Ashe) Small, Variable-leaf Heartleaf. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): slopes and bluffs in xeric to mesic forests, usually associated with *Kalmia latifolia*; common. March-late May. A broad Southern Appalachian endemic: w. VA and WV south through e. KY, ne. TN, and w. NC to nw. SC, n. GA, and n. AL. [= RAB, FNA, K, S, W, Y, Z; < *H. virginicum* – C; < *Asarum virginicum* Linnaeus – F, G]

Hexastylis lewisii (Fernald) Blomquist & Oosting, Lewis's Heartleaf. Pd, Cp (NC, VA): upland forests (pine or oak), pocosin ecotones; rare (NC Rare, VA Watch List). April-May. Endemic to the Piedmont of VA and the Piedmont and Coastal Plain of NC. [= RAB, FNA, K, Y, Z; < *H. shuttleworthii* – C; = *Asarum lewisii* Fernald – F]

Hexastylis minor (Ashe) Blomquist, Little Heartleaf. Pd (NC, SC, VA), Mt (VA), Cp (NC): upland or moist forests, pocosin margins; common (rare in VA). February-May. Endemic to the Piedmont and adjacent Coastal Plain and Mountains of nc. VA, NC, and nc. SC. The pocosin ecotone plants of the Sandhills are under study by Gaddy and may be recognized as a separate taxon. [= RAB, FNA, K, W, Z; < *Asarum virginicum* Linnaeus – F; < *H. virginica* – C, G; = *Asarum minus* Ashe; = *Hexastylis minus* – Y, a grammatical error]

Hexastylis naniflora Blomquist, Dwarf-flower Heartleaf. Pd (NC, SC): acidic, sandy loam on bluffs and ravines in deciduous forests, frequently associated with *Kalmia latifolia*; rare. March-June. Endemic to the upper Piedmont of s. NC and n. SC. [= RAB, FNA, K, W, Y, Z; < *H. virginica* – C]

Hexastylis rhombiformis Gaddy, French Broad Heartleaf. Mt (NC, SC): in deciduous forests on sandy river bluffs or in ravines with *Kalmia latifolia* and *Rhododendron maximum*; rare. Late March-June. Endemic to the southern Blue Ridge of NC and SC, known only from Henderson, Polk, Buncombe, and Transylvania counties. Following Gaddy's (1986) naming of this species, Barringer (1993) considered the species merely a form of *Asarum contractum*, but electrophoretic and morphologic studies indicate that it is distinct from *H. contracta*, and more closely related to *H. virginica* (Murrell et al. 1998; R. Wyatt, pers. comm.). [= FNA, K, W, Z; < *Asarum contractum* (Blomquist) Barringer – X]

Hexastylis shuttleworthii (Britten & Baker f.) Small *var.* ***harperi*** Gaddy, Harper's Heartleaf. Cp, Pd (GA): bogs, acid hammocks; rare. C. GA, c. AL, and ne. MS, south and west of (and allopatric from) var. *shuttleworthii* (Gaddy 1987b); it approaches SC and should be sought there. [= FNA, K, Z; < *H. shuttleworthii* – S; = *Asarum shuttleworthii* Britten & Baker f. var. *harperi* (Gaddy) Barringer – X]

Hexastylis shuttleworthii (Britten & Baker f.) Small var. ***shuttleworthii***, Large-flower Heartleaf. Mt (GA, NC, SC), Pd (GA, VA?): acidic soils in deciduous and deciduous-coniferous forests, often along creeks under *Rhododendron maximum*; uncommon. May-July. Endemic to the Southern Appalachians: W. NC and e. TN to nw. SC, n. GA, and ne. AL; previois reports of *H. shuttleworthii* for VA are apparently based on large-flowered individuals of *H. heterophylla* (J. Townsend, pers. Comm.. 2008). [= FNA, K, Z; < *H. shuttleworthii* – RAB, G, S, W, Y; < *H. shuttleworthii* – C (also see *H. lewisii)*; < *Asarum shuttleworthii* Britten & Baker – F; = *Asarum shuttleworthii* var. *shuttleworthii* – X]

Hexastylis virginica (Linnaeus) Small, Virginia Heartleaf. Cp (NC, SC, VA), Pd (NC, VA), Mt (GA, NC, VA): upland forests; common (uncommon in Mountains). April-June. A relatively widespread species, occurring throughout NC and VA, extending west into WV, e. KY, and ne. TN (Chester, Wofford, & Kral 1997). *H. memmingeri*, a doubtful taxon close to *H. virginica*, with the calyx very small (< 1.5 cm long), narrowly cylindro-urceolate, and the calyx lobes very short (ca. 2 mm long) will key here. Gaddy does not recognize it, considering it a small form of *H. virginica*, but it may warrant varietal rank. It is known from NC, VA, and WV, in the Piedmont and Mountains. [= RAB, FNA, K, W, Y, Z; < *H. virginica* – C (also see *H. contracta, H. heterophylla, H. minor*, and *H. naniflora*); >< *Asarum virginicum* Linnaeus – F (also see *H. heterophylla* and *H. minor*); > *Asarum memmingeri* Ashe – F; < *H. virginica* – G; > *H. virginica* – S; > *H. memmingeri* (Ashe) Small – S]

Hexastylis species 1. Endemic to Sandhills region of NC and SC, where it grows in seepage bogs. Under study by L.L. Gaddy.

Hexastylis speciosa R.M. Harper. Endemic to a small area in central AL (Autauga, Chilton, and Elmore counties, north of Montgomery). [= FNA, K, S, Y, Z; = *Asarum speciosum* (R.M. Harper) Barringer – X]

Isotrema Rafinesque 1819 (Dutchman's-pipe)

A genus of about 50 species, of temperate and tropical Asia, se. North America, and Central America. References: Barringer in FNA (1997); Ohi-Toma et al. (2006); Kelly & González (2003); Huber in Kubitzki, Rohwer, & Bittrich (1993).

1 Plant nearly glabrous; leaves abruptly pointed; calyx purple or brown; [of the Mountains]..... ***A. macrophyllum***
1 Plant soft pubescent; leaves blunt; calyx yellow, with a purple mouth; [largely of west or south of the Appalachians, also locally spread from cultivation]..... ***A. tomentosum***

Isotrema macrophyllum (Lamarck) C.F. Reed, Pipevine, Dutchman's-pipe. Mt (GA, NC, SC, VA): cove forests and other mesic mountain forests; common. May-June; August-September. A southern-central Appalachian endemic: sw. PA to c. TN and n. GA. [= *Aristolochia macrophylla* Lamarck – RAB, C, FNA, K, S, W; = *A. durior* Hill – F, G]

Isotrema tomentosum (Sims) H. Huber, Woolly Dutchman's-pipe, Pipevine. Cp (FL, GA, SC), Mt* (NC*) {VA?}: floodplain forests, disturbed areas; uncommon, native in FL, GA, and SC, apparently introduced only in NC (rare in FL, GA, and

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SC). S. IN, s. MO, and se. OK, south to sw. GA, Panhandle FL, and TX. FNA also reports that it is escaped in VA. [= *Aristolochia tomentosa* Sims – RAB, C, F, FNA, G, GW, K, S, WH]

ASCLEPIADACEAE [see *APOCYNACEAE*]

ASTERACEAE Dumortier 1822 or *COMPOSITAE* Giseke 1792 (Aster Family)

A family of about 1500-1700 genera and 20,000-25,000 species, shrubs, herbs, trees, and vines, cosmopolitan. References: Cronquist (1980)=SE throughout family treatment.

Identification notes: {define ligulate, discoid, disciform, radiant and radiate heads}

1 Heads ligulate (composed of ligulate florets); sap usually milky..... **Key A**
1 Heads discoid, disciform, radiant, or radiate; sap usually clear.

Key A

1 Cypselas (at least of the inner florets of the head) beaked.
2 Stems leafless; heads solitary.
3 Pappus of bristles..... ***Taraxacum***
3 Pappus **either** of outer scales and inner bristles **or** of aristate scales.
4 Pappus of outer scales and inner plumose bristles; leaves oblanceolate to oblong; plants annual or perennial ..... ***Leontodon***
4 Pappus of aristate scales; leaves linear to narrowly lanceolate; plants annual ..... ***Uropappus***
2 Stems leafy; heads .
10 Achenes distinctly flattened..... ***45. Lactuca***
10 Achenes terete or prismatic.
11 Pappus of simple capillary bristles
12 Beak of the cypsela with a ring of soft white reflexed hairs at the summit (just below the pappus)..... ***82. Pyrrhopappus***
12 Beak of the cypsela lacking a ring of hairs as described.
13 Pappus of 40-50 (or more) smooth bristles; plant a perennial ..... ***38. Chondrilla***
13 Pappus of 80-150 barbellulate bristles; plant an annual or biennial ..... ***36. Crepis***
11 Pappus of plumose bristles, at least in part.
14
14
65. Uropappus (lindleyi) wool alien
54. Hypochaeris
55. Helminthotheca (asteroides)
59. Tragopogon

1 Cypselas beakless.
Lygodesmia, Crepis, Youngia, Leontodon, Krigia, Lapsana, Cichorium, Scolymus, Sonchus, Hieracium, Picris, Stephanomeria, Prenanthes

Acanthospermum Schrank 1820 (Paraguay Bur)

A genus of about 6 species, herbs, of tropical America. References: Strother in FNA (2006c); Cronquist (1980)=SE.

1 Stems prostrate and rooting at the nodes; bur 7-9 mm long, slightly compressed, strongly 5-7-ribbed ..... ***A. australe***
1 Stems erect; bur 2-6 mm long, obviously compressed, obscurely ribbed or 3-ribbed.
2 Leaves (2-) 4-12 (-15) cm long, sessile or subsessile; bur with prickles on all surface ..... ***A. hispidum***
2 Leaves 1-3 (-4.5) cm long, petiolate, the petiole 4-18 mm long; bur unarmed or nearly so on the side faces, the prickles along the ribs and around the tip ..... ***A. humile***

* ***Acanthospermum australe*** (Loefling) Kuntze, Paraguay Bur, Sheep Bur. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (SC): disturbed areas; common (rare in VA), native of South America. May-November. [= RAB, C, F, FNA, G, K, S, SE, WH]

* ***Acanthospermum hispidum*** A.P. de Candolle, Hispid Starbur. Cp (FL, GA, SC): disturbed areas, soybean and peanut fields, gardens; uncommon, native of n. South America. July-November. First reported from SC by Hill & Horn (1997). [= FNA, K, S, SE, WH]

* ***Acanthospermum humile*** (Swartz) A.P. de Candolle, Low Starbur. Cp (FL, SC): disturbed areas; rare, native of the West Indies. Reported for SC by Nelson (2003). [= FNA, K, S, SE, WH; = *Melampodium humile* Swartz]

Achillea Linnaeus 1753 (Yarrow, Milfoil, Thousand-leaf)

A genus of about 115 species, herbs, primarily Eurasian. References: Cronquist (1980)=SE; Arriagada & Miller (1997)=Z; Trock in FNA (2006a).

1 Leaves pinnately dissected into linear segments ..... ***A. millefolium***
1 Leaves serrate to almost entire ..... ***[A. ptarmica]***

Achillea millefolium Linnaeus, Yarrow, Thousandleaf. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): grassy balds, roadsides, disturbed areas; common (rare in FL). April-November. Circumboreal (as here broadly treated). A taxonomically very complex entity, with races of different ploidies, introduced and native genotypes in e. North America. It would be desirable to treat the variation, but a workable treatment has not yet been produced. [= RAB, FNA, SE; > *A. millefolium* ssp. *millefolium* – C, G; > *A. millefolium* ssp. *lanulosa* (Nuttall) Piper – C, G, W; > *A. lanulosa* Nuttall – F, Z; > *A. millefolium* – F, Z; > *A. millefolium* var. *millefolium* – K; > *A. millefolium* var. *occidentalis* de Candolle – K]

* *Achillea ptarmica* Linnaeus, Sneezeweed, Sneezewort, native of Eurasia. Naturalized south to WV and at scattered sites in PA (Rhoads & Klein 1993). [= C, F, FNA, G, K, Z]

Acmella L.C. Richard ex C.H. Persoon 1807 (Spotflower)

A genus of about 30 species, herbs, primarily of tropical distribution. References: Jansen (1985)=Z; Strother in FNA (2006c); Cronquist (1980)=SE.

1 Leaves linear to lanceolate; petioles 2-4.5 mm long; outer series of phyllaries narrowly to broadly ovate, the apex acute; heads radiate or discoid ..... ***A. pusilla***
1 Leaves narrowly to broadly ovate; petioles (3-) 5-43 mm long; outer series of phyllaries lanceolate, the apex acuminate; heads radiate ..... ***A. repens***

* ***Acmella pusilla*** (Hooker & Arnott) R.K. Jansen, Argentine Spotflower. Cp (FL, GA, NC, SC): disturbed areas (especially around old seaports); rare, native of South America. May-September. Known from scattered locations in the se. United States (NC, SC, GA, FL), associated with old seaports, such as Wilmington, NC, Savannah, GA, Pensacola and Apalachoicola, FL, and perhaps not well-established. [= FNA, K, WH, Z]

Acmella repens (Walter) L.C. Richard in Persoon, Creeping Spotflower. Cp (FL, GA, NC, SC), Pd (NC, SC): floating vegetation mats, roadsides, streambanks, other moist, open, habitats; common (uncommon in GA, rare in NC, SC). July-December. Se. NC south to s. FL, west to e. TX, north in the Mississippi Embayment to w. TN and s. MO. Jansen (1985) treats this as var. *repens* of *A. oppositifolia*, the typic var. *oppositifolia* widely distributed from c. Mexico south through Central America into n. South America, stating that var. *repens* "can be easily separated from var. *oppositifolia* by its lanceolate, acuminate phyllaries and short double hairs on the achene margins." Jansen also states that "four factors have caused extreme difficulties in delimiting taxa at the specific and infraspecific level within this group: very close morphological similarity; polyploidy; hybridization, especially between different ploidy levels; and asexual reproduction." In his more statistical taxonomic analyses, his var. *repens* (4X, and the only taxon out of 39 native to North America) separates rather well from *A. oppositifolia* (2X - 6X). Given the morphological distinctiveness and substantial allopatry of the two taxa, I prefer not to associate this taxon as a variety of the complex *A. oppositifolia*. [= FNA; = *Spilanthes americana* (Mutis ex Linnaeus f.) Hieronymus var. *repens* (Walter) A.H. Moore – RAB, F; < *Spilanthes americana* – C, G, GW, S, SE; = *Acmella oppositifolia* (Lamarck) R.K. Jansen var. *repens* (Walter) R.K. Jansen – K, WH, Z]

Acroptilon Cassini 1827 (Russian Knapweed)

A monotypic genus, native of Eurasia. References: Keil in FNA (2006a).

* *Acroptilon repens* (Linnaeus) de Candolle, Russian Knapweed. Reported for VA (FNA), but there is apparently no documentation for its occurrence there; this serious invasive weed is widespread in western North America, east to OH, KY, and AR. [= FNA, K; = *Centaurea repens* Linnaeus – C, F, G] {not keyed}

Ageratina Spach 1847 (Milk-poison, White Snakeroot)

A genus of about 250-290 species, American. The separation of *Ageratina* from *Eupatorium* appears clearly warranted, on morphological, karyological, and molecular grounds. References: Nesom in FNA (2006c); Clewell & Wooten (1971)=Z; Cronquist (1980)=SE. Key based in part on Z and SE.

1 Leaves subcoriaceous in texture; leaves crenate or crenate-serrate; leaf blades 3-7 (-10) cm long, 2-5 cm wide; [primarily of xeric or submesic sites].
  2 Larger leaf blades >5× as long as the petiole; leaf margins crenate; corolla lobes densely long-pubescent; achenes glabrous; [widespread in our area] ..... ***A. aromatica***

2 Larger leaf blades (1-) 2-4× as long as the petiole; leaf margins crenate, dentate, or incised; corolla lobes glabrous or sparsely short-pubescent; achenes usually short-pubescent, at least near the apex; [of e. GA southward] ..... ***A. jucunda***

1 Leaves membranaceous in texture; leaves serrate or coarsely dentate; leaf blades 6-18 cm long, 3-12 cm wide (at least the larger on a given plant usually more 8 cm long); [primarily of mesic sites].

3 Leaves delicately membranaceous, coarsely dentate; larger leaf blades 1.0-1.4× as long as the petiole; [of seepage and waterfall splash zones associated with sandstone rockhouses and cliff bases] ..... ***A. luciae-brauniae***

3 Leaves membranaceous, of a "typical" herbaceous character, coarsely serrate; larger leaf blades 1.4-5× as long as the petiole; [of a wide variety of mesic habitats, especially moist forests and forest openings].

4 Phyllaries mostly 3-5 mm long, acute (to obtuse); heads with (9-) 12-25 flowers; leaves deltoid to ovate (the base generally broadly cuneate); heads arranged in open corymbs; [widespread in our area] ..... ***A. altissima var. altissima***

4 Phyllaries mostly 5-7 mm long, cuspidate-acuminate; heads with (15-) 20-34 flowers; leaves generally deltoid (the base generally subcordate or truncate); heads arranged in dense corymbs; [of moderate to high elevation forests and openings, in the Mountains and upper Piedmont] ..... ***A. altissima var roanensis***

Ageratina altissima King & H.E. Robinson *var.* ***altissima***, Common White Snakeroot, Common Milk-poison. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests, such as cove forests; common (uncommon in Coastal Plain). Late July-October. *A. altissima* var. *altissima* ranges from Québec west to se. ND, south to Panhandle Florida and c. TX. Var. *angustata* (A. Gray) Clewell & Wooten ranges from IL and e. KS south to LA and c. TX. This species has been shown to be the cause of the "milk sickness" of pioneer days; the plants contain a poison which is transmissable to humans through cow milk. [= FNA, K; < *Eupatorium rugosum* Houttuyn – RAB, G, W; = *E. rugosum* Houttuyn var. *rugosum* – C, SE; > *E. rugosum* var. *rugosum* – F; > *E. rugosum* var. *chlorolepis* Fernald – F; > *E. rugosum* var. *tomentellum* (B.L. Robinson) Blake – F; = *Eupatorium urticifolium* Reichard – S; < *A. altissima* var. *altissima* (also see *A. luciae-brauniae*) – WH, Z]

Ageratina altissima King & H.E. Robinson *var.* ***roanensis*** (Small) Clewell & Wooten, Appalachian White Snakeroot, Appalachian Milk-poison. Mt (GA, NC, SC, VA): moist forests, often abundant at high elevations; common. August-October. This variety is endemic to moderate to high elevations of the Southern Appalachians, from nw. VA south to w. SC, n. GA, e. TN, e. KY, and possibly ne. AL. [= FNA, K, Z; < *Eupatorium rugosum* Houttuyn – RAB, G, W; = *Eupatorium rugosum* var. *roanense* (Small) Fernald – C, F, SE; = *Eupatorium roanensis* Small – S]

Ageratina aromatica (Linnaeus) Spach, Small-leaved White Snakeroot, Wild-hoarhound. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): woodlands and forests, usually xeric, and often fire-maintained, also woodland edges; common (uncommon in Piedmont and Mountains). Late August-October. MA, NY, and OH, south to ne. FL, Panhandle FL, and e. LA (Florida parishes). Two varieties have been delineated, both of them occurring in our area. Var. *incisa* (A. Gray) C.F. Reed is described as differing from var. *aromatica* in having the leaves cuneate (vs. truncate to rounded), acuminate (vs. acute), sharply toothed (vs. bluntly toothed, thin in texture (vs. thick), and the petioles slender and 0.5-2 cm long (vs. less slender and 0.1-1.5 cm). It is supposed to be Southeastern in range, from se. VA south to FL, on the Coastal Plain. The validity of this variety needs further assessment. [= FNA, WH, Z; = *Eupatorium aromaticum* Linnaeus – RAB, C, G, SE, W; > *Eupatorium aromaticum* var. *aromaticum* – F; > *Eupatorium aromaticum* var. *incisum* A. Gray – F; > *A. aromatica* var. *aromatica* – K; > *A. aromatica* var. *incisa* (Gray) C.F. Reed – K; > *Eupatorium latidens* Small – S; > *Eupatorium aromaticum* Linnaeus – S]

Ageratina jucunda (Greene) Clewell & Wooten, Hammock Snakeroot. Cp (FL, GA): sandhills, dry pinelands, and subxeric hardwood hammocks; common (uncommon in GA). Se. GA south to s. FL, west to e. Panhandle FL. [= FNA, K, WH, Z; = *Eupatorium jucundum* Greene – S, SE]

Ageratina luciae-brauniae (Fernald) King & H.E. Robinson, Rockhouse White Snakeroot. Mt (KY, TN): sandstone rockhouses, at the base of sandstone cliffs (usually overhanging) in seepage or splash; rare. Endemic to the Cumberland Plateau of ne. TN (Chester, Wofford, & Kral 1997) and se. KY. Although considered by Clewell & Wooten (1971) as mere aberrant plants, Wofford (1976) determined that *A. luciae-brauniae* is a species. [= FNA, K; = *Eupatorium luciae-brauniae* Fernald – C, F, G, SE; < *A. altissima* var. *altissima* – Z]

Ageratum Linnaeus 1753 (Ageratum, Flossflower, Pussyfoot)

A genus of about 44 species, herbs, of tropical America. References: Nesom in FNA (2006c); Cronquist (1980)=SE. Key based in part on SE.

1 Peduncles with short and long non-glandular hairs; phyllaries glabrous to sparsely pubescent with non-glandular hairs ..... ***A. conyzoides***

1 Peduncles with shrt and long hairs, many of them glandular; phyllaries stipitate-glandular and sparsely pubescent with non-glandular hairs..... ***A. houstonianum***

* ***Ageratum conyzoides*** Linnaeus, Ageratum. Cp (NC): disturbed areas; rare, apparently native of South America. July-August. [= FNA, K, S, SE, WH]

* ***Ageratum houstonianum*** P. Miller, Ageratum. Cp (NC, SC): disturbed areas; rare, apparently native of se. Mexico and Central America. July-August. [= FNA, K, S, SE, WH]

Amblyolepis A.P. de Candolle 1836 (Huisache-daisy)

A monotypic genus, an annual herb, native of Texas and n. Mexico. References: Bierner in FNA (2006c).

* ***Amblyolepis setigera*** A.P. de Candolle. Cp (SC): wool-combing mill waif (Nesom 2004d); rare, native of TX-Mexico. [= FNA, K]

Ambrosia Linnaeus 1753 (Ragweed)

A genus of about 43 species, herbs, cosmopolitan. References: Cronquist (1980)=SE; Strother in FNA (2006c).

1 Leaves either undivided, with 2 lateral teeth, or palmately 3-5-lobed.
  2 Leaves sessile to clasping, 2.5-7 cm long, undivided, with 2 teeth near the base ..... ***A. bidentata***
  2 Leaves petiolate, 7-30 cm long, (1-) 3 (-5) lobed ..... ***A. trifida* var. *trifida***
1 Leaves 1- to 2-pinnatifid.
  3 Annual, with fibrous roots; fruiting involucre with short, sharp spines ..... ***A. artemisiifolia***
  3 Perennial, with deep-seated, creeping roots; fruiting involucre with bumps ..... ***A. psilostachya***

Ambrosia artemisiifolia Linnaeus. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): roadsides, gardens, disturbed soils, thin soils on rock outcrops; common. August-November. Newfoundland, Nunuvut, and British Columbia south to FL, TX, CA and southward. [= RAB, C, FNA, G, SE; > *A. artemisiifolia* Linnaeus var. *elatior* (Linnaeus) Descourtils – F, K; > *A. artemisiifolia* Linnaeus var. *paniculata* (Michaux) Blank – F, K; > *A. artemisiifolia* Linnaeus var. *artemisiifolia* – F, K; > *A. elatior* Linnaeus – S; > *A. monophylla* (Walter) Rydberg – S; > *A. glandulosa* Scheele – S]

Ambrosia bidentata Michaux. Pd (VA), Mt (GA, NC); {SC}: mafic woodlands; uncommon. August-November. CT, NY, and MN south to Panhandle FL and TX. Widely scattered throughout TN, east to e. TN (Chester, Wofford, & Kral 1997) and in nw. GA (Jones & Coile 1988). [= RAB, C, FNA, G, K, S, SE]

Ambrosia psilostachya A.P. de Candolle, Perennial Ragweed. Cp (FL, GA, NC, SC), Pd (VA): loamy sandy soil of flats and slight depressions in periodically burned longleaf pine uplands, also in disturbed areas; uncommon. September-November. Nova Scotia, Québec, and British Columbia south to FL, TX, and CA. Primarily western and midwestern, but scattered along eastern seaboard states (ME, NH, NY, NC, SC, GA, FL), where perhaps some of the distribution is adventive. Apparently first collected in VA in 2000. [= C, FNA, G, K, SE, WH; > *A. psilostachya* – RAB; > *A. rugelii* Rydberg – RAB, S; > *A. psilostachya* var. *coronopifolia* (Torrey & Gray) Farwell – F]

Ambrosia sp. 1, Glade Ragweed. Under investigation by P. McMillan and colleagues at CLEMS. {not yet keyed}

Ambrosia trifida Linnaeus *var. **trifida***. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): floodplains, moist pastures; disturbed ground; common (uncommon in VA Coastal Plain, rare in Coastal Plain south of VA). July-November. Nova Scotia and British Columbia south to n. peninsular FL, Panhandle FL, TX, and CA. [= C, F, G; < *A. trifida* var. *trifida* – K; < *A. trifida* – RAB, FNA, SE; = *A. trifida* – S]

Ampelaster Nesom 1995 (Climbing-aster)

A monotypic genus, a vining shrub, of se. North America. References: Semple in FNA (2006b); Nesom (2000b); Nesom (1994)=X; Cronquist (1980)=SE.

Ampelaster carolinianus (Walter) Nesom, Climbing Aster. Cp (FL, GA, NC, SC): swamps, thickets, marshes, streambanks; common (uncommon in GA and SC, rare in NC). Late September-October. Se. NC south to s. FL. Grown horticulturally. [= FNA, K, X; = *Aster carolinianus* Walter – RAB, GW, S, SE; = *Virgulus carolinianus* (Walter) Reveal & Keener; = *Symphyotrichum carolinianum* (Walter) Wunderlin & B.F. Hansen – WH]

Amphiachyris (A.P. de Candolle) Nuttall 1840 (Broomweed)

A genus of 2 species, herbs, of sc. North America. References: Nesom in FNA (2006b); Nesom (2000b); Cronquist (1980)=SE.

* ***Amphiachyris dracunculoides*** (A.P. de Candolle) Nuttall, Prairie Broomweed, Broom Snakeroot. Mt (VA), Cp (SC): disturbed areas over calcareous rocks, wool-combing mill waif (Nesom 2004d); rare, presumably adventive from further west. August-September. This species is common and weedy in disturbed cedar glade habitats in the Nashville Basin of c. TN, where apparently native (Chester, Wofford, & Kral 1997). [= FNA, K, S; = *Gutierrezia dracunculoides* (A.P. de Candolle) Blake – F, G, SE; = *Xanthocephalum dracunculoides* (A.P. de Candolle) Shinners]

Anaphalis A.P. de Candolle 1838 (Pearly-everlasting)

A genus of about 35 to 110 species, herbs, of tropical and temperate areas, with a center of diversity in Asia. References: Nesom in FNA (2006a); Arriagada (1998)=Z; Cronquist (1980)=SE.

Anaphalis margaritacea (Linnaeus) Bentham & Hooker f., Pearly-everlasting. Mt (NC*, VA), Pd (VA): dry open places, probably persistent from cultivation in NC, seemingly native in VA; rare. July-September. Interruptedly circumboreal, in North America from Labrador and Newfoundland west to AK, south to NC, TN, OK, TX, NM, CA, and Baja California. Very

abundant and weedy in large parts of n. and w. North America, sometimes grown for ornament (especially dried arrangements) in our area. [= C, FNA, G, K, S, SE, W, Z; > *A. margaritacea* var. *angustior* (Miquel) Nakai – F; > *A. margaritacea* var. *intercedens* Hara – F]

Antennaria Gaertner 1791 (Pussytoes)

A genus of about 70 species, herbs, of temperate and subtropical areas. Of our species, *A. neglecta*, *A. solitaria*, *A. virginica*, and *A. plantaginifolia* are sexual diploids. *A. parlinii* is of multiple hybrid origin, includes sexual and asexual populations, and is derived from *A. plantaginifolia*, *A. solitaria*, and *A. racemosa*. *A. howellii* is strictly asexual, and is derived from *A. plantaginifolia*, *A. racemosa*, *A. virginica*, and *A. neglecta* (Bayer 1985). For reasons discussed in Bayer & Stebbins (1982) and parallel to those applied in this work to allopolyploid taxa in *Eupatorium*, the treatment of Bayer (1985) and Bayer & Stebbins (1993, 1982) is preferable to Cronquist's treatments, used in most of the floras covering or approaching our area. Much remains to be learned about the relative habitats and distributions of the various taxa in our area. References: Bayer in FNA (2006a); Bayer & Stebbins (1993)=Z; Bayer & Stebbins (1982)=Y; Arriagada (1998)=X; Cronquist (1980)=SE; Bayer (1985); Bayer & Stebbins (1987); Bayer (1984). Key closely adapted from Z, Y.

1 Flowering stalks with 1 head.....***A. solitaria***
1 Flowering stalks with 2 or more heads.
  2 Basal leaves prominently 3-5 (-7)-nerved, mostly > 1.5 cm wide.
    3 Pistillate involucres 5-7 mm high; pistillate corollas 3-4 mm high; staminate corollas 2-3.5 mm high; basal leaves tomentose on the upper surface; young stolons mostly ascending; staminate and pistillate plants equally common .....***A. plantaginifolia***
    3 Pistillate involucres 7-10 mm high; pistillate corollas 4-7 mm high; staminate corollas 3.5-5 mm high; basal leaves tomentose or glabrous on the upper surface; young stolons mostly decumbent; sexual and apomictic populations present.
      4 Basal leaves tomentose on the upper surface (becoming glabrate in age); summit of young cauline stem usually glandless.....***A. parlinii ssp. fallax***
      4 Basal leaves glabrous or nearly so on the upper surface (even when young); summit of young cauline stem usually with purple glandular hairs.....***A. parlinii ssp. parlinii***
  2 Basal leaves prominently 1-nerved (sometimes with 2 additional obscure veins), mostly < 1.5 cm wide.
    5 Young and mature basal leaves glabrous on the upper surface; phyllary tips whitish; flags (flat scarious appendages similar to the tips of phyllaries on the tip of the leaf) present on the upper cauline leaves; species apomictic, populations consisting of pistillate plants only .....***A. howellii ssp. canadensis***
    5 Young basal leaves pubescent on the upper surface, mature leaves either remaining pubescent or becoming glabrous with age; phyllary tips white, ivory, to light brown; flags present or absent on the upper cauline leaves; species apomictic or sexual.
      6 Largest basal leaves < 6.0 mm wide and < 20 mm long; pistillate involucres 4.5-7 mm high; species sexual, populations consisting of both pistillate and staminate plants; [of shale barrens from w. VA northward and westward].....***A. virginica***
      6 Largest basal leaves > 6.0 mm wide and > 20 mm long; pistillate involucres 7-10 mm high; species apomictic or sexual; [collectively of various habitats and more widespread].
        7 Middle and upper cauline leaves tipped with flags; mature basal leaves glabrous, young basal leaves pubescent, glabrescent with age; species sexual, populations consisting of both pistillate and staminate plants.....***A. neglecta***
        7 Middle and upper cauline leaves blunt or with subulate tips (only those leaves immediately around the corymb with flags); mature and young basal leaves pubescent; species apomictic, populations consisting of pistillate plants only.
          8 Basal leaves spatulate, with a distinct petiole; stolons mostly 5-8 cm long, with leaves along the stolon almost equal in size to those of the terminal rosette.....***A. howellii ssp. neodioica***
          8 Basal leaves oblanceolate, lacking a distinct petiole; stolons mostly 8-12 cm long, with leaves along the stolon smaller than those of the terminal rosette.....***A. howellii ssp. petaloidea***

Antennaria howellii Greene *ssp.* ***canadensis*** (Greene) Bayer. Mt (VA): dry woodlands; rare? Newfoundland wet to Yukon, south to VA, WV, OH, IN, and MN. [= FNA, K, Z; = *A. neglecta* Greene var. *canadensis* (Greene) Cronquist – C; = *A. canadensis* Greene – F; = *A. neglecta* Greene var. *randii* (Fernald) Cronquist – G, SE; = *A. neodioica* Greene ssp. *canadensis* (Greene) Bayer & Stebbins – Y]

Antennaria howellii Greene *ssp.* ***neodioica*** (Greene) Bayer. Mt, Pd (NC, VA): dry woodlands. Newfoundland west to North West Territory, south to NC, TN, KS, CO, and OR. [= FNA, K, Z; = *A. neglecta* Greene var. *neodioica* (Greene) Cronquist – C; > *A. neodioica* Greene var. *neodioica* – F; > *A. neodioica* Greene var. *attenuata* Fernald – F; = *A. neglecta* Greene var. *attenuata* (Fernald) Cronquist – G, SE; = *A. neodioica* Greene ssp. *neodioica* – Y]

Antennaria howellii Greene *ssp.* ***petaloidea*** (Fernald) Bayer, Field Pussytoes. Mt (NC, VA), Pd (VA): dry woodlands; rare. March-May. Newfoundland west to British Columbia, south to NC, WV, IN, IL, CO, and OR. [= FNA, K, Z; = *A. neglecta* Greene var. *petaloidea* (Fernald) Cronquist) – C; = *A. petaloidea* Fernald var. *petaloidea* – F; < *A. neglecta* Greene var. *neglecta* – G, SE; = *A. neodioca* Greene ssp. *petaloidea* (Fernald) Bayer & Stebbins – W]

Antennaria neglecta Greene, Field Pussytoes. Pd (NC, VA), Mt (VA): dry woodlands and fields; rare? Nova Scotia west to North West Territory, south to VA, KY, AR, OK, and CO. *A. neglecta* is a sexual diploid ancestor of the *A. howellii* complex (FNA). [= F, FNA, K, X, Y, Z; = *A. neglecta* var. *neglecta* – C; < *A. neglecta* Greene var. *neglecta* – G, SE]

Antennaria parlinii Fernald *ssp.* ***fallax*** (Greene) Bayer & Stebbins, Big-head Pussytoes. Pd, Cp, Mt (NC, VA), {GA, SC}: dry woodlands; common. Late March-early May. Nova Scotia west to MN, south to GA, AL, MS, LA, and TX. [= FNA, K, X, Z; = *A. plantaginifolia* (Linnaeus) Richardson var. *ambigens* (Greene) Cronquist – RAB, C, G, SE; = *A. fallax* Greene var. *calophylla* (Greene) Fernald – F; > *A. calophylla* Greene – S; > *A. fallax* Greene – S; < *A. parlinii* – W]

Antennaria parlinii Fernald *ssp.* ***parlinii***, Parlin's Pussytoes. Mt, Pd, Cp (NC, VA), {GA}: woodlands, roadbanks; common. Late March-early May. Nova Scotia west to Saskatchewan, south to GA, AL, MS, LA, and TX. [= FNA, K, X, Z; = *A. plantaginifolia* (Linnaeus) Richardson var. *arnoglossa* (Greene) Cronquist – RAB, G, SE; = *A. plantaginifolia* var. *parlinii*

(Fernald) Cronquist – C; > *A. parlinii* Fernald var. *parlinii* – F; > *A. parlinii* var. *arnoglossa* (Greene) Fernald – F; < *A. parlinii* – W]

Antennaria plantaginifolia (Linnaeus) Richardson, Plantain Pussytoes. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry woodlands; common (rare in FL). Late March-early May. Nova Scotia west to Saskatchewan, south to FL, AL, MS, AR, and OK. *A. plantaginifolia* is a sexual diploid ancestor of the *A. howellii* complex (FNA). [= FNA, K, W, X, Z, WH; = *A. plantaginifolia* var. *plantaginifolia* – RAB, C, G, SE; > *A. plantaginifolia* var. *plantaginifolia* – F; > *A. plantaginifolia* var. *petiolata* (Fernald) Heller – F; > *A. plantaginifolia* – S; > *A. caroliniana* Rydberg – S; > *A. plantaginifolia* – S]

Antennaria solitaria Rydberg, Southern Single-head Pussytoes. Pd, Mt, Cp (NC, VA), {GA, SC}: forests and woodlands, often mesic; uncommon. Late March-early May. VA, WV, sw. PA, and s. IN south to GA, LA, and OK. *A. solitaria* is a sexual diploid ancestor of the *A. parlinii* complex (FNA). [= RAB, C, F, FNA, G, K, S, SE, W, X, Z]

Antennaria virginica Stebbins, Shale-barren Pussytoes. Mt, Pd (VA): shale barrens and other dry, rocky habitats; uncommon. C. PA and w. VA west to OH. *A. virginica* is a sexual diploid (and tetraploid) ancestor of the *A. howellii* complex (FNA). [= C, FNA, K, W, Y, Z; > *A. virginica* var. *virginica* – F; > *A. virginica* var. *argillicola* Stebbins – F; = *A. neglecta* Greene var. *argillicola* (Stebbins) Cronquist – G, SE]

Anthemis Linnaeus 1753 (Chamomille)

A genus of about 175-210 species, herbs, mainly Eurasian. References: Watson in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z. Key adapted from C. [also see *Chamaemelum, Cota*]

1 Rays yellow ..... *[see **Cota tinctoria**]*
1 Rays white.
  2 Rays sterile and usually neutral; receptacle chaffy only toward the middle ..... ***A. cotula***
  2 Rays pistillate and fertile; receptacle chaffy throughout.
    3 Achenes not tuberculate; leaves not glandular-punctate beneath ..... ***A. arvensis***
    3 Achenes tuberculate; leaves glandular-punctate beneath ..... *[**A. secundiramea**]*

* ***Anthemis arvensis*** Linnaeus, Corn Chamomille. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): roadsides, disturbed areas; common (rare in FL), native of Europe. Late April-July. Var. *agrestis* differs from var. *arvensis* in having chaff shorter than the disk flowers; both varieties apparently occur in our area. [= RAB, C, FNA, G, S, SE, W, WH, Z; > *A. arvensis* var. *arvensis* – F, K; > *A. arvensis* var. *agrestis* (Wallroth) A.P. de Candolle – F, K]

* ***Anthemis cotula*** Linnaeus, Mayweed, Stinking Chamomille, Mayweed, Dog-fennel. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): roadsides, disturbed areas; uncommon (rare in FL), native of Eurasia. May-July. [= RAB, C, F, FNA, G, K, SE, W, WH, Z; = *Maruta cotula* (Linnaeus) A.P. de Candolle – S]

* *Anthemis secundiramea* Bivona-Bernardi. Cp (VA): railroad embankment; rare, native of Mediterranean Europe, probably merely a waif and not established. [= C, F, FNA, K, SE]

Aphanostephus A.P. de Candolle 1836 (Doze-daisy)

A genus of 4 species, of s. United States and Mexico. References: Nesom in FNA (2006b).

Aphanostephus skirrhobasis (Alphonse deCandolle) Trelease *var.* ***thallasius*** Shinners, Dune Doze-daisy. Cp (FL): dunes, disturbed coastal sands; rare. S. LA west to coastal TX and Tamaulipas; scattered in n. FL, both Panhandle FL (Bay and Escambia counties) and ne. FL (St. Johns County) (Wunderlin & Hansen 2004). [= FNA, K, SE, WH] {add S synonymy}

Arctium Linnaeus 1753 (Burdock)

A genus of about 11 species (though circumscription remains uncertain), herbs, of the temperate Old World. References: Keil in FNA (2006a); Cronquist (1980)=SE; Duistermaat (1996)=Z.

1 Inner phyllaries constricted above the middle, widened toward the truncate (or rarely acuminate) apex ..... *[**A. tomentosum**]*
1 Inner phyllaries never constricted above the middle, gradually narrowing toward the acute to acuminate apex.
  2 Petiole of the basal leaves solid; heads in the upper part of the inflorescence on peduncles > 2.5 cm long; heads corymbosely arranged on the main branches ..... ***A. lappa***
  2 Petiole of the basal leaves hollow (at least toward its base); heads in the upper party of the inflorescence on peduncles < 2 cm long; heads racemosely arranged on the main branches.
    3 Heads 1.1-2.4 cm in diameter; heads on terminal branches sessile or pedunculate; middle phyllaries < 1.8 mm wide; corolla with glandular hairs ..... ***A. minus***
    3 Heads 1.9-2.9 cm in diameter; heads on terminal branches sessile; middle phyllaries (1.6-) 1.7-2.5 mm wide; corolla glabrous ..... *[**A. nemorosum**]*

* ***Arctium lappa*** Linnaeus, Great Burdock. Mt (NC): fields and roadsides; rare, native of Eurasia. July-November. [= RAB, C, F, FNA, G, K, SE, Z]

* ***Arctium minus*** Bernhardi, Common Burdock. Mt (GA, NC, SC), Pd (NC, SC, VA), Cp (SC, VA): pastures, barnyards, roadsides, other disturbed areas; common (uncommon in Piedmont and Coastal Plain), native of Eurasia. Late June-November. [= RAB, C, F, FNA, K, S, SE, W, Z; < *A. minus* – G; = *A. minus* ssp. *minus*]

* *Arctium nemorosum* Lejeune & Courtois. Reported for VA by Kartesz (1999) on the basis of Fernald (1950); it is probable that this record is a misidentification. [= C, F, FNA, Z; < *A. minus* – G; = *A. vulgare* (Hill) Evans – K; = *A. minus* Bernhardi ssp. *nemorosum* (Lejeune & Courtois) Syme]

* *Arctium tomentosum* P. Miller, Cotton Burdock. Material purporting to be this taxon from Union County, SC, and the basis of its occurrence in that state, is actually a pubescent form of *A. minus*. May-November. [= C, F, FNA, G, K, SE, Z; = *A. nemorosum* Lejeune & Courtois – RAB, misapplied]

Arctotis Linnaeus 1753 (African-daisy)

A genus of about 60 species, annual and perennial herbs, native of South Africa. References: Mahoney in FNA (2006a); McKenzie et al. (2006).

* *Arctotis stoechadifolia* P.J. Bergius, Blue-eyed African-daisy. {SC}. {specimen at NCU} [= FNA, K]

Arnica Linnaeus 1753 (Arnica)

A genus of about 29-32 species, perennial herbs, north temperate, boreal, and arctic. References: Wolf in FNA (2006c); Cronquist (1980)=SE.

Arnica acaulis (Walter) Britton, Sterns, & Poggenburg, Leopard's-bane, Southeastern Arnica. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): pine savannas, sandhills, clayey or sandy woodlands; common (rare in FL). Late March-early June. DE and se. PA (where on serpentine) south to Panhandle FL, on the Coastal Plain and lower Piedmont. [= RAB, C, F, FNA, G, GW, K, S, SE; = *Doronicum acaule* Walter]

Arnoglossum Rafinesque 1817 (Indian-plantain)

A genus of about 8 species, herbs, of e. North America. References: Anderson in FNA (2006b); Cronquist (1980)=SE; Anderson (1998)=Z; Barkley (1999)=Y; Kral & Godfrey (1958)=X; Ward (2004c)=Q; Harper (1905)=V; Pippen (1978)=U; Robinson (1974).

1 Larger leaves palmately veined, cordate at the base, either strongly toothed or lobed.
  2 Leaves glaucous beneath; stem glaucous and terete (or slightly striate) ..... ***A. atriplicifolium***
  2 Leaves green beneath; stem green and conspicuously grooved ..... ***A. reniforme***
1 Larger leaves parallel-veined (the primary veins parallel and converging toward the leaf apex), lanceolate to elliptic-lanceolate, cuneate at the base, entire to remotely toothed (usually fewer than 10 teeth per leaf).
  3 Phyllaries not wing-keeled; stem terete.
    4 Basal and lower cauline leaves linear to lanceolate, green to slightly glaucous below; plants 0.5-2.5 m tall; [usually of pine savannas, se. NC south to s. FL, west to e. TX] ..... ***A. ovatum var. lanceolatum***
    4 Basal and lower cauline leaves ovate to ovate-lanceolate, glaucous beneath; plants 1.5-2.5 m tall; [usually of shaded, moist to bottomland habitats, e. GA west to e. LA] ..... ***A. ovatum var. ovatum***
  3 Phyllaries wing-keeled; stem strongly angled or sulcate.
    5 Basal and low-cauline leaves truncate or subcordate at the base; larger leaves irregularly angulate-lobed or toothed, often somewhat hastate at the base; corolla usually pale lavender ..... ***A. diversifolium***
    5 Basal and low-cauline leaves cuneate at the base; larger leaves entire, crenate, sinuate, but not lobed or hastate; corolla creamy yellow (or gtreenish or tinged with pink).
      6 Phyllary wings highest towards the base; phyllary wings chalky white, erose; leaves with main lateral veins running with the midrib for 2-4 cm into the blade before diverging; [of FL Panhandle] ..... ***A. album***
      6 Phyllary wings uniform or highest towards the tip; phyllary wings pale green, entire; leaves with main lateral veins diverging from the midrib at or very near the base of the blade, not concurrent; [collectively more widespread].
        7 Involucres 12-15 mm high; corollas (9-) 11-12 mm long ..... ***A. floridanum***
        7 Involucres 8-14 mm high; corollas 7-11.5 mm long.
          8 Involucres (9.5-) 10-12 (-14) mm high; corollas 8-10 (-11.5) mm long; leaves usually with 7-9 main parallel veins; mid-stem leaves petiolate, with rounded bases) ..... ***[A. plantagineum]***
          8 Involucres (8-) 9.5-10 (-12) mm high; corollas 6-8 (-9.5) mm long; leaves usually with 3-5 main parallel veins; mid-stem leaves sessile, with broadly cuneate bases ..... ***A. sulcatum***

Arnoglossum album L.C. Anderson. Cp (FL): wet pine savannas; rare. Endemic to FL Panhandle (Bay and Gulf counties). [= FNA, K, WH, Z]

Arnoglossum atriplicifolium (Linnaeus) H.E. Robinson, Pale Indian-plantain. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): mesic forests, woodland edges, clearings; common (rare in FL). June-October. NY, MN, and NE south to Panhandle FL and LA (attribution to MA is in error, A.Haines, pers.comm.). [= FNA, K, WH, Y, Z; = *Cacalia atriplicifolia* Linnaeus – RAB, C, F, G, SE, U, W; = *Mesadenia atriplicifolia* (Linnaeus) Rafinesque – S]

Arnoglossum diversifolium (Torrey & A. Gray) H.E. Robinson, Variable-leaf Indian-plantain. Cp (AL, FL, GA): calcareous swamps; rare. Sw. GA and Panhandle FL, west to s. AL; disjunct in nw. peninsular FL. May-August; July-September. [= FNA, GW, K, WH, Y, Z; = *Mesadenia diversifolia* (Torrey & A. Gray) Greene – S; = *Cacalia diversifolia* Torrey & A. Gray – SE, U, X]

Arnoglossum floridanum (A. Gray) H.E. Robinson. Cp (FL): sandhills; uncommon. Ne. FL and e. FL Panhandle south to c. peninsular FL. [= FNA, K, WH, Z; = *Cacalia floridana* A. Gray – SE, U, X; = *Mesadenia floridana* (A. Gray) Greene – S]

Arnoglossum ovatum (Walter) H.E. Robinson *var.* ***lanceolatum*** (Nuttall) D.B. Ward, Savanna Indian-plantain. Cp (FL, GA, NC, SC): wet savannas, especially over coquina limestone ("marl"); rare. Late July-October. Se. NC to s. FL, west to e. TX. [= Q; < *Arnoglossum ovatum* – FNA, GW, K, WH, Y, Z; = *Cacalia lanceolata* Nuttall – RAB; < *Cacalia ovata* Walter – SE, U; = *Mesadenia lanceolata* (Nuttall) Rafinesque – S; > *Mesadenia lanceolata* var. *lanceolata* – V; > *Mesadenia lanceolata* var. *virescens* Harper – V; = *Cacalia lanceolata* var. *lanceolata* – X]

Arnoglossum ovatum (Walter) H.E. Robinson *var.* ***ovatum***, Broadleaf Indian-plantain. Cp (FL, GA), Pd (GA): bottomlands, bay forests, moist or wet forests; uncommon. Late July-October. E. GA west to e. LA. The division of *A. ovatum* into two taxa (species or, as done here, varieties) needs additional study. [= Q; < *Arnoglossum ovatum* – FNA, GW, K, WH, Y, Z; < *Cacalia ovata* Walter – SE, U; > *Mesadenia elliottii* R.M. Harper – S; > *Mesadenia maxima* R.M. Harper – S; = *Cacalia lanceolata* var. *elliottii* (Shinners) Kral & Godfrey – X]

Arnoglossum reniforme (Hooker) H.E. Robinson, Great Indian-plantain. Mt (GA, NC, VA): cove forests, other mesic forests; common (rare in VA). June-October. The very large, reniform leaves (sometimes up to 80 cm across) are conspicuous in rich cove forests. The species is widespread in e. North America, south to n. GA (Jones & Coile 1988). [= FNA, Y, Z; = *Arnoglossum muehlenbergii* – K; = *Cacalia muhlenbergii* (Schultz 'Bipontinus') Fernald – RAB, C, F, G, SE, U, V, W; = *Mesadenia reniformis* Rafinesque – S]

Arnoglossum sulcatum (Fernald) H.E. Robinson, Grooved-stem Indian-plantain. Cp (GA): bottomland forests; uncommon (rare in GA). Sw. GA and Panhandle FL west to s. AL. [= FNA, GW, K, Y, WH, Z; = *Mesadenia sulcata* (Fernald) Harper – S; = *Cacalia sulcata* Fernald – SE, U, X]

Arnoglossum plantagineum Rafinesque. Reported for sc. SC, in the unpublished flora of the Savannah River Site by Batson, Angerman, and Jones. It is known definitely from the Nashville Basin of c. TN (Chester, Wofford, & Kral 1997), AL, MS, LA, and KY. [= FNA, K, Y, Z; = *Cacalia tuberosa* Nuttall – G; = *Mesadenia tuberosa* (Nuttall) Britton – S; = *Cacalia plantaginea* (Rafinesque) Shinners – SE, U]

Artemisia Linnaeus 1753 (Wormwood, Mugwort, Sage)

If defined (as here) to include the segregate genus *Seriphidium*, a genus of about 500 species, shrubs and herbs, north temperate, boreal, and arctic. References: Shulz in FNA (2006a); Ling Yeou-Ruenn (1995)=Z; Cronquist (1980)=SE; Arriagada & Miller (1997)=Y. Key based primarily on C.

1 Disk flowers sterile, with abortive ovaries; plant not aromatic when fresh; [subgenus *Dracunculus*] ..... ***A. caudata***
1 Disk flowers fertile, with normal ovaries; plant variously aromatic or not when fresh.
2 Receptacle bearing dense long hairs between the flowers; plant strongly aromatic when fresh; [subgenus *Absinthium*] ..... ***A. absinthium***
2 Receptacle not pubescent; plant variously aromatic or not when fresh; [subgenus *Artemisia*].
3 Leaves green, essentially glabrous on the lower surface; annuals or biennials from a taproot; plants lacking nonflowering shoots.
4 Inflorescence obviously paniculate, the branches evident, the heads on slender peduncles; involucres 1-2 mm high and 1-2 mm wide; fresh plants sweet-aromatic ..... ***A. annua***
4 Inflorescence spike-like, the heads crowded and hiding the branches; involucres 2-3 mm high, 2-3 mm wide; fresh plants not aromatic ..... ***A. biennis var. biennis***
3 Leaves tomentose on the lower surface, densely so in many species; perennials from a branched rhizome or woody caudex; plants with nonflowering shoots.
5 Principal leaves 2-3-pinnatifid, the terminal segments < 1.5 mm wide; plant a shrub or suffrutescent herb.
6 Leaves green above, 3-6 cm long ..... ***A. abrotanum***
6 Leaves white-tomentose above, 1-3 cm long ..... ***[A. pontica]***
5 Principal leaves entire to 2-pinnatifid, the terminal segments > 2 mm wide; plant an herb (sometimes somewhat woody at the base).
7 Involucres 6-10 mm high; disk corollas 3.2-4 mm long ..... ***A. stelleriana***
7 Involucres 2.5-5 mm high; disk corollas 1-3 mm long.
8 Leaves entire to 1-pinnatifid; leaves lacking stipule-like lobes at the base ..... ***A. ludoviciana***
8 Leaves 2-pinnatifid; leaves with 1-2 stipule-like lobes at the base ..... ***A. vulgaris***

* ***Artemisia abrotanum*** Linnaeus, Southernwood, Lad's Love, Old Man. Pd? (NC), {SC}: disturbed areas; rare, native of Eurasia. August-September. Also reported as a waif in e. VA (Reed 1964). [= C, F, FNA, G, K, S, SE, Y, Z]

* ***Artemisia absinthium*** Linnaeus, Common Wormwood, Absinthium, Absinthe. Pd? (NC), {SC}: disturbed areas; rare, native of Europe. July-September. [= C, F, FNA, G, K, S, SE, Y, Z; > *A. absinthium* var. *insipida* Stechmann]

* ***Artemisia annua*** Linnaeus, Sweet Wormwood, Annual Mugwort, Sweet Annie. Cp (SC, VA), Pd, Mt (VA), {NC?}: roadsides, disturbed areas, wool-combing waste (Nesom 2004d); uncommon, native of Asia and e. Europe. August-November. [= C, F, FNA, G, K, S, SE, Y, Z]

* ***Artemisia biennis*** Willdenow *var.* ***biennis***, Biennial Wormwood. Cp (SC): waste area around wool-combing mills; rare, native of the w. United States. Reported for SC by Nesom (2004d); also reported to be naturalized as far east as TN and WV (Hardy County). [= C, K; < *A. biennis* – F, FNA] {synonymy incomplete}

* ***Artemisia caudata*** Michaux. Cp (SC): sandy woodlands; rare, presumably introduced from western United States. September-October. [= RAB, S, Z; = *A. campestris* Linnaeus ssp. *caudata* (Michaux) H.M. Hall & Clements – FNA, K, SE,

WH, Y; > *A. caudata* var. *caudata* – F; > *A. caudata* var. *calvens* Lunell – F; = *Oligosporus caudatus* (Michaux) Poljakov; = *Oligosporus campestris* (Linnaeus) Cassini ssp. *caudatus* (Michaux) W.A. Weber]

* ***Artemisia ludoviciana*** Nuttall, White Sage, Prairie Sage. Pd (NC, SC, VA), Cp (FL, NC, VA), Mt (VA), {GA}: roadsides, disturbed areas; common (rare in FL), native of western North America. Late August-November. [= WH; > *A. ludoviciana* – RAB, Z; = *A. ludoviciana* var. *ludoviciana* – C, G, SE; > *A. ludoviciana* Nuttall var. *gnaphalodes* (Nuttall) Torrey & A. Gray – F; > *A. ludoviciana* var. *ludoviciana* -- F; = *A. ludoviciana* ssp. *ludoviciana* – FNA, K]

* ***Artemisia stelleriana*** Besser, Beach Wormwood, Dusty Miller, Hoary Mugwort. Cp (NC, VA): sandy roadsides, dunes; rare, native of Japan and ne. Asia. May-September. This plant is reported (with documenting photograph) as naturalized and spreading in Nags Head (Dare County, NC) (Graetz 1973). [= C, F, FNA, G, K, SE, WH, Z; = *A. stellerana* – Y, orthographic variant]

* ***Artemisia vulgaris*** Linnaeus, Mugwort, Felon Herb. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, VA): roadsides, pastures, disturbed areas; common, native of Eurasia. Late August-November. [= RAB, C, FNA, S, SE, WH, Y, Z; > *A. vulgaris* var. *vulgaris* – F, K]

* *Artemisia pontica* Linnaeus, Roman Wormwood, Green-ginger, native of Europe, is naturalized at least as far south as DE, se. PA (Rhoads & Klein 1993), and KY. [= C, F, FNA, K] {synonymy incomplete}

Aster Linnaeus 1753 (Aster)

It is now abundantly clear that the traditional, broad circumscription of *Aster*, as a genus of some 250 species of North America and Eurasia, is untenable. All of our native asters have affinities elsewhere than with Old World Aster; most are now placed in *Symphyotrichum* and *Eurybia*, with fewer species in *Ampelaster*, *Doellingeria*, *Ionactis*, *Oclemena*, and *Sericocarpus*. These changes will undoubtedly cause uproar. It may be worth noting for those that consider the dissolution of *Aster* as radical, that most of the segregate genera were recognized in the 19th century, and many have been widely recognized for much of the time since. For instance, *Sericocarpus* and *Doellingeria* were both segregated from *Aster* in the early 1830's, and were frequently recognized as distinct, including by Small (1903, 1913, 1933); *Sericocarpus* was in fact usually regarded as a good genus until sunk by Cronquist. References: Brouillet in FNA (2006b); Semple & Brouillet (1980a, 1980b); Jones (1980a, 1980b); Brouillet & Semple (1981); Reveal & Keener (1981); Jones & Young (1983); Jones (1984); Semple, Chmielewski, & Lane (1989); Nesom (1993a, 1993b, 1994a, 1994b, 2000b); Semple, Heard, & Xiang (1996); Noyes & Rieseberg (1999); Nesom (1994)=X; Semple, Heard, & Xiang (1996); Cronquist (1980)=SE; R. Jones (1992); Lamboy (1992); Nesom (1997); Xiang & Semple (1996). [also see *Ampelaster, Doellingeria, Eurybia, Ionactis, Oclemena, Sericocarpus, Symphyotrichum*]

* ***Aster tataricus*** Linnaeus f., Tartarian Aster. Pd (NC, VA), Mt (GA, VA), Mt (VA): frequently cultivated, sometimes persisting or weakly spreading; rare, native of Eurasia. September-November. [= RAB, C, FNA, G, K, SE, W, X]

Astranthium Nuttall 1840 (Western-daisy)

A genus of about 11 species, herbs, of sc. North America and Mexico. References: Nesom in FNA (2006b); Cronquist (1980)=SE; Nesom (2005a)=Z; DeJong (1965)=Y; Nesom (2000b).

Astranthium integrifolium (Michaux) Nuttall. Mt (GA): limestone glades; rare. Nc. KY south through c. TN to nw. GA and ne. AL (primarily in the Interior Low Plateau); disjunct in c. MS and also disjunct in nc. WV, where perhaps introduced. The related *A. ciliatum* (Rafinesque) Nesom of the Ozarkian region and Texas is sometimes treated as a variety, subspecies, or unnamed component of *A. integrifolium*, but see Nesom (2005a) for rationale for recognition at the specific rank. The report for NC by Kartesz (1999) is erroneous; the cited documentation does not mention NC. [= FNA, Z; = *A. integrifolium* var. *integrifolium* – C; = *A. integrifolium* ssp. *integrifolium* – K, Y; < *A. integrifolium* – F, G, SE, W]

Baccharis Linnaeus 1753 (Silverling, High-tide Bush, Mullet Bush, Groundsel Tree)

A genus of about 350-450 species, shrubs, perennial herbs, and trees, of tropical, subtropical, and warm temperate America. References: Sundberg & Bogler in FNA (2006b); Nesom (2000b); Cronquist (1980)=SE. Key based in part on SE.

1 Leaves linear, 1-3 mm wide, entire ..... ***B. angustifolia***
1 Leaves obovate, oblanceolate, or elliptic, the larger > 7 mm wide and generally coarsely toothed toward the tip.
  2 Leaves entire, spatulate-obovate, 1.5-3 (-3.5) cm long (including the petiole) ..... *[B. dioica]*
  2 Leaves (at least the larger) with coarse teeth and > 3.5 cm long (including the petiole).
    3 Most of the heads sessile (a few pedunculate), the glomerules scattered along leafy branches in the axils of well-developed leaves; [strictly of the outer Coastal Plain, not spread inland as a weed] ..... ***B. glomeruliflora***
    3 Most of the heads pedunculate (a few sessile), the glomerules grouped into terminal paniculiform inflorescences; [of the outer Coastal Plain and also spread extensively inland as a weed] ..... ***B. halimifolia***

Baccharis angustifolia Michaux, False-willow. Cp (FL, GA, NC, SC): interdune swales, wet hammocks, marsh edges; uncommon (rare in GA, NC, SC). September-October. Ne. NC (Dare County) south to s. FL, west to LA; Bahamas. [= RAB, FNA, GW, K, S, SE, WH]

Baccharis glomeruliflora Persoon. Cp (FL, GA, NC, SC): wet hammocks, marsh edges, interdune swales; common (rare in GA, NC, SC). October-November. Se. NC (Brunswick County) south to s. FL, west to MS; West Indies. [= RAB, FNA, GW, K, S, SE, WH]

Baccharis halimifolia Linnaeus, Silverling, High-tide Bush, Mullet Bush, Groundsel Tree. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC): fresh and brackish marshes, marsh borders, hammocks, moist abused land, roadsides, ditches, old fields, and a wide variety of disturbed areas; common (rare in Mountains and VA Piedmont). September-October. Se. MA south to s. FL, west to TX, AR, and OK; West Indies. *B. halimifolia* is becoming increasingly common inland, and can be an aggressive invader after silvicultural disturbance. [= RAB, C, F, FNA, G, GW, K, S, SE, WH]

Baccharis dioica Vahl, Broombush False-willow. Dunes and shores. S. AL; s. FL; West Indies. [= FNA, K, S, SE, WH]

Balduina Nuttall 1818 (Honeycomb-head, Balduina)

A genus of 3 species, herbs, of se. North America. References: Keener in FNA (2006c); Parker & Jones (1975)=Z; Cronquist (1980)=SE.

Identification notes: The common name alludes to the honeycomb-like texture of the receptacle, made up of connected receptacular bractlets which surround the achenes. This condition is diagnostic of the genus, and can be seen even when the plant is in flower by stripping the flowers from the receptacle. Superficially, the perennial species resemble some *Helenium* (particularly *H. pinnatifidum* and *H. vernale*), but these bloom months earlier. The punctate leaves are very distinctive.

1 Plant an annual or biennial; cauline leaves numerous, linear, 0.5-1.9 mm wide; outer involucral bracts 0.6-1.7 mm wide, lanceolate, acuminate; disk 6-15 mm wide; pappus scales obovate-orbicular, 0.3-0.6 mm long ..... ***[B. angustifolia]***
1 Plant a perennial; cauline leaves few, linear-spatulate, 2-7 mm wide; outer involucral bracts 1.7-3.1 mm wide, ovate, acute; disk (10-) 15-25 mm wide; pappus scales lanceolate, 1.1-2.1 mm long.
  2 Disk corollas purple; basal leaves linear-spatulate, (7-) avg. 14 (-32) cm long, about 20× as long as wide; cauline leaves 3.8-6.2 cm long; outer phyllaries 2.9-5.4 mm long; inner phyllaries 4.5-7.6 mm long; ray flower ligules 2.3-4.7 mm wide at apex ..... ***B. atropurpurea***
  2 Disk corollas yellow to reddish-orange; basal leaves spatulate, (5-) avg. 7.5 (-10.5) cm long; about 8× as long as wide; cauline leaves 2.7-4.3 cm long; outer phyllaries 4-7.2 mm long; inner phyllaries 5.1-11 mm long; ray flower ligules 3.2-8.6 mm wide at apex ..... ***B. uniflora***

Balduina angustifolia (Pursh) B.L. Robinson. Cp (FL, GA): sandhills and other dry, sandy soils; common. GA south to s. FL, west to s. MS; it should be sought in s. SC. [= FNA, K, SE, WH, Z; = *Actinospermum angustifolium* (Pursh) Torrey & A. Gray – S]

Balduina atropurpurea R.M. Harper, Bog Honeycomb-head, Purple Honeycomb-head, Purple Balduina. Cp (FL, GA, NC, SC): peaty seepage bogs and wet pine savannas; rare. Late August-early November; October-December. A southeastern Coastal Plain endemic, very rare and disjunct in se. NC and nc. SC (where not recently seen), primarily in ne. to sc. GA and ne. FL. [= RAB, FNA, GW, K, SE, Z; = *Endorima atropurpurea* (R.M. Harper) Small – S]

Balduina uniflora Nuttall, Savanna Honeycomb-head, Yellow Balduina. Cp (FL, GA, NC, SC): wet pine savannas and pine flatwoods; common (uncommon in GA and NC, rare in SC). Late July-September. A southeastern Coastal Plain endemic: se. NC and immediately adjacent ne. SC (apparently absent from much of SC), and from extreme s. SC south to ne. FL, FL Panhandle, and west to e. LA. [= RAB, FNA, GW, K, SE, Z; = *Endorima uniflora* (Nuttall) Rafinesque – S]

Bellis Linnaeus 1753 (English Daisy)

A genus of about 8 species, herbs, of Europe. References: Nesom (2000b); Brouillet in FNA (2006b); Cronquist (1980)=SE.

* ***Bellis perennis*** Linnaeus, English Daisy. Mt (NC, VA), Pd, Cp (VA): lawns, grassy roadsides; rare, native of Europe. April-May. [= RAB, C, F, FNA, G, K, SE]

Berlandiera A.P. de Candolle 1836 (Green-eyes)

A genus of 4-5 species, perennial herbs and subshrubs, of s. North America and Mexico. References: Pinkava in FNA (2006c); Cronquist (1980)=SE; Nesom & Turner (1998)=Z.

1 Leaves mainly cauline; leaves unlobed; disk flowers red to maroon; [of nc. SC south to n. FL, west to TX] ..... ***B. pumila var. pumila***
1 Leaves basally disposed; leaves deeply lobed; disk flowers yellow; [of n. FL southward] ..... ***B. subacaulis***

Berlandiera pumila (Michaux) Nuttall *var.* ***pumila***, Eastern Green-eyes. Cp (FL, GA, SC): sandhills, disturbed sandy areas; common. Late May-November. Nc. SC south to n. peninsular FL, west to s. AL; w. LA to c. TX. Plants in w. LA and e. TX accepted here as *B. pumila* var. *scabrella* Nesom & Turner (1998) are also considered to represent introgression between *B. pumila* and *B. texana* de Candolle (Pinkava in FNA 2006c). [= K, Z; < *B. pumila* – RAB, FNA, S, SE, WH]

Berlandiera subacaulis (Nuttall) Nuttall, Florida Green-eyes. Cp (FL): sandhills; rare. Endemic to FL, from ne. FL (Clay and Columbia counties) and e. Panhandle FL (Leon, Jefferson, and Taylor counties) south to s. FL (Wunderlin & Hansen 2004). [= FNA, K, S, SE, WH]

Bidens Linnaeus 1753 (Beggar-ticks, Bur-marigold)

A genus of about 240 species, herbs, cosmopolitan. Recent molecular studies suggest that the relationship between *Bidens* and *Coreopsis* is complex, and that changes in taxonomy will be needed to more accurately reflect relationships (Kim et al. 1999; Crawford & Mort 2005). References: Strother & Weedon in FNA (2006c); Cronquist (1980)=SE; Sherff & Alexander (1955)=Z; Ballard (1986)=Y. Key based on FNA.

Identification notes: The involucre of phyllaries is subtended by an additional series of bracteal structures, the **calyculus**.

1 Plant aquatic, the leaves finely divided into segments < 0.5 mm wide; pappus awns 13-25 (-40) mm long ..... ***[B. beckii]***
1 Plant terrestrial or wetland, but not aquatic, the leaf segments > 0.5 mm wide; pappus awns lacking or present, if present < 10 mm long.
2 Inner cypselas more-or-less equally 4-angled, thickest near the middle and equally tapered to both ends; ray florets white, pink, or pale yellow (or absent).
3 Leaves 2-3× dissected, primary lobes > 20, the ultimate segments rounded to acute, 2-10 mm wide; ray florets yellowish .... ***B. bipinnata***
3 Leaves mostly once-pinnate, primary lobes 3-7, the ultimate segments serrate and acute, 8-50 mm wide; ray florets white or absent.
4 Ray florets 5-8, the ligule 5-16 mm long; cypselas 2-awned, the awns 1-2 mm long; outer phyllaries (8-) 12 (-16) ..... ***B. alba var. radiata***
4 Ray florets 0 (or if a few present, the ligule < 3 mm long); cypselas 3 (-5)-awned, the awns 1-3 mm long; outer phyllaries 7-10 ..... ***B. pilosa***
2 Inner cypselas flattened (if 4-angled, the alternating angles acute and obtuse), thickest towards the tip; ray florets yellow or orange (or absent).
5 Most leaves simple, the margins dentate to serrate or incised (with 3-7 lobes).
6 Leaves (except sometimes the lower) sessile; heads usually nodding, at least in age.
7 Rays absent, or present and 2-15 (-18) mm long; pales (receptacular bracts) with tan or yellow tips; outer cypselas (3-) 5-6+ mm long, inner cypselas 4-8 mm long (the margins ± thickened or winged); pappus of (2-) 4 awns (1-) 2-4 mm long ..... ***B. cernua***
7 Rays present, (10-) 15-25 (-30) mm long; pales (receptacular bracts) with orange or red tips; outer cypselas 6-8 mm, inner cypselas 8-10 mm (margins not notably thickened or winged); pappus of 2-4 awns 3-5 mm long ..... ***B. laevis***
6 Leaves with a distinct petiole 1-4 cm long (this sometimes winged); heads erect.
8 Rays 12-25+ mm long; cypselas 2.5-4.5 mm long, the margins not barbed or ciliate ..... ***B. mitis***
8 Rays absent or 2-5 (-12) mm long; cypselas (3-) 6-13 mm long, the margins sometimes barbed or ciliate.
9 Involucres usually campanulate to cylindric, sometimes ± hemispheric; disc florets (6-) 10-25 (-60); cypsela faces usually ± striate, sometimes tuberculate ..... ***[B. bidentoides]***
9 Involucres campanulate to hemispheric or broader; disc florets (5-) 20-60 (-150+); cypsela faces usually smooth or tuberculate (not notably striate).
10 Cypselas ± flattened, sometimes weakly 3 (-4)-angled and 3 (-4)-awned, the faces usually smooth, seldom notably tuberculate; disc corollas 4-lobed, light yellow; anthers usually pale ..... ***B. comosa***
10 Cypselas (at least inner) usually ± 4-angled and 4-awned, the faces usually strigose or tuberculate; disc corollas 5-lobed, orange-yellow; anthers usually blackish ..... ***B. connata***
5 Most leaves **either** 1-pinnately compound, the 3-5 (-7) leaflets petiolulate, **or** -1-2× pinnately lobed.
11 Ray florets 0, or rays 1-3, the laminae 2-3.5 mm long.
12 Calyculus bractlets (3-) 4 (-5), seldom ciliate; disc florets usually 10-20 ..... ***B. discoidea***
12 Calyculus bractlets 5-21, usually ciliate; disc florets 20-150.
13 Calyculus bractlets (5-) 8 (-10); leaves usually 3 (-5)-foliolate ..... ***B. frondosa***
13 Calyculus bractlets 10-16 (-21); leaves usually laciniate or pinnatisect ..... ***B. vulgata***
11 Ray florets (5-) 8-13, the laminae 10-30 mm long.
14 Cypselas 2.5-4× as long as wide ..... ***B. trichosperma***
14 Cypselas 1.5-2 (-2.5)× as long as wide.
15 Cypselas 2.5-5 mm long, the margins not winged, barbed, or ciliate ..... ***B. mitis***
15 Cypselas (4-) 5-8 mm long, the margins usually barbed or ciliate, and often also corky-winged.
16 Calyculus bractlets 8-12 (-16), these (4-) 5-7 (-12) mm long ..... ***B. aristosa***
16 Calyculus bractlets 12-21, these (6-) 8-12 (20) mm long ..... ***B. polylepis***

Bidens alba (Linnaeus) A.P. de Candolle *var.* ***radiata*** (Schultz 'Bipontinus') Ballard ex T.E. Melchert. Cp (FL, GA, NC, SC, VA?): disturbed areas; common (uncommon in GA, NC, SC, rare in VA), adventive from the New World tropics. [= K, Y; < *B. pilosa* Linnaeus – RAB, FNA, S, SE; < *B. alba* – WH; = *B. pilosa* Linnaeus var. *radiata* Schultz 'Bipontinus' – Z]

Bidens aristosa (Michaux) Britton, Midwestern Tickseed-sunflower. Cp, Pd (NC, SC, VA), Mt (GA, NC, SC): marshes, wet meadows, ditches; common. August-October (-November). DE, MD, IL, and MO south to FL and TX (and adventive farther north). [= RAB, C, FNA, G, GW, S, SE, W; > *B. aristosa* var. *aristosa* – F, S, Z; > *B. aristosa* var. *fritcheyi* Fernald – F, Z; > *B. aristosa* var. *mutica* (A. Gray) Gattinger – F, S, Z; < *B. aristosa* – K (also see *B. polylepis*)]

Bidens bipinnata Linnaeus, Spanish Needles. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): floodplains, disturbed areas, gardens, fields, roadsides, ditches; common (uncommon in FL). MA, NY, Ontario, IA, NE, and AZ south to Mexico; also e. Asia. [= RAB, C, F, FNA, G, K, S, SE, W, WH; > *B. bipinnata* var. *bipinnata* – Z]

Bidens cernua Linnaeus, Bur-marigold. Mt (GA, NC, VA), Pd (VA), Cp (GA, VA): marshes, wet medaows, bogs, ditches; common. August-October. Circumboreal, south in North America GA, AL, LA, NM, AZ, and CA. [= RAB, C, FNA, G, GW, K, S, SE, W; > *B. cernua* var. *cernua* – F, Z; > *B. cernua* var. *elliptica* Wiegand – F; > *B. cernua* var. *integra* Wiegand – F]

Bidens comosa (A. Gray) Wiegand, Strawstem Beggar-ticks. Cp, Pd, Mt (VA), {GA, NC, SC}: marshes, bogs, wet meadows, disturbed areas; common. August-October. Newfoundland and British Columbia south to GA, TX, and CA. Closely

related to, and sometimes included in, the Eurasian *B. tripartita*. [< *B. comosa* (A. Gray) Wiegand – C, F, G, S; < *B. tripartita* – RAB, FNA, K]

Bidens connata Muhlenberg, Purplestem Beggar-ticks. Mt (GA), Cp (VA), {NC, SC, VA}: marshes, bogs, wet meadows, disturbed areas; uncommon? August-October. Québec, Ontario, and ND south to GA, AL, and KS. [= C, FNA, G, K, S; < *B. tripartita* Linnaeus – RAB; > *B. connata* var. *anomala* Farwell – F, Z; > *B. connata* var. *connata* – F, Z; > *B. connata* var. *fallax* (Warnstorf) Sherff – F, Z; > *B. connata* var. *petiolata* (Nuttall) Farwell – F, Z]

Bidens discoidea (Torrey & A. Gray) Britton, Few-bracted Beggar-ticks. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, VA): floodplain forests, marshes; (rare in FL). Late August-November. Nova Scotia and MN south to ne. FL, Panhandle FL, and TX. [= RAB, C, F, FNA, G, GW, K, S, SE, W, WH, Z]

Bidens frondosa Linnaeus, Devil's Beggar-ticks. Cp, Pd, Mt (GA, NC, SC, VA): fields, pastures, wet meadows, swamp forests, ditches; common (uncommon in FL). June-October. Nova Scaotia and AK south to FL, TX, CA, and southward. [= RAB, C, FNA, G, GW, K, S, SE, W, WH; > *B. frondosa* var. *frondosa* – F, Z; > *B. frondosa* var. *anomala* Porter – Z]

Bidens laevis (Linnaeus) Britton, Sterns, & Poggenburg, Showy Bur-marigold. Cp (FL, GA, NC, SC, VA), Pd (NC, VA), Mt (VA): marshes, stream banks, ditches; common (uncommon in FL). August-November. ME, NY, IN, MO, NV, and CA southward. [= RAB, C, F, FNA, G, GW, K, SE, W, WH, Z; > *B. laevis* – S; > *B. nashii* Small – S]

Bidens mitis (Michaux) Sherff, Coastal Plain Tickseed-sunflower. Cp (FL, GA, NC, SC), Pd (GA), Mt (NC): brackish marshes, fresh marshes, bogs (inland); uncommon (rare in Mountains). July-October. NJ south to FL, west to TX, primarily Coastal Plain, rare and scattered inland. [= RAB, C, F, FNA, G, GW, K, SE, W, WH, Z; > *B. mitis* var. *leptophylla* (Nuttall) Small – S; > *B. mitis* var. *mitis* – S]

* ***Bidens pilosa*** Linnaeus. Cp (FL, GA?, NC?, SC): waste areas near wool-combing mill, ballast, other disturbed areas; rare, native of tropical America. Reported for NC (Kartesz 1999), perhaps based on confusion with *B. alba*; known from ballast in se. PA (Rhoads & Klein 1993). [= K, WH; > *B. pilosa* – FNA; > *B. pilosa* var. *pilosa* – Z; > *B. pilosa* Linnaeus var. *bimucronata* (Turczaninov) Schultz 'Bipontinus' – Z]

* ***Bidens polylepis*** Blake, Ozark Tickseed-sunflower. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): matrshes, wet meadows, bogs, ditches; uncommon. August-October. NJ, Québec, and CO south to SC, AL, TX, and NM. [= RAB, C, FNA, G, GW, SE, W; > *B. polylepis* var. *polylepis* – F, Z; > *B. polylepis* var. *retrorsa* Sherff – F, Z; < *B. aristosa* – K]

Bidens trichosperma (Michaux) Britton, Northern Tickseed-sunflower. Cp (FL, GA, NC, VA): tidal marshes; uncommon. August-October. Québec, MN, and SD south to GA, LA, and NE. [= FNA; = *B. coronata* (Linnaeus) Britton – RAB, C, G, GW, K, S, SE (name invalid); > *B. coronata* var. *coronata* – F, Z; > *B. coronata* var. *brachyodonta* Fernald – F; > *B. coronata* var. *trichosperma* (Michaux) Fernald – F]

Bidens vulgata Greene, Tall Beggar-ticks. Mt (NC, SC, VA), Pd (NC, VA), Cp (VA): fields, marshes, wet places; uncommon. August-October. Québec and British Columbia south to GA, LA, and CA. [= RAB, C, FNA, G, GW, K, S, SE, W; > *B. vulgata* var. *vulgata* – F, Z]

Bidens beckii Torrey ex Sprengel, Water-marigold, Water Beggar-ticks. South to c. PA and NJ. July-October. This species is sometimes treated in the monotypic genus *Megalodonta*; this is contradicted by molecular evidence, which shows *B. beckii* as a component of *Bidens* (Ganders 2000). [= C, FNA, G; = *Megalodonta beckii* (Torrey ex Sprengel) Greene – F, K; > *Megalodonta beckii* var. *beckii* – Z]

Bidens bidentoides (Nuttall) Britton. Tidal shores and mudflats. NY south to se. PA and e. MD. July-October. [= C, FNA, G, K; > *B. bidentoides* – F; > *B. mariana* Blake – F; > *B. bidentoides* var. *bidentoides* – Z; > *B. bidentoides* var. *mariana* – Z]

* *Bidens tripartita* Linnaeus. Eurasian; not known to be in our area. {combined distribution of *comosa*, *connata*, and *tripartita*: Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): marshes, swamps} [> *B. tripartita* – F, G, W, Z; < *B. comosa* (A. Gray) Wiegand – C, F, G, S; < *B. tripartita* – FNA, K; < *B. tripartita* – RAB, GW (also see *B. connata* and *B. comosa*)] {not keyed}

Bigelowia A.P. de Candolle 1836 (Rayless-goldenrod)

A genus of 2 species (one with 2 varieties), herbs, of se. North America. References: Nesom in FNA (2006b); Anderson (1970)=Z; Cronquist (1980)=SE; Nesom (2000b).

1 Basal leaves many, 1-2 mm wide; plants strongly rhizomatous and colonial; [of dry clayey or rocky places] ..... ***B. nuttallii***
1 Basal leaves few, 2-14 mm wide; plants cespitose, or weakly rhizomatous; [of wet to mesic pine savannas and flatwoods].
2 Leaves mostly > 10 cm long, 2-4 mm wide; involucre 6-7.5 mm high ..... ***B. nudata var. australis***
2 Leaves mostly < 10 cm long, 4-14 mm wide; involucre 4.5-6 mm high ..... ***B. nudata var. nudata***

Bigelowia nudata (Michaux) A.P. de Candolle *var.* ***australis*** (L.C. Anderson) Shinners. Cp (FL) : mesic pine flatwoods; rare. Ne. FL (Bradford County) south to s. FL. [= FNA, SE; = *B. nudata* ssp. *australis* L.C. Anderson – GW, K, WH, Z; < *Chondrophora nudata* (Michaux) Britton – S]

Bigelowia nudata (Michaux) A.P. de Candolle *var.* ***nudata***, Rayless-goldenrod. Cp (AL, FL, GA, LA, MS, NC, SC): savannas, pine flatwoods, pocosin edges; common. August-October. E. NC south to n. FL and west to LA. [= FNA, SE; = *B. nudata* ssp. *nudata* – GW, K, WH, Z; < *Chondrophora nudata* (Michaux) Britton – RAB, S]

Bigelowia nuttallii (Michaux) A.P. de Candolle. Cp (AL, FL, GA), Pd (GA), Mt (AL): prairies, sandstone glades, granite flatrocks, Altamaha Grit glades, and roadbanks; rare. September-October. W. LA west to e. TX; disjunct eastward in Mountains of ne. AL, Piedmont of c. GA, and Coastal plain of s. AL, ec. GA (Jones & Coile 1988, Bridges & Orzell 1989), Panhandle FL, and wc. peninsular FL. [= FNA, GW, K, SE, WH, Z; = *Chondrophora virgata* (Nuttall) Greene – S, misapplied]

Boltonia L'Héritier 1789 (Doll's-daisy)

ASTERACEAE

(contributed by John F. Townsend and Alan S. Weakley)

A genus of about 6-7 species, herbs, of e. and c. North America. References: Karaman-Castro & Urbatsch in FNA (2006b); Townsend & Karaman-Castro (2006)=X; Morgan (1966)=Z; Anderson (1987)=Y; Cronquist (1980)=SE; Nesom (2000b).

1 Achenes with pappus reduced to a short ring of bristles to 0.15mm long or with occasional slender awns to 0.6mm; achene wings lacking or up to 0.1 mm wide; faces of achenes glabrous.
  2 Phyllaries 0.2-0.5 mm wide, whitened throughout or with greenish tip, midrib relatively prominent (25%-35% phyllary width); heads 4.3-6.1 mm wide, peduncles 0.25-0.5 mm in diameter; ray corollas white fading to pinkish in age; bracteal leaves narrowly oblanceolate to linear ..... ***B. caroliniana***
  2 Phyllaries 0.4-0.9 mm wide, whitened in lower 1/3 to 1/2 only, distal portion green, midrib relatively narrow (8%-14% phyllary width); heads 6-11.5 mm wide, peduncles 0.5-1.1 mm in diameter; ray corollas lilac or pinkish (-white); bracteal leaves oblanceolate to oblong..... ***B. montana***
1 Achenes with two distinct pappus awns in addition to a shorter ring of bristles, the awns mostly 0.3-1.8 mm long; achene wings obvious, mostly 0.2-0.5 mm wide; faces of achenes pubescent.
  3 Phyllaries spatulate, oblanceolate, or linear-oblanceolate, apices cuspidate, pappus awns 2/3 or more as long as the achenes; inflorescence diffusely branched, with numerous heads.
    4 Phyllaries spatulate to obovate-spatulate, membranaceous margins broad, (2-) 2.5-6 mm wide ..... ***B. asteroides* var. *latisquama***
    4 Phyllaries oblanceolate to linear-oblanceolate, membranaceous margins narrow, 1-2.5 (-3) mm wide ..... ***[B. asteroides* var. *recognita]***
  3 Phyllaries linear-subulate to lanceolate; inflorescence various.
    5 Inflorescence more or less leafy-bracteate.
      6 Inflorescence diffusely branched, heads relatively numerous, phyllaries (0.2-) 0.3-0.4 (-0.5) mm wide, (1.3-) 1.4-1.8 (-2.1) mm long, pappus awns 0.3-0.8 mm long ..... ***B. apalachicolensis***
      6 Inflorescence narrow with loosely ascending branches, heads relatively few, phyllaries (0.5) 0.7 to 0.9 (1.1) mm wide, (1.5-) 2.1-2.4 (-3.5) mm long, pappus awns (0.2-) 0.8-1.1(-1.3) mm long ..... ***B. asteroides* var. *asteroides***
    5 Inflorescence subulate-bracteate
      7 Phyllaries subulate; peduncles filiform ..... ***B. diffusa* var. *diffusa***
      7 Phyllaries linear-oblong; peduncles thick ..... ***[B. diffusa* var. *interior]***

Boltonia apalachicolensis L.C. Anderson, Apalachicola Doll's-daisy. Cp (FL): floodplain forests; rare. August-October. Panhandle FL, s. MS, west to LA. [= FNA, K, WH]

Boltonia asteroides (Linnaeus) L'Héritier, Eastern Doll's-daisy. Cp (FL, NC, SC, VA), Mt (NC), {GA}: marshes, ditches; common (rare in Mountains, rare in FL and VA). August-October. NJ south to Panhandle FL, west to MS and LA, mostly on the Coastal Plain, but with a few disjunct occurrences inland, such as Henderson County, NC. [= RAB, W, WH, Y; = *B. asteroides* var. *asteroides* – C, G, K, SE, X, Z; > *B. asteroides* var. *asteroides* – F; > *B. asteroides* var. *glastifolia* (Hill) Fernald – F; < *B. asteroides* (Linnaeus) L'Héritier var. *asteroides* – FNA; < *Boltonia* sp. – GW]

Boltonia caroliniana (Walter) Fernald, Carolina Doll's-daisy. Cp, Pd (NC, SC, VA), {GA}: bottomlands, ditches, roadsides, prairies; common (rare in GA and VA). August-October. Se. VA south to s. SC (and GA according to Kartesz 1999), primarily on the Coastal Plain and Piedmont. [= C, FNA, G, K, SE, X, Y; < *B. caroliniana* – RAB (also see *B. diffusa* var. *diffusa*); > *B. caroliniana* – F; > *B. ravenelii* Fernald & Griscom – F; < *Boltonia* sp. – GW; = *B. diffusa* var. *caroliniana* – Z]

Boltonia diffusa Elliott *var. **diffusa***, Southern Doll's-daisy. Cp (FL, GA, SC), Pd* (NC*, VA*): clay-based Carolina bays, roadsides, powerline rights-of-way, and other artificially open areas; uncommon (rare in NC, SC, VA). August-October. Se. SC south to s. FL, west to e. TX, inland in the interior to c. TN, s. IL, s. MO, AR, and se. OK; disjunct in the Bahamas (Mangrove Cay of Andros Island). [= FNA, K, Z; < *B. caroliniana* – RAB; < *B. diffusa* – C, G, SE, WH, Y; < *Boltonia* sp. – GW]

* ***Boltonia latisquama*** A. Gray, Midwestern Doll's-daisy. Cp (NC, VA): ditches; rare, native of mw. United States. August-October. WI west to ND, south to MS and OK; disjunct in NC and se. VA. [> *B. latisquama* var. *latisquama* – F; > *B. latisquama* var. *recognita* Fernald & Griscom – F; = *B. asteroides* (Linnaeus) L'Héritier var. *latisquama* (A. Gray) Cronquist – FNA, K; > *B. asteroides* (Linnaeus) L'Héritier var. *latisquama* (A. Gray) Cronquist – C, G; > *B. asteroides* var. *recognita* (Fernald & Griscom) Cronquist – C, G; < *Boltonia sp.* – GW; = *B. asteroides* var. *latisquama* – SE, Z]

Boltonia montana J.F. Townsend & V. Karaman-Castro, Valley Doll's-daisy. Mt (VA): sinkhole ponds; rare. August-October. Augusta Co. VA and Ridge and Valley wetlands in NJ. See Townsend & Karaman-Castro (2006) for detailed information. [= X; < *B. asteroides* (Linnaeus) L'Héritier var. *asteroides* – FNA]

Boltonia asteroides (Linnaeus) L'Héritier *var. **latisquama*** (A. Gray) Cronquist. Cp (VA): {habitat}; rare. WI west to ND, south to MS and OK; reported for VA. [= FNA, K; = *B. latisquama* A. Gray] {synonymy incomplete}

Boltonia asteroides (Linnaeus) L'Héritier var. *recognita* (Fernald & Griscom) Cronquist. MI, OH, KY, TN west to Saskatchewan and OK. [= FNA, K; = *Boltonia recognita* (Fernald & Griscom) G.N. Jones] {synonymy incomplete}

Boltonia diffusa Elliott var. *interior* Fernald & Griscom. KY and TN west to IL, OK, and LA. [= FNA, K] {synonymy incomplete}

Borrichia Adanson 1763 (Seaside Oxeye)

A genus of 2 species, shrubs, of se. United States and West Indies. References: Semple in FNA (2006c); Cronquist (1980)=SE.

Borrichia frutescens (Linnaeus) A.P. de Candolle, Seaside Oxeye. Cp (FL, GA, NC, SC, VA): salt and brackish marshes; common. May-September. DC and e. VA south to s. FL, west to TX and Mexico; also in Bermuda. This species often forms nearly pure stands of many hectares, conspicuous from the fleshy, gray leaves. [= RAB, C, F, FNA, G, K, SE, WH]

Brickellia Elliott 1823 (False-boneset)

A genus of about 110 species, herbs and shrubs, primarily of sw. North America, Central America, and South America. *Kuhnia* appears to be a part of *Brickellia* (King & Robinson 1987; Shinners 1971). References: Scott in FNA (2006c); Cronquist (1980)=SE; Shinners (1971)=Z; Shinners (1946)=Y; Turner (1989)=X.

1 Leaves rounded at base; upper stem leaves reduced in size but similar in shape to the lower leaves; pappus purplish, of ca. 40 bristles; [of s. GA south] ..... ***B. cordifolia***
1 Leaves cuneate at base; upper stem leaves (at least) linear-lanceolate; pappus whitish, of 20-25 bristles; [widespread in our area] ..... ***B. eupatorioides*** *var.* ***eupatorioides***

Brickellia cordifolia Elliott, Flyr's False-boneset. Cp (FL, GA): mesic pine-hardwood or oak-hickory woods of upland hammocks; rare. Late August-late October. Sw. GA (Jones & Coile 1988) and AL south to Panhandle FL and n. peninsular FL. [= FNA, K, SE, WH; = *Coleosanthus cordifolius* (Elliott) Kuntze – S]

Brickellia eupatorioides (Linnaeus) Shinners *var.* ***eupatorioides***, Eastern False-boneset. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry slopes, shale barrens, dry woodlands, thickets; common (uncommon in Mountains, uncommon in VA Piedmont, rare in VA Coastal Plain). June-October. NJ west to IN, south to c. peninsular FL and se. TX. In addition to var. *eupatorioides*, *B. eupatorioides* includes several other varieties, of more southern or western distribution. Var. *floridana* (R.W. Long) B.L. Turner [= *B. mosieri* Small] has all leaves linear and is apparently restricted to s. FL; previous references to its occurrence further north (as by SE) are based on narrow-leaved forms of *B. eupatorioides* var. *eupatorioides*. Var. *texana* (Shinners) Shinners [= var. *ozarkana* (Shinners) Shinners] has the outer phyllaries prolonged into setae, nearly or fully as long as the inner phyllaries, and should be considered a possibility for our area, in dry open habitats with prairie or midwestern affinities; it is known from eastward to AR and MO. Var. *corymbulosa* (Torrey & Gray) Shinners ranges as far east as IN, IL, MO, and AR (and allegedly to KY) and has larger heads than var. *eupatorioides* (9-15 mm high, with mostly 15-35 florets, vs. 7-11 mm high, with mostly 6-15 florets). [= FNA, K, X, Z; < *Kuhnia eupatorioides* Linnaeus – RAB, S, W; = *Kuhnia eupatorioides* var. *eupatorioides* – C, F, G, SE; < *Brickellia eupatorioides* – WH; = *Kuhnia eupatorioides* var. *pyramidalis* Rafinesque – Y]

Brintonia Greene 1895 (Brintonia)

A monotypic genus of the East Gulf Coastal Plain of the Southeastern United States, though sometimes combined with *Solidago*. References: Semple in FNA (2006b); Nesom (1993).

Brintonia discoidea (Elliott) Greene, Brintonia, Rayless Mock-goldenrod. Cp (FL, GA): rich bluff forests; rare. August-October. A Southeastern Coastal Plain endemic: sw. GA and Panhandle FL west to LA. [= FNA, S, SE, WH; = *Solidago discoidea* Elliott – K]

Calotis R. Browne 1820

* ***Calotis cuneifolia*** R. Browne. Cp (SC): waste areas near wool-combing mill; rare, native of Australia. Reported by Nesom (2004d). [= K]

Calyptocarpus Lessing 1832 (Straggler-daisy, Lawnflower)

A genus of 3 species, herbs, of sw. North America south to Central America. References: Strother in FNA (2006c); Sherff & Alexander (1955)=Z; Cronquist (1980)=SE.

* ***Calyptocarpus vialis*** Lessing, Straggler-daisy, Lawnflower. Cp (FL, GA, SC): disturbed areas, lawns; rare, native of tropical America. [= FNA, K, S, SE, WH, Z]

Carduus Linnaeus 1753 (Plumeless Thistle)

A genus of about 90 species, herbs, of temperate Old World. References: Keil in FNA (2006a); Cronquist (1980)=SE. [also see *Cirsium*]

1 Phyllaries 2-8 mm wide; heads mostly nodding ..... ***C. nutans ssp. macrolepis***
1 Phyllaries 1-2 mm wide; heads erect.
  2 Involucres cylindrical or narrowly ellipsoid ..... ***C. pycnocephalus ssp. pycnocephalus***
  2 Involucres spherical or hemispherical.
    3 Involucre 14-20 mm high, 25-35 mm across (excluding the flowers); leaves glabrate to glabrous beneath; plants very spiny; stem tough. ..... ***C. acanthoides ssp. acanthoides***
    3 Involucre 12-17 mm high, 15-20 (-25) mm across (excluding the flowers); leaves cottony-tomentose beneath, at least when young; plants not very spiny; stem brittle ..... ***C. crispus***

* ***Carduus acanthoides*** Linnaeus *ssp.* ***acanthoides***, Plumeless Thistle. Mt (NC, VA), Pd, Cp (VA): disturbed areas, pastures; common (rare in NC), native of Eurasia. June-October. [= FNA; > *C. acanthoides* – RAB, C, F, G, K, SE, W]

* ***Carduus crispus*** Linnaeus, Welted Thistle. Cp (VA): disturbed areas, naturalized around large ports; rare, native of Eurasia. June-September. [= C, F, FNA, G, K, SE]

* ***Carduus nutans*** Linnaeus *ssp.* ***macrolepis*** (Peterm.) Kazmi, Musk Thistle, Nodding Thistle. Mt (VA), Pd (GA, NC, VA), Cp (SC, VA): disturbed areas; uncommon (rare in NC and SC), native of Eurasia. Late May-November. [= K; < *C. nutans* – RAB, C, F, FNA, G, SE, W]

* ***Carduus pycnocephalus*** Linnaeus *ssp.* ***pycnocephalus***, Italian Plumeless-thistle. Cp (SC): waste areas around wool-combing mill; rare, native of n. Africa and w. Asia. Reported by Nesom (2004d). Scattered other occurrences in e. North America, including old ballast collections (FNA). [= FNA; < *C. pycnocephalus* – K] {not yet keyed}

* *Carduus tenuiflorus* W. Curtis. Known from ballast collections from se. PA from 1877-1879 (Rhoads & Klein 1993) and from NJ (Kartesz 1999). [= FNA, K] {not keyed}

Carphephorus Cassini 1816

A genus of 7 species, herbs, endemic to the Southeastern Coastal Plain of North America. The merger of *Trilisa* and *Litrisa* into *Carphephorus* has been recently questioned (Schmidt & Schilling 2000). The only species not occurring in our area is *C. carnosus* (Small) James (of c. peninsular FL). No area in the range of the genus has more than five of the seven species, and only se. SC and immediately adjacent GA has more than four. References: Nesom in FNA (2006c); Correa & Wilbur (1969)=Z; DeLaney, Bissett, & Weidenhamer (1999)=Y; Orzell & Bridges (2002)=X; Cronquist (1980)=SE.

1 Stem glabrous or nearly so, the pubescence (if present) short and appressed; surfaces of the basal leaves glabrous; inflorescence corymbiform.
  2 Stem leaves few, most of the stem exposed; basal leaves 4-20 cm long, 0.5-2.5 cm wide, dull, minutely punctate-pitted, fairly thick in texture, but not succulent; stems 1-5 dm tall, (1-) 2-5 per plant ..... ***C. bellidifolius***
  2 Stem leaves numerous, densely clothing the stem at least below; basal leaves 9-50 cm long, 2-10 cm wide, shiny, succulent, not glandular-punctate; stems 6-20 dm tall, 1 per plant ..... ***C. odoratissimus var. odoratissimus***
1 Stem conspicuously spreading hirsute, at least on the lower part of the stem; surfaces of the basal leaves conspicuously pubescent to glabrous; inflorescence corymbiform or thyrsoid-paniculate.
  3 Leaves linear, the widest 1-3 mm wide; [of sw. GA west through the East Gulf Coastal Plain] ..... ***C. pseudoliatris***
  3 Leaves oblancolate, the widest 7-40 mm wide; [collectively widespread in the Coastal Plain of our area].
    4 Inflorescence thyrsoid-paniculate; florets 4-10 per head; basal leaves glabrous, minutely and inconspicuously punctate, lacking resin droplets; phyllaries in 1-2 (-3) series, scarcely overlapping ..... ***C. paniculatus***
    4 Inflorescence corymbiform; florets 15-30 per head; leaves generally conspicuously pubescent (sometimes glabrate or with a few long hairs on the upper surface), not punctate, copiously beset with resin droplets; phyllaries in 3-6 series, closely imbricate.
      5 Phyllaries glabrous on the back; phyllaries subacute to rounded, entire to erose; phyllaries mostly 15-20 ..... ***C. corymbosus***
      5 Phyllaries viscid-pubescent on the back; phyllaries acute to subacute, entire and often callus-tipped; phyllaries 20-40 ... ***C. tomentosus***

Carphephorus bellidifolius (Michaux) Torrey & A. Gray, Sandhill Chaffhead. Cp (GA, NC, SC, VA): xeric sandy forests and woodlands, primarily in sandhills; common (rare in GA and VA). August-October. Se. VA to extreme e. GA. The leaf apices are generally blunt, giving the leaves a nearly spatulate shape. Of our species of *Carphephorus*, *C. bellidifolius* occupies the driest habitats; it often occurs with the other species, however. [= RAB, C, F, FNA, G, K, S, SE, Z]

Carphephorus corymbosus (Nuttall) Torrey & A. Gray. Cp (FL, GA, SC): wet flatwoods; common (rare in GA and SC). August-October. Se. SC south to s. FL. This species was reported as far north as NC by Small (1933); Correa & Wilbur (1969) considered the northern limit of the species to be e. GA, but it is now known from Jasper County, SC. [= RAB, FNA, K, S, SE, WH, Y, Z]

Carphephorus odoratissimus (J.F. Gmelin) Herbert *var.* ***odoratissimus***, Deer's-tongue, Vanilla-leaf. Cp (FL, GA, NC, SC): moist to mesic savannas and flatwoods; uncommon. Late July-October; September-November. Se. NC south to c. peninsular FL and west to e. LA. *C. odoratissimus* has the largest leaves of our species of *Carphephorus*; its leaves are normally wider than 3 cm, and have a very wide and prominent midrib, usually purple toward the base of the leaf and white toward the tip. This species contains coumarin and gives off a pleasant vanilla odor when drying; it is gathered from the wild and used as a supplementary flavoring in cigarettes. See DeLaney, Bissett, & Weidenhamer (1999), Ward (2001), and Orzell & Bridges (2002) for discussion of a southern Florida taxon related to *C. odoratissimus*, perhaps best treated as *C. odoratissimus* var. *subtropicanus* (DeLaney, N. Bissett, & Weidenhamer) Wunderlin & B.F. Hansen. [= FNA, WH, X; < *C. odoratissimus* – GW, K, SE, Z; = *C. odoratissimus* – Y; < *Trilisa odoratissima* (J.F. Gmelin) Cassini – RAB, S]

Carphephorus paniculatus (J.F. Gmelin) Herbert. Cp (FL, GA, NC, SC): savannas and flatwoods; common. August-October; September-November. Se. NC south to s. FL, and west to the FL Panhandle and s. AL. The leaves of this species are reminiscent of *C. odoratissimus*, but are narrower, (0.5-) 1-3 (-4) cm wide (vs. 1-6 (-11) cm wide in *C. odoratissimus*). Sterile *C. paniculatus* can be mistaken for glabrate *C. tomentosus*, which has shorter and broader leaves. [= FNA, GW, K, SE, WH, Y, Z; = *Trilisa paniculata* (J.F. Gmelin) Cassini – RAB, S]

Carphephorus pseudoliatris Cassini, Lavender Lady. Cp (FL, GA): seepage bogs, savannas, wet to moist pinelands; common (rare in GA). Sw. GA and FL Panhandle west to e. LA. [= FNA, GW, K, S, WH, Y, Z; *C. pseudo-liatris* – SE, orthographic variant]

Carphephorus tomentosus (Michaux) Torrey & A. Gray. Cp (GA, NC, SC, VA): savannas, flatwoods, and sandhills; common (rare in VA). August-October. Se. VA south to s. GA. *C. tomentosus* is highly variable in its pubescence, ranging

from glabrate to densely hirsute. [= RAB, C, FNA, G, GW, K, S, SE, Z; > *C. tomentosus* var. *tomentosus* – F; > *C. tomentosus* var. *walteri* (Elliott) Fernald – F]

Carthamus Linnaeus 1753 (Distaff-thistle)

A genus of 14 specoies, annual and perennial herbs, of the Mediterranean region. Closely related to *Centaurea*, and perhaps to be included there. References: Keil in FNA (2006a).

* ***Carthamus creticus*** Linnaeus, Smooth Distaff-thistle. Cp (SC): waste area around wool-combing mill; rare, native of s. Europe and n. Africa. Reported by Nesom (2004d) for SC, as *C. baeticus*. [= FNA; ? *C. lanatus* Linnaeus ssp. *baeticus* (Boissier & Reuter) Nyman – K; ? *Carthamus baeticus* Boissier & Reuter; = *Centaurea cretica* (Linnaeus) Sprengel]

Centaurea Linnaeus 1753 (Star-thistle, Knapweed)

A genus of about 500 species, herbs, native of Eurasia and n. Africa. References: Keil & Ochsmann in FNA (2006a); Cronquist (1980)=SE. Key adapted from C, SE, and FNA. [also see *Acroptilon*, *Carthamus,* and *Plectocephalus*]

1 Phyllaries evidently spine-tipped.
  2 Leaf bases not decurrent on the stem, the stem merely angled; pappus absent; corollas purple
    3 Central spines of the principal phyllaries 10-25 mm long ..... ***C. calcitrapa***
    3 Central spines of the principal phyllaries 1-3 mm long ..... ***[C. diffusa]***
  2 Leaf bases decurrent on the stem as wings (only shortly so in *C. benedicta*); pappus present in at least the central flowers in the head; corollas yellow.
    4 Heads sessile, closely subtended and partially concealed by large foliar bracts ..... ***C. benedicta***
    4 Heads obviously pedunculate, lacking large foliar bracts subtending the head.
      5 Larger spines of the middle and outer phyllaries 5-9 mm long; marginal and central flowers of the head with pappus ..... ***C. melitensis***
      5 Larger spines of the middle and outer phyllaries 11-22 mm long; marginal flowers of the head lacking pappus ..... ***C. solstitialis***
1 Phyllaries not spine-tipped.
  6 Plant an annual; flowers pale to medium blue, flowering April-June ..... ***C. cyanus***
  6 Plant a perennial; flowers pink to purple, flowering June-October.
    7 Phyllary appendages tapering to long, often recurved, pectinately dissected, filiform tips ..... ***[C. phrygia]***
    7 Phyllary appendages obtuse to acute, erect or ascending.
      8 Involucres 10-13 mm high ..... ***C. stoebe ssp. micranthos***
      8 Involucres 15-25 mm high.
        9 Phyllary appendages evidently decurrent along phyllary margins ..... ***[C. scabiosa]***
        9 Phyllary appendages not or only slightly decurrent along phyllary margins.
          10 Phyllary appendages roundish (seldom triangular), scarious, light to dark brown, undivided to irregularly lacerate ..... ***C. jacea***
          10 Phyllary appendages more-or-less triangular, brown to black, more-or-less wholly pectinate-margined.
            11 Heads discoid (the peripheral florets not expanded and showy); pappus blackish, < 1 mm long; green parts of phyllaries nearly or completely covered by black appendages, the involucres thus appearing totally black ..... ***C. nigra***
            11 Heads radiate (the peripheral florets expanded and showy); pappus absent or rudimentary (when present usually not black); green part of phyllaries sometimes evident, or the appendages light to dark brown.
              12 Heads relatively broad, the pressed involucres usually as wide as or wider than long; green parts of phyllaries usually covered by brown, variously pectinate fimbriate appendages, the involucres thus light to dark brown ..... ***C. ×moncktonii***
              12 Heads relatively narrow, the pressed involucres usually longer then wide; green parts of phyllaries not fully covered by black appendages, the involucres black and green ..... ***C. nigrescens***

* ***Centaurea benedicta*** (Linnaeus) Linnaeus, Blessed-thistle. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (VA): fields, roadsides, disturbed areas; uncommon (rare in FL), native of Mediterranean Europe. Late March-June. [= RAB, FNA; = *Cnicus benedictus* Linnaeus – C, F, G, K, S, SE, W, WH]

* ***Centaurea calcitrapa*** Linnaeus, Purple Star-thistle, Caltrops. Mt, Cp, Pd (VA): roadsides, disturbed areas; rare, native of Europe. June-September. [= C, F, FNA, G, K, S, SE]

* ***Centaurea cyanus*** Linnaeus, Cornflower, Batchelor's-buttons. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): roadsides, disturbed areas; common (uncommon in VA Mountains, rare in FL), native of Mediterranean Europe. April-June. [= RAB, C, F, FNA, G, K, S, SE, W, WH]

* ***Centaurea jacea*** Linnaeus, Brown Knapweed. Mt , Pd (VA): roadsides, disturbed areas; rare (locally common), native of Europe. June-September. This species is increasing rapidly in the VA Ridge and Valley. [= C, F, FNA, G, K, SE; = *Jacea pratensis* Lamarck]

* ***Centaurea melitensis*** Linnaeus, Maltese Star-thistle. Cp (GA, SC): waste areas near wool-combing mill, roadsides, disturbed areas; rare, native of Mediterranean Europe. June-September. [= C, F, FNA, G, K, S, SE]

* ***Centaurea ×moncktonii*** C.E. Britton, Meadow Knapweed. Mt, Pd (VA): roadsides, disturbed areas; rare, native of Europe. July-October. [= FNA; = *C. ×pratensis* Thuillier – C; *? C. nigra* var. *radiata* A.P. de Candolle – F; *? C. debeauxii* Godron & Grenier ssp. *thuillieri* Dostál]

* ***Centaurea nigra*** Linnaeus, Black Knapweed, Spanish-buttons. Pd (VA): roadsides, disturbed areas; rare, native of Europe. July-October. [= C, F, FNA, G, K, SE]

* ***Centaurea nigrescens*** Willdenow, Tyrol Knapweed, Short-fringed Knapweed. Mt, Pd (VA): roadsides, disturbed areas; rare (locally common), native of Europe. July-October. This species is increasing rapidly in the n. VA Piedmont. *Centaurea*

transalpina Schleicher ex de Candolle was also reported for VA by Kartesz (1999). [= FNA; = *C. dubia* Suter – C, SE, W (not a valid name); > *C. vochinensis* Bernhardi ex Reichenbach – F; > *C. dubia* ssp. *vochinensis* (Berhardi ex Reichenbach) Hayek – G; > *C. nigrescens* – K; > *C. transalpina* Schleicher ex de Candolle – F, K]

* ***Centaurea phrygia*** Linnaeus, Wig Knapweed. {VA}. Reported for VA in FNA. [= FNA, K; > *Centaurea austriaca* Willdenow]

* ***Centaurea solstitialis*** Linnaeus, Barnaby's-thistle, Yellow Star-thistle. Mt, Pd (VA), Cp (NC, SC): roadsides, disturbed areas; rare, native of Mediterranean Europe. June-August. First reported for South Carolina by Hill & Horn (1997). [= RAB, C, F, FNA, G, K, S, SE]

* ***Centaurea stoebe*** Linnaeus *ssp.* ***micranthos*** (S.G. Gmelin ex Gugler) Hayek, Spotted Knapweed, Bushy Knapweed. Mt, Pd (NC, SC, VA), Cp (FL, VA): roadsides, disturbed areas; common (rare in FL and SC), native of Europe. Late June-November. [= FNA, WH; = *Centaurea biebersteinii* A.P. de Candolle – K; = *C. maculosa* Lamarck – RAB, C, F, G, SE, W, misapplied]

* *Centaurea diffusa* Lamarck, Tumble Knapweed. Naturalized in Davidson County, TN (Chester, Wofford, & Kral 1997); also in KY (FNA). [= C, F, FNA, G, K; = *Acosta diffusa* (Lamarck) Soják]

* *Centaurea scabiosa* Linnaeus, Greater Knapweed, Hardheads. Naturalized in KY, PA, NJ (FNA), MD (Kartesz 1999), and other states in e. North America. [= FNA, C, F, G, K]

Chaetopappa A.P. de Candolle 1836 (Least-daisy)

A genus of 11 species, annual or perennial herbs, of sc. and sw. United States and n. Mexico. References: Nesom in FNA (2006b).

* ***Chaetopappa asteroides*** (Nuttall) A.P. de Candolle *var.* ***asteroides***, Tiny Lazy-daisy. Cp (SC): waste areas near wool-combing mills; rare, native of sc. United States. Reported by Nesom (2004d). [= FNA, K, SE]

Chamaemelum P. Miller 1754 (Chamomile)

A genus of 2 species, herbs, of the Medterrannean region. References: Cronquist (1980)=SE. [also see *Cladanthus*]

1 Rays white with a yellow base; plant an annual ..... *[see **Cladanthus mixtus**]*
1 Rays white; plant a perennial ..... ***Ch. nobile***

* ***Chamaemelum nobile*** (Linnaeus) Allioni, Garden Chamomile. Pd (NC): persistent from cultivation in gardens; rare, native of Europe. [= FNA, K; = *Anthemis nobilis* Linnaeus – C, F, G, S, SE]

Chaptalia Ventenat 1802 (Sunbonnets)

A genus of about 60 species, herbs, of warm temperate, subtropical, and tropical America. The remainder of the genus is distributed in the West Indies, Central America, and South America. References: Nesom in FNA (2006a); Vuilleumier (1969)=Z; Nesom (1995a)=Y; Cronquist (1980)=SE.

Identification notes: The basal leaves are distinctive, the undersurface permanently and tightly white floccose, the upper surface floccose when young but glabrate in age, and the margins with obscure denticulations.

Chaptalia tomentosa Ventenat, Sunbonnets, Pineland Daisy, Night-nodding Bog-dandelion, Woolly Sunbonnets. Cp (FL, GA, NC, SC): savannas, sandhill seeps, pine flatwoods; common. February-May. A Southeastern Coastal Plain endemic: e. NC south s. FL and west to e. TX. [= RAB, FNA, GW, K, S, SE, WH, Y, Z]

Chevreulia Cassini 1817

* ***Chevreulia sarmentosa*** (Persoon) S.F. Blake. Cp (SC): waste area near wool-combing mill; rare, native of s. South America. Reported for SC by Nesom (2004d).

Chondrilla Linnaeus 1753 (Skeleton-weed)

A genus of about 25 species, herbs, of temperate Eurasia. References: Gottlieb in FNA (2006a); Cronquist (1980)=SE.

* ***Chondrilla juncea*** Linnaeus, Skeleton-weed, Gum-succory. Pd (GA, VA), Cp, Mt (VA): cultivated fields, disturbed areas, roadsides; uncommon, native of Eurasia. June-August. [= C, F, FNA, G, K, SE]

Chromolaena A.P. de Candolle 1836

A genus of about 165 species, perennial herbs and shrubs, of s. North America, Central America, and South America. References: Nesom in FNA (2006c).

*? ***Chromolaena ivifolia*** (Linnaeus) King & Robinson, Ivy-leaf Thoroughwort. Cp (FL): prairies and fields; rare. August-November. S. FL, Panhandle FL, s. AL, s. MS, TX; West Indies, Mexico, Central America, South America (Woods, Diamond, & Searcy 2003; Kartesz 1999, Nesom in FNA 2006c). [= FNA, K, WH; = *Osmia ivaefolia* (Linnaeus) Schultz 'Bipontinus' – S; = *Eupatorium ivaefolium* – SE, orthographic variant]

Chrysanthemum Linnaeus 1753 (Chrysanthemum)

If circumscribed narrowly, a genus of 3 species, herbs, of n. Africa and Europe. References: Cronquist (1980)=SE; Arriagada & Miller (1997)=Z. [also see *Glebionis, Leucanthemum,* and *Tanacetum*]

* *Chrysanthemum indicum* Linnaeus, Garden Chrysanthemum, is persistent or perhaps naturalized as far south as se. PA (Rhoads & Klein 1993). [= *Dendranthema ×grandiflorum* Kitam. – K; *? Dendranthema morifolium* (Ramat.) Tzvelev; *? Chrysanthemum morifolium* Ramat.; *Dendranthema indicum × japonicum*]

Chrysogonum Linnaeus 1753 (Green-and-gold)

A genus of 1 species (with varieties), herbs, of se. North America. References: Nesom in FNA (2006c); Nesom (2001b)=Z; Cronquist (1980)=SE. Key based on Nesom (2001b).

1 Plants occurring individually, not producing stolons; earliest flowering stems leafless, later flowering stems leafy; leafy flowering stems mostly 15-35 (-50) cm high; [of e. VA, sc. PA, and se. OH south to se. NC, nc. SC, nw. NC, and sw. VA] ..... ***Ch. virginianum var. virginianum***

1 Plants colonial, forming mats by stolons; flowering stems leafless or leafy; leafy flowering stems (if present) 15-25 cm high; [of ne. SC, sc, NC, nw. NC, ne. TN. and se. KY southward].

2 Earliest flowering stems leafless, mostly 2-10 cm high; later flowering stems leafy 15-25 cm high; longest stolon internodes 2-6 cm long; [of ne. SC, sc. NC, nw. NC, sw. VA, ne. TN. and se. KY south to e. GA, c. GA, and ec. AL] ..... ***Ch. virginianum var. brevistolon***

2 Earliest flowering stems leafless, 2-10 cm high; later flowering stems leafless as well, 2-10 cm high; longest stolon internodes 12-60 cm long; [of sc. and sw. GA west to e. LA] ..... ***Ch. virginianum var. australe***

Chrysogonum virginianum Linnaeus *var.* ***australe*** (Alexander ex Small) Ahles, Gulf Coast Green-and-gold. Cp (FL, GA): moist to fairly dry woodlands and forests; uncommon (rare in FL). Late March-early June. A Gulf Coastal Plain endemic: sc. and sw. GA west to e. LA. [= FNA, WH, Z; < *Ch. virginianum* var. *australe* – RAB, K, SE, W (also see var. *brevistolon*); < *Ch. australe* Alexander ex Small – S (also see var. *brevistolon*)]

Chrysogonum virginianum Linnaeus *var.* ***brevistolon*** Nesom, Carolina Green-and-gold. Pd (GA, NC, SC), Cp (GA, SC), Mt (GA, NC, SC, VA): moist to fairly dry woodlands and forests; common (rare in VA). Late March-early June. Ne. SC, sc. NC, nw. NC, sw. VA, ne. TN. and se. KY south to e. GA, c. GA, and ec. AL. [= FNA, Z; < *Ch. virginianum* var. *australe* – RAB, K, SE, W; < *Ch. australe* Alexander ex Small – S]

Chrysogonum virginianum Linnaeus *var.* ***virginianum***, Northern Green-and-gold, Virginia Green-and-gold. Cp (NC, SC, VA): Pd (NC, VA), Mt (VA): moist to fairly dry woodlands and forests; common. Late March-early June. E. VA, sc. PA, and se. OH south to se. NC, nc. SC, nw. NC, and sw. VA. [= RAB, C, FNA, K, SE, W, Z; = *Ch. virginianum* – S]

Chrysoma Nuttall 1834 (Woody Goldenrod)

A monotypic genus, a shrub, of se. North America. References: Nesom in FNA (2006b); Nesom (2000b); Cronquist (1980)=SE.

Chrysoma pauciflosculosa (Michaux) Greene, Woody Goldenrod. Cp (FL, GA, NC, SC): xeric sands of very barren, open, white-sand sandhills, in our area primarily on fluvial dunes, and less commonly in the fall-line Sandhills; uncommon (rare north of FL). Late July-October. S. NC south to n. FL and west to s. MS. *Chrysoma* has a growth habit unlike any other shrub in our flora. From a trunk-like base, numerous branches ascend, forming a flat-topped shrub 3-5 dm tall. Each branch has a cluster of evergreen leaves restricted to its terminal few cm, the internodes very short (a few mm at most). In summer, some of the woody branches produce terminal, deciduous, flowering branches, which elongate rapidly, the leaves widely spaced, reaching a height of a meter or more. Following flowering and fruiting, the deciduous branches die back to the summit of the woody branches. The leaves are gray-green, rather thick-textured, and finely reticulate, the reticulations giving an appearance rather like snakeskin. The midrib is prominent below, almost invisible on the upper surface. Godfrey (1988) has an excellent drawing and description of this distinctive shrub. [= FNA, K, S, SE, WH; = *Solidago pauciflosculosa* Michaux – RAB; = *Chrysoma solidaginoides* Nuttall]

Chrysopsis (Nuttall) Elliott 1823 (Golden-aster)

A genus of about 10 species, herbs, of se. North America, Mexico, and the Bahamas. This remains a difficult and rather poorly understood group. The appropriate taxonomic status of many of the entities remains unclear; for the moment, I am recognizing a number of entities at the specific level that should perhaps be recognized at lower taxonomic levels; in some cases, the appropriate nomenclatural combinations are not already available. References: Semple in FNA (2006b); Semple (1981)=Z; Harms (1974)=Y; Semple (1996)=X; Cronquist (1980)=SE; Nesom (2000b); DeLaney, Wunderlin, & Semple (2003). Key adapted from Semple (1981). [also see *Heterotheca* and *Pityopsis*]

1 Stem, leaves, and phyllaries sparsely to densely pubescent with spreading non-glandular hairs as well has having minutely glandular pubescence; annuals with taproots; [section *Bradburia*] ..... ***Ch. pilosa***
1 Stems, leaves, and phyllaries various but lacking spreading non-glandular hairs; biennials or perennials, either fibrous-rooted or with a mostly short and quickly disintegrating taproot; [section *Chrysopsis*].
2 Peduncles and phyllaries glabrous or the outer phyllaries basally with a few stipitate glands; achenes usually with raised yellow-red translucent ribs.
3 Stems erect; leaf margins serrate-ciliate, the surfaces sparsely pubescent to glabrous; all phyllaries glabrous ..... ***Ch. hyssopifolia***
3 Stems decumbent to ascending; leaf margins entire, either eciliate and glabrous, or sometimes ciliate with glabrate to sparsely woolly surfaces; phyllaries either glabrous and glandular punctate or the outer basally stipitate-glandular.
4 Stem leaves glabrous and eciliate (but rosette leaves densely woolly), lower stem leaves absent at flowering; outer phyllaries with a few stipitate glands basally, the involucre otherwise glabrous ..... ***Ch. cruiseana***
4 Stem leaves eciliate or ciliate, the surfaces glabrate to sparsely woolly, the hairs often only or mostly near the margin, lower stem leaves usually present at flowering; phyllaries glabrous, glandular-punctate ..... ***Ch. trichophylla***

Add linearifolia under 2a

2 Peduncles and phyllaries evidently stipitate-glandular or woolly-hairy, or both; achenes with or without raised yellow-red translucent ribs.
5 Upper stem leaves woolly-hairy; not stipitate-glandular; peduncles and involucres sparsely pubescent to woolly, sometimes stipitate-glandular as well.
6 Stems decumbent; inflorescence loosely corymbose-cymose, buds not nodding; peduncles stipitate-glandular or not, ligules 7-12 mm long; achenes sparsely to moderately strigose, usually with raised yellow-red translucent ribs; [of VA to FL] ..... ***Ch. gossypina***
6 Stems decumbent to ascending; inflorescence corymbose, buds nodding; peduncles densely stipitate-glandular, ligules 10-15 mm long; achenes densely strigose, lacking raised yellow-red translucent ribs; [of barrier islands of w. FL Panhandle] ..... ***Ch. godfreyi***
5 Upper stem leaves arachnoid to glabrate or densely stipitate-glandular; peduncles and involucres stipitate-glandular but otherwise glabrous.
7 Upper stem leaves lacking stipitate glands, either arachnoid to glabrate, or woolly ..... ***Ch. mariana***
7 Upper stem leaves densely stipitate-glandular, not woolly.
8 Stems decumbent to ascending; leaves lanceolate; inflorescence compactly corymbose; involucres 9-12 mm long; phyllaries acute to attenuate; ligules 10-15 mm long ..... ***Ch. godfreyi***
8 Stems erect; leaves linear-elliptic; inflorescence open flat-topped corymbose; involucres 6-9 mm long; phyllaries obtuse; ligules 6-8 mm long ..... ***Ch. scabrella***

Add lanuginosa & latisquamea under 2b

Chrysopsis cruiseana Dress. Cp (AL, FL): coastal sand dunes. October-December. FL Panhandle and s. AL. [= *Chrysopsis gossypina* (Michaux) Elliott ssp. *cruiseana* (Dress) Semple – FNA, K, WH, Z] {add synonymy}

Chrysopsis godfreyi Semple. Cp (AL, FL): coastal sand dunes. November-December. FL panhandle and s. AL. Plants with densely stipitate-glandular, non-woolly upper stem leaves have been treated as forma *viridis* (Semple 1981). [= FNA, K, WH, Z] {add synonymy}

Chrysopsis gossypina (Michaux) Elliott, Cottonleaf Golden-aster. Cp (FL, GA, NC, SC, VA): sandhills, coastal dunes, other dry sandy places; common (rare in VA). September-October. Se. VA south to c. peninsular FL and sw. GA. [< *Chrysopsis gossypina* ssp. *gossypina* – FNA, K, WH, Z; < *Heterotheca gossypina* (Michaux) Shinners – RAB (also see *Ch. pilosa*); < *Ch. gossypina* – C, G, SE; > *Ch. longii* Fernald – F; >< *Ch. arenicola* Alexander – S; > *Ch. decumbens* Chapman – S; > *Ch. pilosa* – S, misapplied; < *Heterotheca gossypina* (Michaux) Shinners – Y]

Chrysopsis hyssopifolia Nuttall. Cp (FL): dry sands; uncommon. October-December. N. FL peninsula west to FL panhandle, s. AL, s. MS, and se. LA. [= SE; = *Chrysopsis gossypina* (Michaux) Elliott ssp. *hyssopifolia* (Nuttall) Semple – FNA, K, WH, Z; > *Chrysopsis hyssopifolia* – S; > *Chrysopsis gigantea* Small – S; = *Heterotheca hyssopifolia* (Nuttall) Harms – Y]

Chrysopsis mariana (Linnaeus) Elliott, Maryland Golden-aster. Cp, Pd, Mt (GA, NC, SC, VA): dry forests and woodlands, roadsides, other dry habitats; common. Late June-October. Se. NY west to se. OH, c. KY, w. TN, south to c. peninsular FL and se. TX. [= C, FNA, G, K, S, SE, W, WH, Z; = *Heterotheca mariana* (Linnaeus) Shinners – RAB, Y; > *Chrysopsis mariana* var. *mariana* – F; > *Ch. mariana* var. *macradenia* Fernald – F]

* ***Chrysopsis pilosa*** Nuttall. Cp (FL, GA?, NC, SC, VA): sandy roadsides; rare, introduced from a primary, native range from s. MO and se. KS, south to TX. See Anderson (2007) for FL record. [= F, G, K, SE, Z; < *Heterotheca gossypina* (Michaux) Shinners – RAB; = *Heterotheca pilosa* (Nuttall) Shinners – Y; = *Bradburia pilosa* (Nuttall) Semple – FNA, X]

* ***Chrysopsis scabrella*** Torrey & A. Gray. Cp (NC?, SC): sandy roadsides; rare, presumably introduced from FL (but possibly native and disjunct). [= FNA, K, SE, S, WH, Z; = *Heterotheca scabrella* (Torrey & A. Gray) Harms – Y]

Chrysopsis trichophylla (Nuttall) Elliott. Cp (GA?, NC, SC): sandhills, sandy roadsides, coastal dunes; rare (NC Watch List). The taxon treated by many authors as *Ch. trichophylla* was reduced to a form by Semple (1981), as *Ch. gossypina* ssp. *gossypina* f. *trichophylla* (Nuttall) Semple. He suggests, though, that varietal status may be warranted. Plants in SC previously identified as *Ch. cruiseana* are referrable to *Ch. trichophylla*. [= SE; = *Heterotheca trichophylla* (Nuttall) Shinners – RAB; < *Chrysopsis gossypina* ssp. *gossypina* – FNA, K, Z; < *Ch. gossypina* – C, G; > *Ch. trichophylla* – S; >< *Ch. arenicola* Alexander – S; >< *Ch. pilosa* – S, misapplied; < *Heterotheca gossypina* (Michaux) Shinners – Y]

Chrysopsis lanuginosa Small, Lynn Haven Goldenaster. Cp (FL): dry pinelands; rare. Endemic to FL Panhandle. [= FNA, K, WH] {not yet keyed; synonymy incomplete}

Chrysopsis latisquamea Pollard. Cp (FL): sandhills; uncommon. [= FNA, K, WH; = *Heterotheca latisquamea* (Pollard) V.L. Harms] {not yet keyed; synonymy incomplete}

Chrysopsis linearifolia Semple. Cp (FL): scrub, sandhills; uncommon. [= *Chrysopsis linearifolia* ssp. *linearifolia* – FNA, K, WH] {not yet keyed; synonymy incomplete}

Cichorium Linnaeus 1753 (Chicory)

A genus of 7 species, herbs, of Europe and n. Africa. References: Strother in FNA (2006a); Cronquist (1980)=SE; Kiers (1999)=Z.

* ***Cichorium intybus*** Linnaeus, Chicory, Succory, Blue-sailors. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): roadsides, fencerows, vacant lots, disturbed areas; common (rare in FL), native of Europe. Late May-November. The dried roasted root is used as a flavoring or substitute for coffee. See Anderson (2007) for FL record. [= RAB, C, F, FNA, G, K, S, SE, W, WH, Z]

Cirsium P. Miller 1754 (Thistle)

A genus of about 250 species, herbs, north temperate. References: Keil in FNA (2006a); Cronquist (1980)=SE. Key adapted in part from SE.

1 Plant colonial from creeping rhizomes; heads 13-20 (-25) mm high; phyllaries all lacking spine tips, or the outermost tipped with spines < 1 mm long; plant perennial; [alien weeds, generally in altered habitats].
  2 Leaves shallowly undulate-lobed, with only a few fine marginal prickles ..... ***C. arvense var. arvense***
  2 Leaves strongly sinuate-pinnatifid, with numerous well-developed marginal prickles ..... ***C. arvense var. horridum***
1 Plant not colonial; heads 25-50 mm high (as small as 15-25 mm in *C. carolinianum, C. nuttallii, C. muticum,* and *C. virginianum*); phyllaries mostly spine-tipped, with at least some of the spines > 1 mm long (except sometimes mostly or entirely spine free in *C. muticum*); plant biennial (to weakly perennial); [native (except *C. vulgare*), in natural or some species also in disturbed habitats].
  3 Leaves decurrent onto the stem below, the decurrency extending as a wing at least several cm down the stem, and often to the leaf below; leaves scabrous-hispid above; phyllaries lacking a glutinous dorsal ridge; [alien weed] ..... ***C. vulgare***
  3 Leaves not decurrent as a conspicuous wing, or the decurrency extending < 1 cm (sometimes more decurrent in *C. lecontei*); leaves not scabrous-hispid above; [native, sometimes in disturbed habitats].
    4 Phyllaries lacking spine tips (the outermost sometimes with a weak spine-tip to 0.5 mm long); leaves deeply lobed, to 55 cm long and 20 cm wide ..... ***C. muticum***
    4 Phyllaries (at least the outer and middle) with well-developed spine-tips > 1 mm long; leaves lobed or merely toothed, generally < 30 cm long and < 10 cm wide (except in *C. altissimus*).
      5 Heads immediately subtended by several spiny-toothed leaves (appearing as a leafy involucre); flowers yellow, white, or purple.
        6 Involucres more-or-less densely tomentose; stems densely tomentose; [of the Coastal Plain and Piedmont] ..... ***C. horridulum var. horridulum***
        6 Involucres glabrous; stems glabrous or sparsely tomentose; [of the Coastal Plain].
          7 Leaves shallowly to deeply pinnatifid; main spines of the leaves 10-30 mm long; [of s. AL and Panhandle FL westward] ..... ***[C. horridulum var. megacanthum]***
          7 Leaves spinose-dentate to shallowly pinnatifid; main spines mostly 5-10 mm long; [widespread in the Coastal Plain] ..... ***C. horridulum var. vittatum***
      5 Heads pedunculate (rarely with 1 or 2 reduced leaves below); flowers pink, purple, lavender, or white.
        8 Lower surface of the leaves densely white-tomentose beneath, this persistent and entirely obscuring the green surface.
          9 Heads 15-25 mm high; plants 4-15 dm tall; larger leaves < 5 cm wide.
            10 Cauline leaves mostly 10-25; plants flowering April-June; [of dry soils of the Piedmont] ..... ***C. carolinianum***
            10 Cauline leaves mostly 30-70; plants flowering August-October; [of moist to dry soils of the Coastal Plain (and rarely the lower Piedmont in association with other Coastal Plain species, such as *Pinus palustris*)] ..... ***C. virginianum***
          9 Heads 25-35 mm high; plants 10-40 dm tall; larger leaves usually > 5 cm wide.
            11 Leaves toothed or shallowly lobed ..... ***C. altissimum***
            11 Leaves deeply pinnatifid ..... ***C. discolor***
        8 Lower surface of the leaves thinly and loosely white-tomentose beneath, this sloughing off in age, the green surface visible through the tomentum except on very small, young leaves.
          12 Heads 15-25 mm high; plants 5-35 dm tall, usually much branched and with numerous heads ..... ***C. nuttallii***
          12 Heads 25-50 mm high; plants 2-10 dm tall, usually strict or few-branched and with 1 or a few heads.
            13 Heads on well-developed peduncles; [of moist to wet pinelands of the Coastal Plain from NC and SC south] ..... ***C. lecontei***
            13 Heads on short peduncles; [of various habitats, mostly inland from the Coastal Plain, or of dry pinelands of the Coastal Plain].
              14 Plants generally with well-developed, persistent basal leaves; cauline leaves with internodes usually > 2 cm; [of various habitats, mostly inland from the Coastal Plain] ..... ***C. pumilum***
              14 Plants lacking well-developed basal leaves; cauline leaves with internodes mostly 0.5-2 cm long; [of dry pinelands of the Coastal Plain] ..... ***C. repandum***

Cirsium altissimum (Linnaeus) Hill, Tall Thistle. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA): pastures, woodlands, thickets; uncommon (rare in FL and VA). September-November. MA west to ND, south to Panhandle FL (Jackson County) and TX. [= C, F, FNA, G, K, S, SE, W, WH; = *Carduus altissimus* Linnaeus – RAB]

* ***Cirsium arvense*** (Linnaeus) Scopoli *var.* ***arvense***, Canada Thistle, Field Thistle. Mt (VA): pastures, disturbed areas; uncommon?, native of Europe. July-November. [= C, G, SE; < *Carduus arvensis* (Linnaeus) Robson – RAB; = *Cirsium arvense* var. *mite* Wimmer & Gräbner – F; < *Cirsium arvense* – FNA, K, S, W; < *Breea arvense* (Linnaeus) Lessing]

* ***Cirsium arvense*** (Linnaeus) Scopoli *var.* ***horridum*** Wimmer & Grabner, Canada Thistle, Field Thistle. Mt, Cp (NC, VA), Pd (VA): pastures, disturbed areas; common (uncommon in Piedmont, rare in Coastal Plain), native of Europe. July-November. [= C, G, SE; < *Carduus arvensis* (Linnaeus) Robson – RAB; = *Cirsium arvense* var. *arvense* – F, misapplied; < *Cirsium arvense* – FNA, K, S, W, < *Breea arvense* (Linnaeus) Lessing]

Cirsium carolinianum (Walter) Fernald & Schubert, Carolina Thistle, Spring Thistle. Pd (GA, NC, SC, VA), Mt (GA): prairies, open woodlands over mafic, ultramafic, or calcareous rocks; rare (GA Special Concern, NC Rare, VA Rare). April-June (-July). Sc. VA west to s. OH and MO, south to w. SC, n. GA, AL, and TX. In our area, *C. carolinianum* seems to be restricted to prairies and woodlands (or maintained powerline or road rights-of-way) over circumneutral rocks and soils, in situations which were oak savannas or even prairies prior to fire suppression. [= C, F, FNA, G, K, SE, W; = *Carduus carolinianus* Walter – RAB; > *Cirsium flaccidum* Small – S; > *Cirsium virginianum* – S, misapplied]

Cirsium discolor (Muhlenberg ex Willdenow) Sprengel, Field Thistle. Mt (NC, SC, VA), Pd (GA, NC, VA), Cp (VA): pastures, woodlands, thickets; common. August-November. Québec west to Manitoba, south to NC, MS, LA, and KS. [= C, F, FNA, G, K, S, SE, W; = *Carduus discolor* (Muhlenberg ex Willdenow) Nuttall – RAB]

Cirsium horridulum Michaux *var.* ***horridulum***, Common Yellow Thistle. Cp (FL?, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): roadsides, woodlands, pine savannas; common (rare in VA Piedmont, rare in Mountains). Late March-early June. ME south to FL, west to TX, mostly on the Coastal Plain and adjacent provinces; also in Mexico. [= C, K, SE; = *Carduus spinosissimus* Walter – RAB; < *Cirsium horridulum* – F, G, WH; < *Cirsium horridulum* complex – GW; = *Cirsium horridulum* – S]

Cirsium horridulum Michaux *var.* ***megacanthum*** (Nuttall) D.J. Keil, Bigspine Thistle. Cp (AL, FL): moist ground; uncommon. AL and Panhandle FL west to TX and OK. [= FNA; < *Cirsium horridulum* complex – GW; < *Cirsium horridulum* var. *vittatum* – K, SE; > *Cirsium vittatum* – S; < *Cirsium horridulum* – WH]

Cirsium horridulum Michaux *var.* ***vittatum*** (Small) R.W. Long, Southern Yellow Thistle. Cp (FL, GA?, NC, SC): wet pine savannas; uncommon. May-July. Se. NC south to s. peninsular FL and panhandle FL. [= *Carduus smallii* (Britton) Ahles – RAB; < *Cirsium horridulum* complex – GW; < *Cirsium horridulum* var. *vittatum* – K, SE; > *Cirsium smallii* Britton – S; > *Cirsium vittatum* Small – S; < *Cirsium horridulum* – WH]

Cirsium lecontei Torrey & A. Gray, LeConte's Thistle. Cp (FL, GA, NC, SC): wet pine savannas, bogs; uncommon (rare in GA, NC, SC). June-August. E. NC south to Panhandle FL, west to LA. [= FNA, GW, K, S, SE, WH; = *Carduus lecontei* (Torrey & A. Gray) Pollard – RAB]

Cirsium muticum Michaux, Swamp Thistle. Cp (FL, NC, SC, VA), Mt (GA, NC, VA), Pd (NC, VA): swamps, wet thickets, woodlands, seepage slopes, wet prairies, meadows; uncommon (rare in FL and GA, VA Piedmont and Coastal Plain). August-November. Newfoundland west to Saskatchewan, south to DE, NC, TN, and MO, and less commonly south to FL and TX. [= C, FNA, G, GW, K, S, SE, W, WH; = *Carduus muticus* (Michaux) Persoon – RAB; > *Cirsium muticum* var. *muticum* – F]

Cirsium nuttallii A.P. de Candolle, Coastal Tall Thistle. Cp (FL, GA, NC, SC, VA): pine savannas, roadsides, pastures; uncommon (rare in VA). June-August. Se. VA south to FL, west to LA; reported for the first time from NC (Krings, Westbrooks, & Lloyd 2002). [= C, F, FNA, G, GW, K, S, SE, WH; = *Carduus nuttallii* (A.P. de Candolle) Pollard – RAB]

Cirsium pumilum (Nuttall) Sprengel, Pasture Thistle. Pd (NC, VA), Cp, Mt (VA): pastures, thickets, and woodlands, perhaps especially over mafic rocks; uncommon (rare in Coastal Plain). Late May-July. S. ME west to w. NY, south to DE, and w. NC. [= C, F, G, K, SE, W; = *Carduus pumilus* Nuttall – RAB; = *Cirsium pumilum* var. *pumilum* – FNA; = *Cirsium odoratum* (Muhlenberg ex W. Bart.) Petrak – S]

Cirsium repandum Michaux, Sandhill Thistle. Cp (GA, NC, SC, VA): sandhills, other dry sandy habitats; common (rare in VA). May-July. Se. VA south to e. GA, nearly endemic to the Carolinas. Similar in distribution to *Vaccinium crassifolium, Carphephorus bellidifolius,* and *Baptisia cinerea*, which are all locally abundant endemic indicators of Carolina pinelands. [= C, FNA, G, K, S, SE; = *Carduus repandus* (Michaux) Persoon – RAB]

Cirsium virginianum (Linnaeus) Michaux, Virginia Thistle. Cp (FL, GA, NC, SC, VA), Pd (NC): moist to fairly dry pine savannas, bogs; uncommon (rare in VA). August-October. S. NJ south to ne. FL, on the Coastal Plain. [= C, F, FNA, G, GW, K, SE, WH; = *Carduus virginianus* Linnaeus – RAB; = *Cirsium revolutum* (Small) Petrak – S]

* ***Cirsium vulgare*** (Savi) Tenore, Bull Thistle. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, VA): meadows, pastures, and disturbed areas; common (rare in FL), native of Europe. Late June-November. [= C, F, FNA, G, K, SE, W, WH; < *Carduus lanceolatus* Linnaeus – RAB; < *Cirsium lanceolatum* (Linnaeus) Scopoli – S, misapplied]

Cladanthus Cassini 1816

A genus of about 5 species, herbs, of the Mediterranean region. References: Watson in FNA (2006a).

* ***Cladanthus mixtus*** (Linnaeus) Chevallier. Cp (FL), Pd (NC): disturbed areas; rare, native of Europe. June. [= FNA; = *Anthemis mixta* Linnaeus – C, F, G, SE; = *Chamaemelum mixtum* (Linnaeus) Allioni – K, WH; = *Ormenis mixta* (Linnaeus) Dumortier – S]

Conoclinium A.P. de Candolle 1836 (Mistflower)

A genus of 4 species, of e. and c. North America extending into Mexico. References: Patterson & Nesom in FNA (2006c); Schmidt & Schilling (2000).

Conoclinium coelestinum (Linnaeus) A.P. de Candolle, Mistflower, Ageratum. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): moist to wet disturbed areas, especially ditches; common (uncommon in Piedmont of NC and SC, rare in Mountains), probably more common than formerly. Late July-October. NJ west to IL, c. MO, se. KS, and OK, south to s. FL and c. TX; also in Cuba, and scattered further north (as in NY, n. OH, and n. IN) probably as escapes from cultivation. See Wooten & Clewell (1971) for further discussion of this species. [= FNA, K, WH; = *Eupatorium coelestinum* Linnaeus – RAB, C, F, G, SE, W]

Conyza Lessing 1832 (Horseweed)

A genus of about 60 species, herbs, shrubs, and trees, of temperate, subtropical, and tropical regions. Recent molecular studies have indicated the likely polyphyly of *Conyza* and its close relationship with *Erigeron*; the ultimate circumscription of these genera is in doubt (Nesom 2000b, Noyes 2000). References: Strother in FNA (2006b); Cronquist (1980)=SE; Nesom (2000b). Key based in part on SE.

1 Plants diffusely branched from the base and throughout; plants 1-2.5 (-3) dm tall ..... ***[C. ramosissima]***
1 Plants with a well-developed central axis, sparingly branched (unless mowed or otherwise injured); plants 1-15 dm tall.
2 Involucre 4-6 mm high, densely pubescent; pistillate flowers (50-) 70-200 or more per head ..... ***C. bonariensis***
2 Involucre 3-4 mm high, glabrous or very sparsely pubescent; pistillate flowers mostly 25-45 per head.
3 Stem coarsely spreading-hirsute; leaves ciliate, the larger generally with a few to many coarse teeth; phyllaries green-tipped ..... ***C. canadensis** var. **canadensis***
3 Stem glabrous or with widely scattered, appressed hairs; leaves with a few cilia toward the base, generally entire; phyllaries purple-tipped ..... ***C. canadensis** var. **pusilla***

* ***Conyza bonariensis*** (Linnaeus) Cronquist, South American Horseweed. Cp (FL, GA, NC, SC, VA), Pd (SC): fields, disturbed areas; uncommon, apparently native of South America. April-October. Se. VA south into the tropics. [= C, FNA, K, SE, WH; = ***Erigeron bonariensis*** Linnaeus – RAB, F; = *Conyza floribunda* Kunth – G, misapplied; > *Leptilon bonariense* (Linnaeus) Small – S; > *Leptilon linifolium* (Willdenow) Small – S]

Conyza canadensis (Linnaeus) Cronquist *var.* ***canadensis***, Common Horseweed. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): old fields, disturbed areas, gardens; common. July-November. S. Canada south through nearly all of the United States to tropical America. [= C, G, K, SE, W, WH; = *Erigeron canadensis* Linnaeus var. *canadensis* – RAB; < *C. canadensis* – FNA; = ***Erigeron canadensis*** – F; = *Leptilon canadense* (Linnaeus) Britton – S]

Conyza canadensis (Linnaeus) Cronquist *var.* ***pusilla*** (Nuttall) Cronquist, Southern Horseweed. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dunes, old fields, disturbed areas; common. (May-) July-December. Se. MA and CT west to s. IN, south to FL and TX, and south into tropical America. [= C, G, K, SE, W, WH; = *Erigeron canadensis* Linnaeus var. *pusillus* (Nuttall) Boivin – RAB; < *C. canadensis* – FNA; = ***Erigeron pusillus*** Nuttall – F; = *Leptilon pusillum* (Nuttall) Britton – S; = *Conyza parva* Cronquist]

* *Conyza floribunda* Kunth. Reported as introduced in GA, AL, and MS by Kartesz (1999), probably on the basis of confusion with *C. bonariensis*. [= FNA, K] {rejected; not keyed}

Conyza ramosissima Cronquist. Weedy situations. OH west to MN, south to KY, ec. TN (Chester, Wofford, & Kral 1997), ne. AL, LA, and TX. [= C, FNA, G, K, SE; = *Erigeron divaricatus* Michaux – F; = *Leptilon divaricatum* (Michaux) Rafinesque – S]

Coreopsis Linnaeus 1753 (Coreopsis, Tickseed)
[contributed by Alan S. Weakley and Bruce A. Sorrie]

A genus of about 50 species, herbs, of America. Recent molecular studies suggest that the relationship between *Bidens* and *Coreopsis* (as traditionally circumscribed) is complex, and that changes in taxonomy will be needed to more accurately reflect relationships (Kim et al. 1999; Crawford & Mort 2005). References: Strother in FNA (2006c); Smith (1976)=Z; Sherff & Alexander (1955)=Y; Cronquist (1980)=SE. Key adapted from Y and Z.

1 Disk flowers with 4 corolla lobes and 4 anthers; ray flowers usually apically 3-lobed.
2 Leaves pinnately or bipinnately lobed into linear segments or narrowly lanceolate segments; [section *Calliopsis*] ..... ***C. tinctoria** var. **tinctoria***
2 Leaves simple or with 1-2 auriculate lobes at the base; [section *Eublepharis*].
3 All of the major cauline leaves opposite.
4 Ray flowers pink (white); plant rhizomatous ..... ***C. rosea***
4 Ray flowers yellow; plant fibrous-rooted.
5 Leaf blades ovate (to elliptical), very gradually reduced upward, margins ciliolate, surfaces lacking tiny dark dots; achenes about 5 mm long ..... ***C. integrifolia***
5 Leaf blades linear-oblanceolate to linear, rapidly reduced upward, margins glabrous, surfaces with numerous tiny dark dots (easiest to see on undersurface); achenes less than 2.5 mm long ..... ***C. linifolia***
3 Some (at least) of the major cauline leaves alternate, especially the lowermost several.
6 Ray flowers pink; leaves juncoid (linear-terete) ..... ***C. nudata***

6 Ray flowers yellow; leaves with an expanded blade.
7 Outer phyllaries deltoid and very short, less than 0.3× the length of the inner phyllaries; flowering late September-December (-January or even February); [endemic to Florida] ..... ***C. floridana***
7 Outer phyllaries lanceolate, 0.4-0.8× the length of the inner phyllaries; flowering various, but not past early November; [distribution various].
8 Basal/lower leaves (at least 4 nodes) absent at anthesis; mid-cauline leaves broadly (to narrowly) elliptical; [of swamp forests and openings, freshwater marshes, fresh-tidal creek margins]; [restricted to se. NC to ne. FL] ..... ***C. helianthoides***
8 Basal/lower leaves present at anthesis; leaves rapidly reduced upwards such that mid-cauline leaves are narrow or slender; [of wet savannas, seepage slopes, pitcher-plant bogs, streamhead ecotones, pocosin ecotones].
9 Lower cauline leaves with numerous tiny dark dots (easiest to see on the undersurface); heads (including extended rays) small, 2.5-4.0 cm diameter; median and upper leaves opposite, 1-few lower ones alternate ..... ***C. linifolia***
9 Lower cauline leaves without dark dots; heads large, 3.5-6.0 cm diameter; all major leaves alternate.
10 At least one major leaf per plant with 1-few slender auricles near base; achene wing broad, >3/4 the width of the achene body; flowering early May-early July ..... ***C. falcata***
10 Leaves without auricles; achene wing various (see next lead); flowering period collectively various.
11 Achene wing broad, >3/4 width of achene body; leaf texture firm but not thick and leathery; flowering early May-early July ..... ***C. falcata***
11 Achene wing narrow, <1/2 width of achene body; leaf texture thick and leathery; flowering early September-early November ..... ***C. gladiata***

1 Disk flowers with 5 corolla lobes and 5 anthers; ray flowers apically entire, or with (2-) 4-5 teeth.
12 All of the leaves simple or the plant with a mixture of simple leaves and leaves with 1-2 (-4) basal auricles or leaflets, these distinctly smaller than the terminal lobe or leaflet.
13 Leaves all simple, 4-12 cm wide, the margins coarsely serrate (some of the lower leaves sometimes pinnately lacerate basally); [section *Silphidium*] ..... ***C. latifolia***
13 Leaves simple, usually (but not always) some of the leaves on a plant with basal auricles or lobes, the leaf blades (or terminal leaflets) 0.5-3.5 cm wide, the margins entire; [section *Coreopsis*].
14 Stems with 1-5 (-8) nodes between the first node > 1 cm above the basal leaves and the first head.
15 Plants spreading by elongate stolons; leaf blades (or terminal leaflets) 1-2.2× as long as wide ..... ***C. auriculata***
15 Plants lacking stolons; leaf blades (or terminal leaflets) > 3× as long as wide (basal leaves sometimes broader) ..... ***C. lanceolata***
14 Stems with (5-) 6-12 nodes between the first node > 1 cm above the basal leaves and the first head.
16 Leaf blades (or terminal leaflets) more or less broadly elliptical, ca. 1.5-4 cm wide, acute; stem (and often also the leaves) rather densely hairy (to glabrate) ..... ***C. pubescens*** *var.* ***pubescens***
16 Leaf blades (or terminal leaflets) narrowly elliptical to oblanceolate, ca. 0.6-2 cm wide, acuminate; stem and leaves glabrous ..... ***C. pubescens*** *var.* ***robusta***
12 Most or all of the leaves deeply lobed or dissected into distinct leaflets or divisions, the leaflets or divisions 3-20 or more, if only 3, then the lateral leaflets nearly or fully as large and well-developed as the terminal.
17 Leaves sessile or with a short subpetiolar base < 2 mm long, the initial division of the leaves palmate into 3 leaflets (these sometimes further divided), giving the 2 opposite leaves the superficial appearance of a whorl of 6 leaves; [section *Gyrophyllum*].
18 Leaves palmately 3-foliolate (rarely simple or 3-foliolate with the middle leaflet 2- or 3-lobed), the total number of leaflets or divisions thus 3 (-5), the middle leaflet of median leaves 5-30 mm wide.
19 Leaf blades rather densely short-pubescent; outer phyllaries rather densely short-pubescent; middle leaflet of median leaves 10-30 mm wide; leaflets herbaceous ..... ***C. major*** *var.* ***major***
19 Leaf blades slightly short-pubescent to glabrous; outer phyllaries slightly short-pubescent to glabrous; middle leaflet of median leaves 5-10 (-12) mm wide; leaflets subcoriaceous and stiff ..... ***C. major*** *var.* ***rigida***
18 Leaves palmately compound, the leaflets simple to lobed or pinnatifid, the total number of leaflets or divisions (3-) 5-25, the middle leaflet of median leaves 0.5-7 mm wide.
20 Leaflets usually lobed (rarely simple), the total number of leaflets or divisions (3-) 5-11 (-15) per leaf, the segments of median leaves (1.5-) 2-7 (-9) mm wide ..... ***C. delphiniifolia***
20 Leaflets pinnatifid, the total number of leaflets or divisions 11-25 or more per leaf, the segments of median leaves 0.2-1.2 mm wide ..... ***C. verticillata***
17 Leaves, at least the lower, distinctly petioled on petioles 5-50 mm or more long.
21 Ray flowers not toothed terminally (or rarely with a few with inconspicuous and irregular teeth); mid-cauline leaves palmately 3-foliolate, the terminal leaflet sometimes again 3-5-foliolate (sometimes giving an appearance of a pinnately 5-7-foliolate leaf), the leaflets 6-35 mm wide, 3-15× as long as wide; [section *Gyrophyllum*] ..... ***C. tripteris***
21 Ray flowers apically with (2-) 4-5 teeth; mid-cauline leaves pinnately 5-11-foliolate, the leaflets either 3-15 mm wide and about 1-3× as long as wide, or 0.5-2 mm wide and > 20× as long as wide; [section *Coreopsis*].
22 Disk flowers reddish; ray flowers usually with a basal red mark; leaflets of mid-cauline leaves 3-15 mm wide and about 1-3× as long as wide ..... ***C. basalis***
22 Disk flowers yellow; ray flowers yellow; leaflets of mid-cauline leaves 0.5-6 (-10) mm wide and > 10× as long as wide.
23 Achene wings fimbriate; [of granitic outcrops of the Piedmont of GA and AL] ..... ***C. grandiflora*** *var.* ***saxicola***
23 Achene wings entire; [collectively more widespread].
24 Divisions of the midstem and upper cauline leaves with 1-3 divisions; plants reclining; flowering late June-July; [of dolomite glades in c. AL] ..... ***[C. grandiflora*** *var.* ***inclinata]***
24 Divisions of the midstem and upper cauline leaves with > 5 divisions; plants erect; flowering May-late June; [of granite outcrops and disturbed areas].
25 Larger divisions of midstem and upper stem leaves 2-6 (-10) mm wide ..... ***C. grandiflora*** *var.* ***grandiflora***
25 Larger divisions of midstem and upper stem leaves 0.5-1.5 mm wide ..... ***C. grandiflora*** *var.* ***harveyana***

Coreopsis auriculata Linnaeus, Lobed Coreopsis. Pd, Cp, Mt (GA, NC, SC, VA): moist slopes and woodlands; common (rare in Coastal Plain and Mountains). April-June. S. VA and KY south to MS, AL, and GA. [= RAB, C, F, FNA, G, K, S, SE, W, Y, Z]

* ***Coreopsis basalis*** (A. Dietrich) Blake, Texas Coreopsis. Cp (FL, GA, NC, SC), Pd (GA): sandy roadsides and fields; common (uncommon in FL), native of farther west. May-July. Probably native only to e. TX, now distributed across the Coastal Plain from TX east to FL and north to NC. [= RAB, C, F, FNA, G, K, SE, WH, Z; > *C. basalis* var. *basalis* – Y]

Coreopsis delphiniifolia Lamarck, Larkspur Coreopsis. Cp (GA, SC, VA), Pd (GA, NC, SC), Mt (GA): dry woodlands; uncommon (rare north of GA). May-July. The species ranges from e. VA and s. NC south to c. GA, and se. TN (Polk County) (Chester, Wofford, & Kral 1997), and reputedly AL. Smith (1976) indicates that the species is an allopolyploid derivative (at 4x, 6x, and 8x) of *C. major*, *C. tripteris*, and *C. verticillata*. Its range extends south well beyond the range of *C. verticillata*. [= FNA, K; < *C. major* var. *stellata* – RAB; = *C. delphinifolia* – F, G, S, SE (an orthographic variant); > *C. delphinifolia* var. *delphinifolia* – Y; > *C. delphinifolia* var. *chlooidea* Sherff – Y; > *C. major* Walter var. *linearis* Small – Y; = *C.* ×*delphiniifolia* – Z]

Coreopsis falcata Boynton, Pool Coreopsis. Cp (GA, NC, SC, VA), Mt (SC): peat bogs, very wet savannas, ditches and borrow pits in savannas; common (rare in VA). Early May-early July (rarely later, perhaps in response to growing season fire). The species is endemic to the Coastal Plain of se. VA (City of Chesapeake), e. NC, e. SC, and e. GA; disjunct in Oconee County, SC. First reported for VA by Wieboldt et al. (1998). *C. falcata* should not be included (as by Cronquist in C and SE) in *C. gladiata*; the two species are distinctive in ecological preferences, morphology, phenology, and distribution. [= RAB, GW, K, S, Y, Z; < *C. gladiata* var. *gladiata* – C, SE; < *C. gladiata* – FNA, WH]

Coreopsis floridana E.B. Smith, Florida Coreopsis. Cp (FL): wet pine flatwoods; uncommon. Late September-late December (-February). Panhandle FL south to s. FL. [= FNA, K, WH, Z] {not yet keyed; add GW, S, and Y synonymy}

Coreopsis gladiata Walter, Swamp Coreopsis. Cp (FL, GA, NC, SC): swamp forests; rare (SC Rare). August-October. Se. NC south to c. FL and west to s. MS. See *C. helianthoides* and *C. linifolia* for further discussion of the taxonomy of this group of species. [= RAB, S, Z; < *C. gladiata* var. *gladiata* – C, G, SE (also see *C. falcata*); < *C. gladiata* – FNA, GW, K, WH (also see *C. helianthoides*); > *C. gladiata* – Y; > *C. longifolia* Small var. *longifolia* – Y; > *C. longifolia* Small var. *godfreyi* Sherff – Y]

Coreopsis grandiflora Hogg ex Sweet *var.* ***grandiflora***, Large-flowered Coreopsis. Pd (GA, SC): in thin soils of rock outcrops, especially granitic flatrocks; rare. Late May-late June. Var. *grandiflora* ranges from c. GA and w. SC west to e. TX and e. OK, very scattered in distribution; it differs from var. *harveyana* in having the leaf divisions 2-6 mm wide (vs. 0.5-2 mm wide). [= F, K, Z; < *C. grandiflora* – RAB, FNA, G, S, W; < *C. grandiflora* var. *grandiflora* – C, SE (also see var. *harveyana*); > *C. grandiflora* var. *grandiflora* – Y; > *C. grandiflora* var. *pilosa* Sherff – Y]

* ***Coreopsis grandiflora*** Hogg ex Sweet *var.* ***harveyana*** (A. Gray) Sherff, Large-flowered Coreopsis. Cp (GA, NC, SC, VA), Pd, Mt (NC, SC, VA): disturbed areas; rare, native of farther west. Late May-late June. As treated by Smith (1976), the species consists of 4 varieties. Var. *harveyana* is the most abundant variety, probably originally endemic to AR, n. LA, ne. TX, OK, e. KS, and s. and c. MO, but now scattered eastward to IN, NC, and SC. Var. *longipes* (Hooker) Torrey & Gray is endemic to e. TX. See Crawford & Smith (1984) for additional discussion of the varieties. [= F, K, Y, Z; < *C. grandiflora* – RAB, FNA, G, S, W, WH; < *C. grandiflora* var. *grandiflora* – C, SE]

Coreopsis grandiflora Hogg ex Sweet *var.* ***saxicola*** (Alexander) E.B. Smith, Stone Mountain Coreopsis. Pd (GA): granitic outcrops; uncommon. As interpreted by Smith (1976) and Cronquist (1980), this variety is endemic to granite outcrops in c. GA and ec. AL and to sandstone outcrops in nc. AR; the AR plants, differing in morphology, phenology, karyotype, and distribution, may well warrant separate status. [= K, SE, Z; < *C. grandiflora* Hogg ex Sweet – FNA; = *C. saxicola* Alexander – S; > *C. saxicola* var. *saxicola* – Y; > *C. saxicola* var. *duncanii* Sherff – Y]

Coreopsis helianthoides Beadle, Beadle's Coreopsis. Cp (GA, NC, SC), Mt (NC), Pd (GA): swamp forests, swamp edges, and bogs; rare. September-October. Se. NC south to c. and w. FL and west to s. MS, with a disjunct occurrence in sw. NC. The validity of this taxon is controversial. Smith (1976) includes it in *C. gladiata*, considering it merely a pubescent form. Cronquist (in SE) regards it as distinct at the species level, despite his serious over-lumping of all its close relatives into a single species with two varieties: *C. gladiata* var. *gladiata* (including *C. falcata* and *C. gladiata*), and var. *linifolia* (including *C. oniscicarpa* and *C. linifolia*). [= RAB, S, SE, Y, Z; < *H. gladiata* – FNA, GW, K, WH]

Coreopsis integrifolia Poiret, Chipola Dye-flower. Cp (GA, SC): banks and floodplains of small blackwater streams (especially over limestone), edges of swamp forests bordering longleaf pinelands or bordering brackish marshes; rare (GA Special Concern). July-November. Se. SC south to the Panhandle of Florida, apparently uncommon throughout its range. It is related to *C. helianthoides* and *C. linifolia*; the leaves are cauline and opposite, the petioles are ciliate. [= FNA, GW, K, S, SE, WH, Y, Z]

Coreopsis lanceolata Linnaeus, Longstalk Coreopsis. Cp, Pd, Mt (GA, NC, SC, VA)): disturbed areas; common (rare in Mountains). April-June. S. MA, MI and WI south to c. peninsular FL, e. TX, and NM. Often spread from cultivation, its original range obscure. [= RAB, C, FNA, K, SE, W, WH, Z; > *C. lanceolata* var. *lanceolata* – Y; > *C. lanceolata* var. *villosa* Michaux – F, G, Y; > *C. heterogyna* Fernald – F; > *C. lanceolata* – S; > *C. crassifolia* Aiton – S]

Coreopsis latifolia Michaux, Broadleaf Coreopsis. Mt (GA, NC, SC): in rich, moist, cove forests and slopes at medium elevations, primarily from 500 m in the Blue Ridge Escarpment to nearly 1500 m; rare (though often locally abundant). (July-) August-September. A Southern Appalachian endemic: sw. NC and se. TN (Polk County) (Chester, Wofford, & Kral 1997) south into nw. SC and ne. GA. This species is treated by Smith (1976) in a monotypic section (section *Silphidium*) of *Coreopsis*, and, indeed, it does not closely resemble our other species. Smith (1976) considered it a primitive species, with its closest relatives in Mexico, and all of his attempts to hybridize it with other Southeastern *Coreopsis* failed. Flowering appears to be triggered by canopy tree-fall light gaps. It often occurs with *Helianthus glaucophyllus*. [= RAB, FNA, K, S, SE, W, Y, Z; = *Leiodon latifolius* (Michaux) Shuttleworth]

Coreopsis linifolia Nuttall, Savanna Coreopsis. Cp (FL, GA, NC, SC, VA), Mt (NC): savannas, sandhill seeps, sandhill-pocosin ecotones, bogs; common, rare in Mountains (rare in VA). August-October. Se. VA south to ne. and Panhandle FL, west to e. TX. Basal rosettes of this species are abundant in wet savannas and can be distinguished readily by the distinctive leaves: very long-petiolate, about 1 cm across, the pinnate venation very neat (the main lateral veins straight and parallel to the other laterals on the same side of the leaf), with small dark dots when backlit, and very thick (ca. 1 mm) and stiff in texture. The

proper taxonomic treatment of this taxon and its relatives remains unclear. Smith (1976) interpreted *C. linifolia* to range from se. VA south and west along the Coastal Plain to e. TX (with a few inland disjunctions) and to consist of two chromosome races, a diploid Gulf Coast race (w. FL to se. TX) and a tetraploid Atlantic Coast race (s. GA to se. VA), "not differing sufficiently morphologically to justify nomenclatural recognition." Fernald, however, named *C. oniscicarpa* (the tetraploid) based on morphologic characters. Given the existence of morphologic characters, the failure of Smith's attempted hybridizations of the two "races," his speculation that the tetraploid could be an allotetraploid (though likely an autotetraploid), and the allopatric ranges of the two races, specific recognition is plausible. Further study is needed. Cronquist (in C, G, SE) does not recognize *C. oniscicarpa* as distinct from *C. linifolia*, and reduces *C. linifolia* (*sensu lato*) to a variety of *C. gladiata*, also including *C. falcata* in the typic variety of *C. gladiata*. The abundant morphologic, phenologic, and ecologic differences between *C. gladiata*, *C. linifolia*, and *C. falcata* render such an approach undesirable. [= GW, K, W, Y, Z; = *C. angustifolia* Aiton – RAB, possibly misapplied; = *C. gladiata* var. *linifolia* (Nuttall) Cronquist – C, G, SE; > *C. oniscicarpa* Fernald var. *oniscicarpa* – F; > *C. oniscicarpa* var. *simulans* Fernald – F; < *C. gladiata* – FNA]

Coreopsis major Walter *var. **major***, Woodland Coreopsis. Pd, Mt (GA, NC, SC, VA): woodlands; rare. May-July. W. VA s. OH, and KY south to SC, GA, w. FL, s. AL, and s. MS. How to treat the "*Coreopsis major* complex" (here including *C. major* var. *major*, *C. major* var. *rigida*, *C. delphiniifolia*, and *C. verticillata*) is not clear. The group apparently includes diploids and a variety of allopolyploids and autopolyploids (at various ploidies) variously derived from *C. major* var. *major* and *C. verticillata*. [= RAB, C, F, G, SE, W, Y; < *C. major* – FNA, K, S, WH, Z]

Coreopsis major Walter *var. **rigida*** (Nuttall) F.E.Boynton, Stiffleaf Coreopsis. Mt, Pd, Cp (GA, NC, SC, VA?): dry woodlands and forests; common. June-August. VA, WV, and KY south to w. FL, s. AL, s. MS, and se. LA. The recognition of varieties is problematic and controversial. [= C, SE, Y; >< *C. major* var. *stellata* (Nuttall) B.L. Robinson – RAB; > *C. major* var. *stellata* – F, G, Y; > *C. major* var. *rigida* – F, Y; < *C. major* – FNA, K, S, WH, Z]

Coreopsis nudata Nuttall. Cp (FL, GA): seasonally flooded pineland depressions, either herbaceous-dominated or under a canopy of *Taxodium ascendens*; uncommon. E. GA (in close proximity to SC) south to ne. FL and Panhandle FL, west to e. LA. [= FNA, GW, K, S, SE, WH, Y, Z]

Coreopsis pubescens Elliott *var. **pubescens***, Common Hairy Coreopsis. Mt (NC, VA), Pd (GA, NC), Cp (NC): forests, woodlands, and rock outcrops; common, rare in Piedmont and Coastal Plain (rare in VA). July-September. The species as a whole is largely centered in the Southern Appalachians and Ozarks-Ouachitas, with scattered outlying occurrences; var. *pubescens* has essentially the range of the species, from s. VA, s. KY, s. IL, and s. MO south to nw. FL, MS, and LA. Var. *robusta*, of the Southern Appalachians, is discussed below. [= F, GW, K, Y, Z; < *C. pubescens* – RAB, C, FNA, G, S, SE, W, WH]

Coreopsis pubescens Elliott *var. **robusta*** Gray ex Eames, Mountain Hairy Coreopsis. Mt (GA, NC, SC, VA), Pd (NC), Cp* (NC): rocky slopes, glades, edges of rock outcrops; common (rare in Piedmont and Coastal Plain, rare in VA). July-September. Var. *robusta* is a Southern Appalachian endemic, known from sw. VA, w. NC, nw. SC, n. GA, e. TN, and c. AL. [= F, GW, K, Y, Z; < *C. pubescens* – RAB, C, FNA, G, S, SE, W]

Coreopsis rosea Nuttall. Cp (GA, SC): upland depression ponds in the Inner Coastal Plain, drawdown zones on banks of blackwater rivers in the Outer Coastal Plain; rare. July-September. Coastal Plain of s. Nova Scotia, MA, RI, NY (Long Island), NJ, DE, MD, e. SC, and e. GA, where it occurs on shores with fluctuating water levels, primarily on Coastal Plain pond shores, but also on river banks. It occurs in Horry County, SC, in the drawdown zone on the banks of the Waccamaw River; it should be sought in NC. It is immediately distinguishable from all our species by its pink to white ray flowers; another pink-rayed species, *C. nudata* Nuttall, ranges in the Coastal Plain from GA west to e. LA and has linear, terete, "juncoid" leaves. [= FNA, GW, K, S, SE, Y, Z]

* ***Coreopsis tinctoria*** Nuttall *var. **tinctoria***, Calliopsis, Plains Coreopsis. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): roadsides and other disturbed places; uncommon (rare in VA Mountains), probably introduced from farther west. Var. *tinctoria* was apparently widespread in the Great Plains, now distributed nearly throughout North America. Var. *similis* (Boynton) H.M. Parker ex E.B. Smith is endemic to s. TX and adjacent Tamaulipas and Nuevo Leon. [= C, K, Z; < *C. tinctoria* – FNA, G, GW, SE, W, WH; > *C. tinctoria* – RAB, S; > *C. cardaminefolia* (A.P. de Candolle) Torrey & A. Gray – RAB, S, Y; > *C. tinctoria* var. *tinctoria* – Y; > *C. stenophylla* Boynton – Y]

Coreopsis tripteris Linnaeus, Tall Coreopsis. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, VA): rich, moist woodlands and woodland borders, primarily over calcareous or mafic rocks or on nutrient-rich alluvium; uncommon. July-early September. Widespread in e. North America, from MA, s. Ontario, and WI south to Panhandle FL and TX. [= RAB, C, FNA, G, GW, K, S, SE, W, WH, Z; > *C. tripteris* var. *deamii* Standley – F; > *C. tripteris* var. *smithii* Sherff – F, Y; > *C. tripteris* var. *tripteris* – F, Y]

Coreopsis verticillata Linnaeus, Threadleaf Coreopsis. Pd, Cp, Mt (NC, SC, VA): dry sandy, rocky, or clayey woodlands and woodland borders; common (uncommon in Coastal Plain and Mountains). May-July. Smith (1976) indicates that the species consists of two chromosome races, a diploid, ranging in the Piedmont and Mountains from c. SC and NC north to ne. WV, and s. MD, and an allotetraploid, limited to the Coastal Plain of ne. NC and se. VA. The finely-divided leaves are attractive and the plant is cultivated horticulturally; scattered occurrences outside the ranges indicated above are escapes from cultivation. [= RAB, C, F, FNA, G, K, S, SE, W, Y, Z]

Coreopsis grandiflora Hogg ex Sweet var. *inclinata* J. Allison, Ketona Tickseed, Ketona Coreopsis, is endemic to dolomitic Ketona glades of c. AL (Allison & Stevens 2001). [< *C. grandiflora* – FNA]

Coreopsis leavenworthii Torrey & Gray. AL and FL. [= FNA, K; > *C. leavenworthii* vars. – Y] {not yet keyed; synonymy incomplete}

Coreopsis pubescens Elliott *var. **debilis*** (Sherff) E.B. Smith. C. TN south through AL and ne. MS to w. FL, s. AL, s. MS, and se. LA; it has very narrow leaf blades or terminal leaflets. [= GW, K, Z; < *C. pubescens* – FNA, S, SE; > *C. corninsularis* Sherff – Y; > *C. debilis* Sherff – Y] {not yet keyed}

Coreopsis pulchra F.E. Boynton, Lookout Mountain Coreopsis. Nw. GA and ne. AL. [= FNA, K, S, SE, Y, Z] {not yet keyed}

Coreopsis tinctoria Nuttall *var.* ***atkinsoniana*** (Douglas ex Lindley) H.M. Parker ex E.B. Smith. Mt (GA): roadsides; rare, apparently introduced eastward in nw. GA from a distribution in the w. North America. [= K; < *C. tinctoria* – FNA, SE; = *C. atkinsoniana* Douglas ex Lindley – Y] {not yet keyed; synonymy incomplete]

Cosmos Cavanilles 1791 (Cosmos)

A genus of about 26 species, of tropical, subtropical, and warm temperate America. References: Kiger in FNA (2006c); Cronquist (1980)=SE; Sherff & Alexander (1955)=Z.

1 Rays pink or white; ultimate leaf segments mostly ca. 1 mm wide or less ..... ***C. bipinnatus***
1 Rays orange, yellow, or red; ultimate leaf segments mostly > 2 mm wide ..... ***C. sulphureus***

* ***Cosmos bipinnatus*** Cavanilles, Common Cosmos. Cp, Pd (NC, SC, VA), Mt (NC): garden edges, roadsides, disturbed areas; commonly cultivated, rarely escaped, native of Mexico. August-November. [= RAB, C, F, FNA, G, K, S, SE; > *C. bipinnatus* var. *bipinnatus* – Z]

* ***Cosmos sulphureus*** Cavanilles, Orange Cosmos. Cp (GA, NC, SC, VA): garden edges, roadsides, disturbed areas; commonly cultivated, rarely escaped, native of tropical America. August-November. [= C, F, FNA, G, K, S, SE; > *C. sulphureus* var. *sulphureus* – Z]

Cota J. Gay ex Gussone 1845 (Golden Marguerite)

A genus of ca. 40 species, herbs, of Europe, sw. Asia , and Africa. References: Watson in FNA (2006a).

* ***Cota tinctoria*** (Linnaeus) J. Gay ex Gussone, Yellow Chamomile, Golden Marguerite. Cp (VA): disturbed areas, roadsides; rare, native of Europe. June-September. [= FNA; = *Anthemis tinctoria* Linnaeus – C, F, G, K, Z]

Cotula Linnaeus 1753 (Brassbuttons)

A genus of about 55 species, annual and perennial herbs, of the Old World, mainly southern hemisphere. References: Watson in FNA (2006a).

* ***Cotula australis*** (Sieber) Hooker f. Cp (SC): waste area around wool-combing mill; rare, native of Australia and New Zealand. Reported for SC by Nesom (2004d). [= K]

Crepis Linnaeus 1753 (Hawksbeard)

A genus of about 200 species, herbs, of the Northern Hemisphere, South America, and southern Africa. References: Bogler in FNA (2006a); Cronquist (1980)=SE. Key adapted from C and SE. [also see *Youngia*]

1 Cypselas (at least the inner in the head) with a distinct narrow beak
  2 Cypselas dimorphic, the inner beaked ..... ***C. foetida***
  2 Cypselas monomorphic, all beaked.
    3 Stems coarsely setose, the setae yellowish; bractlets subtending the phyllaries 10-14, not reflexed ..... ***[C. setosa]***
    3 Stems glabrate, hispid, or tometose, if sparsely setose the setae blackish; bractlets subtending the phyllaries 5-12, reflexed ..... ***C. vesicaria*** *ssp.* ***taraxacifolia***
1 Cypselas narrowed toward the summit, but not distinctly beaked.
  4 Stems (at least towards the base) hispid and viscid with stipitate glands; phyllaries glabrous on both the inner and outer surfaces; cypselas 4-6 mm long ..... ***C. pulchra***
  4 Stems variously pubescent, but not viscid with stipitate glands; phyllaries variously pubescent on one or both surfaces; cypselas 1.5-7 mm long.
    5 Inner surface of the inner phyllaries glabrous; outer surface stipitate-glandular and with 2 rows of black setae; cypselas 1.5-2.5 mm long ..... ***C. capillaris***
    5 Inner surface of the inner phyllaries pubescent with appressed, shining, white hairs 0.1-0.2 mm long; outer surface of phyllaries tomentose, hispidulous, or canescent, but the hairs not glandular and without setae; cypselas 3-7 mm long.
      6 Cypselas 4-7 mm long, yellowish- or reddish-brown, with 13-20 ribs; pappus 5-7 mm long; biennial ..... ***C. biennis***
      6 Cypselas 3-4 mm long, reddish- or purplish-brown, with 10 ribs; pappus 4-5 mm long; annual ..... ***C. tectorum***

* ***Crepis capillaris*** (Linnaeus) Wallroth, Smooth Hawksbeard. Mt, Pd (NC, VA): pastures, roadsides, disturbed areas; common in Mountains, rare in Piedmont, native of Eurasia. May-November. [= RAB, C, F, FNA, G, K, SE, W]

* ***Crepis pulchra*** Linnaeus, Smallflower Hawksbeard. Pd (GA, NC, SC, VA), Mt (NC, SC, VA), Cp (FL, NC, SC, VA): roadsides, fields, disturbed areas; common in Piedmont, rare in Mountains and Coastal Plain, native of Eurasia. Late April-July. [= RAB, C, F, FNA, G, K, SE, W, WH]

* ***Crepis tectorum*** Linnaeus. Mt (NC), Cp (VA): disturbed areas; rare, perhaps not established, native of Europe. June-July. [= C, F, FNA, G, K, S]

* ***Crepis vesicaria*** Linnaeus *ssp.* ***taraxacifolia*** (Thuillier) Thellung. Mt (NC): lawns; rare, native of Mediterranean and w. Europe. Late May-July. [= RAB, C, FNA, K, SE; *? Crepis vesicaria* Linnaeus ssp. *haenseleri* (Boiss. ex A.P. de Candolle) P.D. Sell]

* ***Crepis biennis*** Linnaeus, Rough Hawkbeard. {VA} [= FNA, K]
* ***Crepis foetida*** Linnaeus, Stinking Hawksbeard. {NC} [= FNA, K]
* *Crepis setosa* Haller f., Bristly Hawksbeard. Reported for Polk County, TN by Chester, Wofford, & Kral (1997) and from s. PA by Rhoads & Klein (1993). [= C, FNA, K] {not yet keyed}

Croptilon Rafinesque 1837 (Scratch-daisy)

A genus of 3 species, herbs, of s. North America. References: Smith (1981); Correll & Johnston (1970); Cronquist (1980)=SE; Nesom (2000b).

Croptilon divaricatum (Nuttall) Rafinesque, Scratch-daisy. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): sandy soils of fields, roadsides, and sandhill woodlands; common (rare in VA). August-November. Se. VA south to c. peninsular FL and west to c. TX, inland to se. OK and s. AR. [= FNA, K; = *Haplopappus divaricatus* (Nuttall) A. Gray – RAB, C, F, G, SE, W; = *Isopappus divaricatus* (Nuttall) Torrey & Gray – S]

Cyclachaena Fresenius 1838

A monotypic genus, a perennial herb, of North America. References: Strother in FNA (2006c).

* ***Cyclachaena xanthiifolia*** (Nuttall) Fresenius, Big Marsh-elder. Mt, Pd (VA), Cp (SC): disturbed areas, waste areas near wool-combing mills; rare, native of w. North America. August-October. See Nesom (2004d). [= FNA; = *Iva xanthifolia* Nuttall – C, F, G, K, SE, orthographic variant; = *I. xanthiifolia* Nuttall]

Diaperia Nuttall 1840 (Dwarf Cudweed)

A genus of 3 species, annual herbs, of c. United States and n. Mexico. References: Morefield in FNA (2006a); Arriagada (1998)=Z; Cronquist (1980)=SE; Anderberg (1991)=Y.. Key based closely on FNA.

1 Heads ellipsoid to cylindrical, 3.5-4.5 mm high, 2-3× as high as wide; capitular leaves visible between and surpassing the heads; cypselas 0.9-1.2 mm long ..... ***D. prolifera* var. *prolifera***
1 Heads campanulate to spherical, 2-3.3 mm high, about 1× as high as wide; capitular leaves more-or-less hidden between and surpassed by the heads; cypselas 0.7-0.9 mm long.
  2 Pistillate paleas individually visible through thin, silky pubescence; heads spherical, the largest 2.5-3.3 mm high ..... ***[D. verna* var. *drummondii]***
  2 Pistillate paleas collectively hidden by dense woolly pubescence; heads campanulate the largest 2.0-2.5 mm long ..... ***D. verna* var. *verna***

Diaperia prolifera (Nuttall ex de Candolle) Nuttall *var.* ***prolifera***, Cotton-rose, Bighead Pygmy-cudweed. Cp (*SC): disturbed areas, waste areas around wool-combing mill; rare, introduced from farther south and west (Nesom 2004d). May-June. MO west to MT, south to LA and TX; disjunct eastwards in the Black Belt prairies of AL and MS. [= FNA; < *Filago prolifera* (Nuttall ex A.P. de Candolle) Britton – Y, Z; < *Evax prolifera* Nuttall ex A.P. de Candolle – K, SE]
* ***Diaperia verna*** (Rafinesque) Morefield *var.* ***verna***, Cotton-rose, Poverty-weed. Pd (GA), Cp (SC): disturbed areas, waste areas around wool-combing mill; rare, introduced from farther south and west (Nesom 2004d). Early March-late June. [= FNA; = *Filago verna* (Rafinesque) Rafinesque – Y, Z; *? Evax verna* Rafinesque var. *verna* – K; *? Filaginopsis nivea* Small – S; *? E. multicaulis* A.P. de Candolle – SE]

Diaperia verna (Rafinesque) Morefield var. *drummondii*, Gulf Coast Rabbit-tobacco. Dunes, beaches, disturbed sandy soils. AL west to TX. Mid February-mid May. [= FNA; = *Evax verna* Rafinesque var. *drummondii* (Torrey & A> Gray) Kartesz & Gandhi -- K]

Dittrichia W. Greuter 1973

A genus of 2 species, herbs, of the Mediterranean region. References: Preston in FNA (2006a).

* ***Dittrichia graveolens*** (Linnaeus) W. Greuter. Cp (SC): waste area around wool-combing mill; rare, native of Meditteranean Europe, but quite possibly introduced into SC by wool from Australia (Nesom 2004d). [= FNA, K] {add to synonymy}

* *Dittrichia viscosa* (Linnaeus) Greuter. Cp (FL): disturbed areas, on ballast; rare, native of Mediterranean Europe. Collected as a ballast weed in Pensacola, Escambia County, FL, and elsewhere in eastern North America, in the late 1800s; it does not appear to be naturalized. [= FNA, WH; = *Cupularia viscosa* (Linnaeus) Godron & Grenier – S; = *Inula viscosa* (Linnaeus) Aiton – SE] {not keyed}

Doellingeria Nees 1832 (Flat-topped Aster)

A genus of about 7 species, herbs, of e. North America and e. Asia. This group of species has long been recognized as distinctive, sometimes given status as the genus *Doellingeria* (first by Nees in 1832), or as subgenus *Doellingeria* of *Aster*. Nesom (1993d) argues that *Doellingeria* should be separated from *Aster*, as its affinities seem to be at least as strongly to *Solidago* and its relatives, an assertion supported by molecular evidence (Noyes & Rieseberg 1999). References: Semple & Chmielewski in FNA (2006b); Nesom (1993d)=Z; Cronquist (1980)=SE; Nesom (2000b).

1 Disk flowers 4-14 per head; ray flowers 2-7 per head; leaves mostly 1.5-4× as long as wide; [of sandhill ecotones and streamhead pocosins of the Coastal Plain (primarily fall-line sandhills) from sc. NC southward] ..... ***D. sericocarpoides***
1 Disk flowers 16-40 per head; ray flowers 5-14 per head; leaves 2-6× as long as wide; [collectively widespread in our area].
2 Plants with stems solitary or several from a crown, to 11 dm tall; leaves mostly 2-4 (-5)× as long as wide ..... ***D. infirma***
2 Plants with stems scattered from creeping rhizomes (forming clonal patches), to 20 dm tall; leaves mostly 4-6× as long as wide..... ***D. umbellata***

Doellingeria infirma (Michaux) E. Greene, Appalachian Flat-topped White Aster. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, VA): woodland borders, dry or dry-mesic woodlands, glades; common (rare in FL). Late June-September. MA west to KY, south to SC, GA, Panhandle FL (Gadsden County), AL, and wc. TN. [= FNA, K, WH, Z; = *Aster infirmus* Michaux – RAB, C, G, SE, W; > *Doellingeria infirma* – S; >< *Doellingeria humilis* (Willdenow) Britton – S, in part]

Doellingeria sericocarpoides Small, Pocosin Flat-topped Aster. Cp (FL, GA, NC, SC): sandhill ecotones and streamhead pocosins; uncommon. Late July-October. Sc. NC south to ne. FL and Panhandle FL, west to AL; also in AR, OK, and TX. [= FNA, K, S, WH, Z; = *Aster sericocarpoides* (Small) K. Schumann – SE; = *A. umbellatus* P. Miller var. *brevisquamus* Fernald – RAB, misapplied; = *A. umbellatus* var. *latifolius* A. Gray – GW; >< *Doellingeria humilis* (Willdenow) Britton – S, in part, misapplied]

Doellingeria umbellata (P. Miller) Nees, Tall Flat-topped White Aster. Mt (GA, NC, SC, VA), Pd (GA, NC, VA), Cp (VA): wet meadows, pastures, bogs, marshes, stream floodplains, roadbanks, to at least 1900 m; common (rare in Coastal Plain). August-September. Newfoundland west to MN, south to e. VA, w. NC, nw. SC (P. McMillan pers.comm. 2002), n. GA, ne. AL, TN, and KY. [= S, Z; = *Aster umbellatus* P. Miller – C, G, SE, W; = *A. umbellatus* var. *umbellatus* – RAB, GW; > *Doellingeria umbellata* var. *umbellata* – FNA, K]

Dracopis Cassini 1825 (Coneflower)

A monotypic genus, an annual herb, of sc. and se. North America, perhaps better included in *Rudbeckia*. References: Urbatsch & Cox in FNA (2006c).

Dracopis amplexicaulis (Vahl) Cassini. Cp (FL, SC*), Pd* (GA*): prairies, calcareous bttomlands, dry open areas, disturbed areas, waste areas near wool-combing mill; rare, introduced at least in part in our area. Native to prairie-like areas and calcareous bottomlands from GA (?) and AL west to KS and TX; reported for nc. GA (Jones & Coile 1988) and introduced in SC (Nesom 2004d). [= K, SE, WH; = *Rudbeckia amplexicaulis* Vahl – F, FNA]

Dyssodia Cavanilles 1802

A genus of 4 species, herbs, of North America south to Central America. References: Strother in FNA (2006c).

* ***Dyssodia papposa*** (Ventenat) A.S. Hitchcock, Dogweed. Cp (SC): waste areas near wool-combing mill; rare, native of c. and sw. North America. Reported for SC by Nesom (2004d). [= FNA, K, SE; = *Boebera papposa* (Ventenat) Rydberg – S]

Echinacea Moench 1794 (Purple Coneflower)

A genus of 4-9 species, herbs, endemic to e. and c. North America. There has been considerable medicinal use of extracts from many of the species, and collection of plants from the wild to meet the demand of the herbal trade has extirpated many populations, particularly in c. United States. Foster (1991) presents a lengthy and detailed discussion of medicinal uses of *Echinacea*, along with considerable information on the biology, conservation needs, taxonomy, and nomenclatural history of the genus. Binns, Baum, & Arnason (2002) provide no rationale for their approach of recognizing the same number of taxa as McGregor, but treating them as 4 species and 10 varieties; the entities seem to be distinct at the specific level. References: Urbatsch, Neubig, and Cox in FNA (2006c); Baskin, Snyder, & Baskin (1993)=Z; Foster (1991)=Y; Cronquist (1980)=SE; Binns, Baum, and Arnason (2002)=X; McKeown (1999); Gaddy (1990); McGregor (1968).

1 Leaves lanceolate to ovate, the larger > 5 cm wide, the stem leaves well-developed, though smaller than the basal.
2 Leaves glabrous on both sides, or scabrous above; chaffy bracts (pales) ca. 9 mm long, the awns about a fourth as long as the body of the pales and with incurved tips; rays 3.5-8 cm long, strongly drooping ..... ***E. laevigata***

2 Leaves pubescent or scabrous on both sides; chaffy bracts (pales) 10-13 mm long, the awns about half as long as the body of the pales and with straight tips; rays 2.5-5.5 cm long, horizontal to slightly drooping ..... ***E. purpurea***

1 Leaves lanceolate to linear, the larger < 5 cm wide, stem leaves few and poorly developed, the basal leaves predominant.

3 Rays curved upward, medium pink, 2.5-3.2 cm long; [endemic to calcareous glades in c. TN] ..... ***[E. tennesseensis]***

3 Rays horizontal to drooping, pale pink, 4-9 cm long; [widely scattered in our area].

4 Fresh pollen white ..... ***E. pallida***

4 Fresh pollen pale to bright yellow ..... ***E. simulata***

Echinacea laevigata (C.L. Boynton & Beadle) Blake, Smooth Purple Coneflower. Pd (NC, VA), Mt (GA, SC, VA), Cp (SC): open woodlands and glades over mafic or calcareous rocks, such as diabase, limestone, and dolostone, rarely in oak-pine savannas of the upper Coastal Plain over circumneutral clay sediments; rare. Late May-July. The species is an eastern sibling of *E. purpurea*. In NC, this attractive, medicinal plant is now limited to a few populations in Durham, Granville, and Rockingham counties. Extensive populations occur over Elbrook Dolomite in Montgomery, VA. Populations of this species in sandy soils of the Coastal Plain of SC have been variously interpreted as native or introduced (Nelson & Kelly 1997). [= RAB, C, F, FNA, K, SE, W, X, Y; = *E. purpurea* var. *laevigata* (C.L. Boynton & Beadle) Cronquist – G]

*? ***Echinacea pallida*** (Nuttall) Nuttall, Pale Purple Coneflower. Pd (GA, NC?, VA), Mt (VA), Cp (GA): roadsides; rare, perhaps introduced in part from c. US (GA Special Concern, NC Watch List). June-July. Some at least of the eastern populations considered to be *E. pallida* are actually the closely related *E. simulata*; additional herbarium work is needed to determine the relative distributions of these two species in our area. [= RAB, F, FNA, G, K, W, Y, Z; < *E. pallida* var. *pallida* – C, SE; = *E. pallida* var. *pallida* – X]

Echinacea purpurea (Linnaeus) Moench, Eastern Purple Coneflower. Mt, Pd (NC, VA*), Cp (FL): open woodlands, roadsides, some of the occurrences spread from cultivation; rare. [= RAB, C, F, FNA, K, SE, W, WH, X, Y; = *E. purpurea* var. *purpurea* – G]

Echinacea simulata R.L. McGregor, Prairie Purple Coneflower. Mt (GA!, VA*?), Pd (NC!, VA*?), Cp (NC!): prairies, roadsides; rare. June-July. Some at least of the eastern populations considered to be *E. pallida* are actually *E. simulata*; additional work is needed to determine the relative distributions of these two species in our area; GA native populations (Floyd Co.) are *E. simulata*. [= FNA, K, Y, Z; < *E. pallida* var. *pallida* – C, SE; = *E. pallida* (Nuttall) Nuttall var. *simulata* (McGregor) Binns, B.R. Baum, & Arnason – X]

Echinacea tennesseensis (Beadle) Small, Tennessee Purple Coneflower. Ip (TN): calcareous glades; rare. Endemic to the Nashville Basin of c. TN (Davidson, Rutherford, & Wilson counties) (Chester, Wofford, & Kral 1997). [= FNA, K, S, Y, Z; < *E. pallida* (Nuttall) Nuttall var. *angustifolia* (A.P. de Candolle) Cronquist – SE; = *E. pallida* (Nuttall) Nuttall var. *tenneseensis* (Beadle) Binns, B.R. Baum, & Arnason – X; = *E. angustifolia* A.P. de Candolle var. *tennesseensis* (Beadle) Blake]

Echinops Linnaeus (Globe-thistle)

A genus of about 120 species, herbs, of temperate and subtropical Europe, Asia, and Africa. References: Keil in FNA (2006a).

* ***Echinops sphaerocephalus*** Linnaeus, Globe-thistle. Mt (VA): roadsides, edges of railroad tracks, disturbed areas; rare, native of Europe and w. Asia. Reported as introduced as far south as se. PA (Rhoads & Klein 1993) and VA (Fernald 1950; Keil in FNA 2006a). Its occurrence in VA has recently been verified (C.N. Horn, pers. comm. 2006). [= C, F, FNA, G, K]

Eclipta Linnaeus 1753

A genus of 4 species, herbs, of temperate, subtropical, and tropical regions. References: Strother in FNA (2006c); Cronquist (1980)=SE.

Eclipta prostrata (Linnaeus) Linnaeus, Yerba-de-tajo. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): moist or wet disturbed areas, ditches, shores, disturbed bottomlands; common (uncommon in Mountains). June-November. MA west to WI, south to s. FL and TX, and into the tropics. [= C, FNA, K, WH; = *E. alba* (Linnaeus) Hasskarl – RAB, F, G, GW, SE, W; = *Verbesina alba* Linnaeus – S]

Elephantopus Linnaeus 1753 (Elephant's-foot)

A genus of about 12-30 species, of tropical, subtropical, and warm temperate regions. References: Strother in FNA (2006a); Jones (1982)=Z; Cronquist (1980)=SE.

Identification notes: The acaulescent species are easily and often confused with *Vernonia acaulis*, especially when sterile. *Vernonia* has leaves scabrous above and sparsely pilose to glabrate beneath; *Elephantopus* has leaves sparely pilose above, densely pilose or tomentose below. *Vernonia* leaves tend to have a more acute apex, and the veins above are more strikingly differentiated in their color (white or pink) from the adjacent leaf tissue. When in flower, the presence of subtending foliose bracts below the compound glomerule of heads in *Elephantopus* (versus the absence of foliose bracts below the simple head in *Vernonia*) is diagnostic.

1 Leaves cauline, the stem with well-developed leaves over 10 cm long ..... ***E. carolinianus***

1 Leaves basal, the stem scapose or with a few leaves much smaller than the basal, usually < 8 cm long.

2 Longest phyllaries 10-13 mm long; pappus 6-8 mm long; basal leaves 5.5-10.5 cm wide, usually at least some on a plant > 7 cm wide; leaves pubescent on the midrib below with spreading or reflexed hairs; [of the Coastal Plain, Piedmont, and rarely the Mountains] ..... ***E. tomentosus***

2 Longest phyllaries 6-9 mm long; pappus 3-4.5 mm long; basal leaves 1.5-7.5 cm wide, rarely any on a plant > 7 cm wide; leaves pubescent on the midrib below with appressed or spreading hairs; [of the Coastal Plain, and rarely the lower Piedmont].

3 Phyllaries densely villous with white hairs (0.3-) 0.5-1.0 mm long, the punctate glands obscured; cypselas 3-3.5 mm long; [of e. SC southward] ..... ***E. elatus***

3 Phyllaries punctate-glandular, also sparsely pubescent with hairs 0.05-0.3 (-0.5) mm long; cypselas 2.5-3.0 mm long; [widespread in our area] ..... ***E. nudatus***

Elephantopus carolinianus Raeuschel, Leafy Elephant's-foot. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): mesic to dry forests and woodlands; common. August-November. NJ west to KS, south to s. FL and TX; West Indies. [= RAB, C, F, FNA, G, GW, K, S, SE, WH, Z]

Elephantopus elatus Bertoloni, Southern Elephant's-foot. Cp (FL, GA, SC): pine barrens; common (rare in GA and SC). Late August-September. E. SC south to s. FL, west to LA, on the Coastal Plain. [= RAB, FNA, K, S, SE, WH, Z]

Elephantopus nudatus A. Gray. Cp (FL, GA, NC, SC, VA), Pd (NC, SC, VA): woodlands and woodland borders, usually fairly dry; common (rare in Piedmont, lower Piedmont only). Late July-September. DE south to n. peninsular FL, west to TX and AR, primarily on the Coastal Plain; south into n. South America. [= RAB, C, F, FNA, G, GW, K, S, SE, WH, Z]

Elephantopus tomentosus Linnaeus. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): woodlands and woodland borders, usually fairly dry; common (rare in Mountains). August-November. MD south to Panhandle FL, west to TX, north in the interior to w. NC, KY, and south to Chiapas, Mexico. [= RAB, C, F, FNA, G, K, S, SE, WH, Z]

Emilia Cassini 1817 (Tasselflower)

A genus of 50-100 species, of the Old World. References: Barkley in FNA (2006b); Cronquist (1980)=SE.

1 Leaves well-distributed along the stem, with at most few and shallow lobes; corollas salmon or red-orange; involucre 1-2 (-3)× as high as wide ..... ***E. fosbergii***

1 Leaves mostly on the lower portion of the stem, the larger lyrate-pinnatifid; corollas lilac; involucre 3-4× as high as wide ..... ***E. sonchifolia*** *var.* ***sonchifolia***

* ***Emilia fosbergii*** Nicolson, Salmon Tasselflower. Cp (FL): disturbed areas; rare, native of Old World tropics. Scattered as an introduction in FL, including the Panhandle. [= FNA, K, SE, WH]

* ***Emilia sonchifolia*** (Linnaeus) A.P. de Candolle *var.* ***sonchifolia***, Lilac Tasselflower. Cp (FL, SC), Pd (GA): disturbed areas, native of the Old World tropics. The occurrence of this species in SC was first reported by Nelson & Kelly (1997); it is unclear how well established *Emilia* is in the northern part of our area. See Anderson (2007) for FL Panhandle record. [= FNA, K; < *E. sonchifolia* – S, SE, WH]

Erechtites Rafinesque 1817 (Fireweed)

A genus of about 12-15 species, American and Australian. Barkley in FNA (2006a) points out that the genus should be treated as masculine gender. References: Barkley in FNA (2006b); Cronquist (1980)=SE. Key based in part on C and FNA.

1 Denuded receptacle 5-8 mm in diameter; achenes 2-3 mm long, with 10-12 ribs ..... ***E. hieraciifolius***

1 Denuded receptacle 9-12 mm in diameter; achenes 4-5 mm long, with 16-20 ribs ..... ***[E. megalocarpus]***

Erechtites hieraciifolius (Linnaeus) Rafinesque ex de Candolle, Fireweed. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): in disturbed soil in nearly all habitats except the extremely xeric, present in most parts of the modern (beat-up) landscape at least as seedlings, liable to turn up at the smallest disturbance (such as small tree-fall tip-up mounds or campfires, even in large natural areas), most abundant in areas extensively disturbed or scarified by timber-harvest, bulldozing, or severe fire; common. Late July-November. Newfoundland west to Saskatchewan, south to s. FL and e. TX; West Indies; tropical America. Ecologically filling something of the same role in the south as the other (unrelated) "fireweed" in the north, *Epilobium angustifolium*. The only other species in our area as adept at appearing (seemingly from nowhere) at small soil disturbances in forests are *Phytolacca americana* and the moss *Atrichum angustatum* (Brid.) BSG. [= *E. hieracifolia* var. *hieracifolia* – C, G, K, SE; < *E. hieracifolia* – RAB, GW, S, W; > *E. hieracifolia* var. *hieracifolia* – F; > *E. hieracifolia* var. *intermedia* Fernald – F; > *E. hieracifolia* var. *praealta* (Rafinesque) Fernald – F; = *E. hieraciifolius* var. *hieraciifolius* – FNA; < *E. hieraciifolius* – WH]

Erechtites megalocarpus (Fernald) Cronquist. Coastal marshes (brackish or salty) from MA to NJ and should be sought in our area, especially in VA. As the differences between this and *E. hieraciifolius* consist of multiple, non-overlapping morphological characters, the presumption should be to treat the two as specifically distinct. [= *E. hieracifolia* var. *megacarpa* – C, G, K; = *E. megalocarpa* Fernald – F, orthographic variant; = *E. hieraciifolius* var. *megalocarpus* – FNA]

Erigeron Linnaeus 1753 (Daisy Fleabane)

ASTERACEAE

A genus of about 150 species, nearly cosmopolitan. References: Nesom in FNA (2006b); Cronquist (1980)=SE; Allison & Stevens (2001)=Z. Key adapted from those references. [also see *Conyza*]

1 Stem leaves sessile; pappus of the pistillate (ray) flowers consisting only of a few short, slender scales, < 1 mm long (visible at 20× magnification); annual or perennial (rarely biennial).
  2 Stem leaves many, mostly toothed, the larger > 1cm wide; pubescence of the mid-stem long and spreading ..... ***E. annuus***
  2 Stem leaves few, mostly entire, the larger usually < 1 cm wide; pubescence of the mid-stem usually short and appressed.
    3 Phyllary hairs flattened, 0.5-1.2 mm long; stem hairs appressed to spreading, 0.5-1.0 mm long ..... ***[E. strigosus var. septentrionalis]***
    3 Phyllary hairs terete, mostly 0.1-0.5 mm long; stem hairs appressed to spreading, 0.1-0.4 (-0.8) mm long.
      4 Plants annual (rarely biennial), lacking rhizomes; [of various, often weedy, habitats] ..... ***E. strigosus var. strigosus***
      4 Plants perennial, rhizomatous; [plants of shallow soil over calcareous rock].
        5 Basal leaves oblanceolate to narrowly obovate or spatulate, (3.2-) 3.8-15 (-21) mm wide; cauline leaves glabrous (but ciliate) except along the midvein; [of limestone glades of c. TN, nw. GA, and n. AL] ..... ***E. strigosus var. calcicola***
        5 Rosette leaves linear-oblanceolate, 1-3.5 (-6) mm wide; cauline leaves sparsely to moderately strigillose; [of dolostone glades of Bibb Co. AL] ..... ***[E. strigosus var. dolomiticola]***
1 Stem leaves relatively large and clasping, or small and sessile (in *E. vernus*); pappus of the pistillate (ray) flowers of elongate capillary bristles (sometimes also with scales); plants biennial or perennial.
  6 Plants trailing or ascending, rooting at the nodes, and with stolons ..... ***[E. procumbens]***
  6 Plants erect (sometimes the shoots curved at the base but ultimately vertical).
    7 Stem leaves not clasping; basal leaves fleshy; rays 25-40, white, 0.5-1.3 mm wide; [of moist to wet habitats of the Coastal Plain] ..... ***E. vernus***
    7 Stem leaves clasping; basal leaves herbaceous; rays 50-400, pink, blue, purplish, or white, either 0.3-0.5 mm wide (in *E. philadelphicus* var. *philadelphicus, E. quercifolius,* and *E. tenuis*) or 0.8-1.2 mm wide (in *E. pulchellus* var. *pulchellus*); [of more general distribution and habitat].
      8 Disk corollas 4-6 mm long; rays 50-100, 0.8-1.2 mm wide.
        9 Stems and leaves glabrous ..... ***[E. pulchellus var. brauniae]***
        9 Stems and leaves densely pubescent with long hairs ..... ***E. pulchellus var. pulchellus***
      8 Disk corollas 2.0-3.2 mm long; rays 60-400, 0.3-0.5 mm wide.
        10 Involucre 4-6 mm high; rays 150-400, white to deep pink, 5-10 mm long ..... ***E. philadelphicus var. philadelphicus***
        10 Involucre 2.5-4 mm high; rays 60-250, blue-lavender (rarely white to pink), 2.5-5 (-6) mm long.
          11 Pappus simple; stem spreading pubescent throughout (or appressed pubescent in the upper third only); rays 100-250 ..... ***E. quercifolius***
          11 Pappus double, with short outer setae in addition to the long slender bristles; stem appressed pubescent in at least the upper half; rays 60-120 ..... ***E. tenuis***

Erigeron annuus (Linnaeus) Persoon, Annual Fleabane. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): roadsides, disturbed areas; common (uncommon in FL, rare in Coastal Plain of SC). May-October. Newfoundland west to Manitoba, south to Panhandle FL and TX (and beyond). [= RAB, C, F, FNA, S, SE, W, WH; > *E. annuus* var. *annuus* – G]

Erigeron philadelphicus Linnaeus *var.* ***philadelphicus***, Philadelphia-daisy. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): roadsides, meadows, disturbed areas; common (uncommon in FL, NC, SC, and VA Coastal Plain). April-June. Newfoundland west to British Columbia, south to n. FL and TX. Var. *scaturicola* Fernald, of bluffs along the James River in VA, seems to be merely an extreme form. Other varieties [var. *glaber* Henry and var. *provancheri* (Victorin & Rouss.) Boivin] may have more merit. [= FNA, K; < *E. philadelphicus* – RAB, C, G, GW, S, SE, W, WH; > *E. philadelphicus* var. *philadelphicus* – F; > *E. philadelphicus* var. *scaturicola* Fernald – F]

Erigeron pulchellus Michaux *var.* ***pulchellus***, Robin's-plantain. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist slopes, coves, limestone bluffs, trail margins, roadbanks; common (uncommon in Coastal Plain, rare in FL). April-early June. ME west to MN, south to Panhandle FL (Jackson County), GA, and TX. In addition to the widespread var. *pulchellus*, *E. pulchellus* has two additional local varieties, var. *brauniae* Fernald, of ne. KY and s. OH, and var. *tolsteadii* Cronquist, of se. MN. [= C, F, FNA, G, K, SE; < *E. pulchellus* – RAB, GW, S, W, WH]

Erigeron quercifolius Lamarck, Oak-leaved Fleabane. Cp (FL, GA, NC, SC, VA): sandy roadsides, disturbed areas; common, rare in VA. April-June. Se. VA south to s. FL, west to TX, north in the interior to TN; Bahamas. [= RAB, C, F, FNA, G, K, S, SE, WH]

Erigeron strigosus Muhlenberg ex Willdenow *var.* ***calcicola*** J. Allison, Cedar Glade Daisy Fleabane. Mt (GA): limestone glades; rare. (April-) May-October. Central basin of TN (Allison & Stevens 2001), nw. GA (GANHP) and n. AL. [= FNA, Z]

Erigeron strigosus Muhlenberg ex Willdenow *var.* ***strigosus***, Common Rough Fleabane. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): roadsides, disturbed areas; open woodlands; common. Late April-October. Nova Scotia west to WA, south to c. peninsular FL and TX. [= FNA; < *E. strigosus* – RAB, W, WH; > *E. strigosus* var. *strigosus* – C, F, G, K, SE, Z; > *E. strigosus* var. *beyrichii* – C, F, G, K, SE, Z; < *E. ramosus* (Walter) Britton, Sterns, & Poggenburg – S]

Erigeron tenuis Torrey & A. Gray, Midwestern Fleabane. Cp (FL): disturbed areas; rare. FL Panhandle (Okaloosa County) and AL west to KS, OK, and TX. Reported for w. NC (Nesom 1980); but later discounted (Nesom in FNA 2006b). Mid March-May (sporadically later). [= FNA, K, SE, WH]

Erigeron vernus (Linnaeus) Torrey & A. Gray, Whitetop Fleabane. Cp (FL, GA, NC, SC, VA): wet savannas, seepages, interdunal swales; common (rare in VA). Late March-June. E. VA south to s. FL, west to LA. [= RAB, C, F, FNA, G, GW, K, S, SE, WH]

Erigeron procumbens (Houstoun ex Miller) Nesom, Corpus Christi Fleabane. Moist to dry coastal areas, including marsh edges. S. MS (?), LA, TX, Tamaulipas, Veracruz. [= FNA, K; = *E. myrionactis* Small –S, SE]

Erigeron pulchellus Michaux var. *brauniae* Fernald. Sandy woodlands and forests. WV, KY, MD, and OH (FNA, K). April-June. [= C, F, FNA, G, K]

Erigeron strigosus Muhlenberg ex Willdenow var. *dolomiticola* J. Allison, Cahaba Daisy Fleabane. Mt (AL): calcareous Ketona glades; rare. Endemic to Bibb County, AL (Allison & Stevens 2001). Late May-October. [= FNA, Z]

Erigeron strigosus Muhlenberg ex Willdenow var. *septentrionalis* (Fernald & Wiegand) Fernald. Scattered in n. North America, south to NY, TN (FNA), AR, OK, WY, CA. [= C, FNA, F, G, K]

Eupatorium Linnaeus 1753 (Eupatorium, Thoroughwort, Dog-fennel)

A genus of about 40 species, herbs, of e. North America and Eurasia (after the exclusion of *Ageratina, Chromolaena, Conoclinium, Eutrochium, Fleischmannia*, and other genera). I have differed considerably from Cronquist's treatments, as for instance in SE, regarding the rank at which to recognize taxonomic entities in *Eupatorium*. In the Southeastern United States, *Eupatorium* is a reticulately evolved complex, including diploids, triploids, and tetraploids; derivatives of hybridization produce sterile pollen but in some cases reproduce vigorously via agamospermous production of seeds. In some cases, these entities form separate populations from their presumed parental species, with distinctive ranges and habitats and more-or-less distinctive morphology. Cronquist treats morphologically highly distinctive entities, such as *E. pinnatifidum*, as full species, while stating that they are "not long-persistent." He treats morphologically more subtle entities as varieties of one of the two presumed parental species, such as *E. album* var. *vaseyi* ("very probably derived by hybridization of *E. album* var. *album* and *E. sessilifolium*"). Other entities, difficult to distinguish morphologically from another species, he does not recognize, as for instance *E. saltuense*, included as a synonym under *E. altissimum* ("*E. saltuense* may reflect hybridization between *E. altissimum* and some other species such as *E. album*, or possibly between *E. hyssopifolium* and *E. album*"].

A species concept that stresses ecological, biological, and distributional independence seems preferable. When plants of a putative hybrid occur in substantial populations, reproducing independently of one or both alleged parents, and in geographically and/or ecologically distinctive situations they should be treated as a separate species. Only field observations and studies can provide the necessary information. I have seen no evidence that *E.* ×*pinnatifidum* (though morphologically strikingly distinctive) occurs independent of its parents; thus I treat it as a hybrid (see below). *E. vaseyi* regularly occurs without one or both of its presumed parents, forms fertile achenes, occurs in large populations, and (in NC) is distributionally more limited than its presumed parents (Sullivan 1978). Biologically, it is best treated as an allopolyploid species; its treatment as a variety leads to conceptual and nomenclatural problems (reflected in the synonymy above): of which species should it be a variety? Sullivan (1978) considered that *E. saltuense* was derived from hybridization of *E. album* and *E. lecheifolium* (= *hyssopifolium*), but found it to be a triploid, growing in association with triploid (and pollen-sterile) *E. lecheifolium*. She concluded that "the origin of *E. saltuense* through hybridization could have occurred in the ancient past when diploids of *E. lecheifolium* were more prevalent." In addition to its postulated "ancient origin," *E. saltuense* appears to occur in NC in habitats different from any of its variously alleged parents; for these reasons it seems best to treat *E. saltuense* as an allopolyploid species as well. Species in our flora believed to be of allopolyploid derivation include *E. anomalum*, *E. cordigerum*, *E. godfreyanum*, *E. linearifolium*, *E. mohrii*, *E. pubescens*, *E. saltuense*, *E. torreyanum*, and *E. vaseyi*. References: Siripun & Schilling in FNA (2006c); Cronquist (1980)=SE; Godfrey (1949). The key adapted from those references. (also see *Ageratina, Chromolaena, Conoclinium, Eutrochium, Fleischmannia*)

1 Leaves generally in whorls of 3-7 (very rarely all of them opposite), most of them > 2 cm wide; involucre 6.5-9 mm high, the flowers pale pink to purple ..... *[see **Eutrochium**]*
1 Leaves generally opposite, sometimes in whorls of 3-4 (if so the leaves usually < 2 cm wide), or some of them alternate; involucre mostly 2-6 mm high, the flowers mostly white, rarely blue (rarely the involucre 6-11 mm high, then the flowers white).
  2 Leaves pinnate or pinnatifid, divided into linear or capillary segments, 0-5 mm wide ..... **Key A**
  2 Leaves simple or palmately 3 (-5)-lobed, the leaves or lobes generally over 5 mm wide.
    3 Leaves palmately 3 (-5)-lobed ..... ***E. cannabinum***
    3 Leaves simple.
      4 Leaves long-petiolate, the petioles of larger leaves > 10 mm long.
        5 Leaf blades deltate or rhombic, held vertically; [of FL] ..... ***E. mikanioides***
        5 Leaf blades lanceolate, held horizontally; [widespread] ..... ***E. serotinum***
      4 Leaves sessile or short-petiolate, the petioles < 9 mm long.
        6 Florets (3-) 5 (-7) per head ..... **Key B**
        6 Florets 7-14 per head.
          7 Leaf bases fused ..... ***E. perfoliatum***
          7 Leaf bases tapering to a cuneate base ..... ***E. resinosum***

Key A – leaves pinnatifid or pinnate into linear or capillary segments (Dog-fennels)

1 Stem glabrous throughout, or short-pubescent in the lower portion only; inflorescence paniculate, the panicle branches recurved, the heads secundly arranged ..... ***E. leptophyllum***
1 Stem pubescent throughout, generally conspicuously so; inflorescence paniculate, the branches not recurved, the heads not secund.
  2 Leaves bright green, glabrous, sparsely glandular-punctate, segments of the basal leaves 1-1.5 mm wide, segments of the **upper** leaves 0.2-0.5 mm wide ..... ***E. capillifolium***
  2 Leaves grayish-green, pubescent, densely glandular-punctate, segments of the basal leaves 2-5 mm wide, segments of the **upper** leaves 1-2.5 mm wide ..... ***E. compositifolium***

Key B – leaves simple, flowers usually 5 per head

1 Phyllaries acuminate to attenuate.
2 Larger leaves 0.2-1.3 cm wide; stems puberulent; involucre 3.5-7 mm high.
3 Rhizome absent to < 2 cm long; leaves usually reflexed-spreading to spreading-ascending, the larger (5-) 6-13 mm wide; leaf margins and surfaces moderately to densely strigose; involucre 5-8 mm long; pappus (3.3-) 3.9-5.0 mm long; corolla:pappus length ratio 0.63-0.89; mature achene 2.2-3.5 mm long ..... ***E. leucolepis***
3 Rhizome 2-20 cm long; leaves usually ascending to erect-recurved, the larger 2-4.5 mm wide; leaf margins and adaxial surface glabrous to sparsely strigose; involucre 3.5-5.5 mm long; pappus 2.7-4.1 mm long; corolla:pappus length ratio 0.83-1.00; mature achene 1.6-2.3 mm long ..... ***E. paludicola***
2 Larger leaves 1.5-3 (-4) cm wide; stems villous to puberulent; involucre 8-11 mm high.
4 Leaves with few or no resin-glands; phyllaries glabrous, lacking resin-glands; [of the Coastal Plain of GA, Panhandle FL, AL, and MS] ..... ***E. petaloideum***
4 Leaves with resin-glands; phyllaries puberulent to villous (at least towards the base and on the midrib); [collectively widespread]
5 Leaves 3-nerved from the base; leaves 4-7 cm long, 10-20 mm wide; [of DC, DE, NJ, and NY] ..... ***[E. album var. subvenosum]***
5 Leaves 3-nerved from above the base; leaves 5-11 cm long, 10-40 mm wide; [collectively widespread].
6 Leaves pubescent, the pubescence short to long; phyllaries generally attenuate (rarely acuminate); leaves (2.5-) 3-6× as long as wide; leaf apices obtuse; teeth obtuse or rounded ..... ***E. album var. album***
6 Leaves sparsely pubescent to nearly glabrous, the pubescence generally short; phyllaries generally acuminate, sometimes abruptly so; leaves 2-4× as long as wide; leaf apices acute to acuminate; teeth sharp ..... ***E. vaseyi***

1 Phyllaries acute to obtuse.
7 Leaf bases broadly cuneate, truncate, or subcordate, the leaves generally distinctly broadest near the base.
8 Leaves (2.5-) 3-6 (-7)× as long as wide; plants glabrous below the inflorescence.
9 Leaves subcoriaceous, the larger ones 8-18 cm long, 3-6 cm wide, averaging about 3× as long as wide ..... ***E. sessilifolium var. brittonianum***
9 Leaves membranaceous, the larger ones 9-18 cm long, 2-4 cm wide, averaging about 5× as long as wide ..... ***E. sessilifolium var. sessilifolium***
8 Leaves 1-3 (-3.5)× as long as wide; plants pubescent below the inflorescence.
10 Leaves pinnately veined ..... ***E. godfreyanum***
10 Leaves 3-veined from the base or just above it.
11 Leaves averaging (1.5) 2-2.5× as long as wide, usually with a purple border; upper leaves and main inflorescence branches often alternate ..... ***E. pilosum***
11 Leaves averaging 1-2× as long as wide, usually lacking a purple border; upper leaves and main inflorescence branches usually all opposite.
12 Leaf base broadly rounded, cordate-clasping; leaves very densely pubescent, the pubescence often harsh; larger leaves usually 4-10 cm long; principal pair of lateral veins diverging from the midrib 2-10 mm above the base of the leaf; toothing of leaf often irregular and coarse ..... ***E. cordigerum***
12 Leaf base cuneate, broadly cuneate, rounded, or cordate (but not clasping); leaves densely to sparsely pubescent; larger leaves usually 2-6 cm long; principal pair of lateral veins diverging at the base or 2-10 mm above the base of the leaf; toothing of leaf regular and relatively fine.
13 Leaves mostly 1-1.5 (-1.7)× as long as wide, tending to be obtuse (the apex usually 90° or more), the teeth generally rounded (the 2 sides of each tooth usually distinctly convex-curved, the end of the tooth therefore rounded), the principal pair of lateral veins diverging directly from the base of the midrib ..... ***E. rotundifolium***
13 Leaves mostly (1.2-) 1.5-2× as long as wide, tending to be acute (the apex usually 90° or less), the teeth generally rather sharp (the 2 sides of each tooth straight to gently curved, the end of the tooth therefore triangular), the principal pair of lateral veins diverging 2-10 mm above the base of the midrib.
14 Leaves broadly cuneate to broadly rounded, thin in texture, the pubescence rather soft and long (and also often sparse), the leaf blade not twisted at base, not borne in a vertical plane, up to 10 cm long and 6.5 cm wide ..... ***E. pubescens***
14 Leaves distinctly cuneate, firm in texture, the pubescence rather harsh and short, the leaf blade twisted at the base, thus borne in a vertical plane, up to 5.5 cm long and 3 cm wide ..... ***E. scabridum***
7 Leaf bases narrowly cuneate, the leaves generally broadest near the middle or toward the tip.
15 Plants from conspicuously tuberous-thickened (ca. 1 cm in diameter) horizontal rhizomes; leaves deflexed, spreading, or ascending.
16 Leaves 15-30 mm wide, spreading or ascending ..... ***E. anomalum***
16 Leaves 2-12 mm wide, deflexed to erect-ascending.
17 Leaves erect-ascending, 2-5.5 mm wide; pappus 4.0-5.4 mm long ..... ***E. species 1 × mohrii***
17 Leaves deflexed to spreading, 3-12 mm wide; pappus 2.5-3 mm long.
18 Stems 3-6 (-7) dm tall, often erectly branching from near the base; involucres 3-4 mm high, the bracts with rounded apices ..... ***E. recurvans***
18 Stems (6-) 10-15 dm tall, not branching near the base; involucres 5-7 mm high, at least some of the inner bracts with acute apices ..... ***E. mohrii***
15 Plants from crowns or caudices; leaves usually spreading or ascending (not deflexed).
19 Plants generally with numerous branches from at or near the base, the axillary shoots of the lower internodes elongating; leaves 2-5 cm long, oblanceolate.
20 Leaves broadly oblanceolate, 5-15 mm wide, crenate or serrate in the upper half ..... ***E. glaucescens***
20 Leaves narrowly oblanceolate, 3-8 mm wide, entire or remotely serrate apically ..... ***E. linearifolium***
19 Plants generally simple below the middle, the axillary shoots of the lower nodes not elongating (except in response to injury of the main stem); leaves 3-12 cm long, lanceolate or linear.
21 Leaves mostly 6-40× as long as wide, the larger ones usually < 10 mm wide, ranging from 1-12 mm wide, whorled or opposite (rarely alternate above).
22 Leaves linear to narrowly lanceolate, the principal leaves 2-7 cm long, 1-5 mm wide, 10-40× as long as wide, entire to obscurely toothed, the leaves mostly in whorls of 3 or 4 ..... ***E. hyssopifolium***
22 Leaves lanceolate, the principal leaves 5-12 cm long, 5-10 (-12) mm wide, 6-15× as long as wide, conspicuously and divergently toothed, the leaves mostly opposite or in whorls of 3 ..... ***E. torreyanum***
21 Leaves mostly 2.5-7× as long as wide, the larger ones > 10 mm wide, ranging from 8-30 mm wide, opposite, alternate, or whorled.

23 Involucre 2.5-4 mm high; leaves obtuse to acute, elliptic to elliptic-oblanceolate, the 2 main lateral veins separating from the midrib about 1 cm above the base; leaves commonly 3 per node ..... ***E. semiserratum***

23 Involucre 4.5-7 mm high; leaves acute to attenuate-acuminate, lanceolate, the 2 main lateral veins separating from the midvein at the base; leaves rarely 3 per node.

24 Leaves 3-5 cm long, 5-13 mm wide; leaf surfaces generally glabrous; [of AL westward] ..... ***[E. lancifolium]***

24 Leaves 5-12 cm long, 5-20 mm wide; leaf surfaces short or long puberulent; [widespread].

25 Leaf surfaces glandular-punctate, densely puberulent on the surfaces and veins, the hairs fairly long and curling or twisted (as seen with at least 10× magnification); stem densely puberulent; leaves entire to serrate, the teeth varying from obscure to sharp, generally about 1 mm long (measured on the side toward the leaf apex), rarely to 3 mm long, generally forward-pointing; leaves acuminate to acute, the terminal portion not strongly attenuated, and about as likely to have teeth as the rest of the margin ..... ***E. altissimum***

25 Leaf surfaces densely glandular-punctate, sparsely puberulent (mainly on the veins), the hairs short; stem sparsely puberulent; leaves serrate to pinnatifid, the teeth often 1-5 mm long (measured on the side toward the leaf apex), often salient or divergent; leaves attenuate-acuminate, the terminal 1/3 extended and generally entire ..... ***E. saltuense***

Eupatorium album Linnaeus *var.* ***album***, White-bracted Thoroughwort. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry woodlands; common (rare in Mountains, uncommon in Piedmont). Late June-September. CT, NY, OH, and TN, south to FL and LA. Var. *glandulosum* is alleged to differ from var. *album* in having the involucre with copious dark glands (vs. glandless or nearly so). The distinction is dubious; variation seems essentially continuous in our area, with frequent intermediates, and there seems to be little correlation between morphology and habitat/range. [= FNA; < *E. album* – RAB, S, WH; < *E. album* var. *album* – C, K, SE, W (also see *E. petaloideum*); > *E. album* var. *album* – F, G; > *E. album* var. *glandulosum* (Michaux) A.P. de Candolle – F, G]

Eupatorium altissimum Linnaeus, Tall Thoroughwort. Pd (GA, NC, VA), Mt (GA, VA), Cp (FL): woodlands, old fields, woodland borders, and openings over mafic rocks (such as diabase) or calcareous rocks (such as limestone and calcareous sandstone); rare south of VA (NC Watch List). Late August-October. CT, NY, Québec, MN, and NE, south to Panhandle FL and TX, primarily in the midwest, especially on limestone substrates, and uncommon east of the mountains. [= RAB, F, G, S, W; < *E. altissimum* – C, FNA, K, SE, WH (also see *E. saltuense*)]

Eupatorium anomalum Nash, Anomalous Eupatorium. Cp (FL, GA, NC, VA): moist savannas, moist interdune swales; rare. August-October. *E. anomalum* is believed to be a triploid and tetraploid, apomictic derivative of the hybrid *E. mohrii* × *serotinum*. Se. VA south to c. peninsular FL and west to s. AL. Inasmuch as it is now a separate lineage (as evidenced by a distinct distribution, more-or-less recognizable morphology, and phenologic separation), treatment as a separate taxon seems warranted. [= FNA, GW, K, SE; < *E. recurvans* – RAB; < *E. anomalum* – S (also see *E. mohrii*); = *E.* ×*anomalum* – WH]

* ***Eupatorium cannabinum*** Linnaeus, Hemp-agrimony. Cp, Pd (VA): disturbed areas; rare, perhaps merely a waif or garden remnant, native of Europe. July-September. The documentation for VA is an 1899 specimen from Fairfax County and a record from Westmoreland County. [= FNA, K]

Eupatorium capillifolium (Lamarck) Small, Common Dog-fennel. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): disturbed soils; common (uncommon in Mountains, uncommon in VA Piedmont). September-November. CT, PA, KY, MO, and OK south to s. FL and TX. This species, like *E. compositifolium*, is an excellent indicator of soil disturbance. [= C, F, FNA, G, GW, K, S, SE, W, WH; = *E. capillifolium* var. *capillifolium* – RAB]

Eupatorium compositifolium Walter, Coastal Dog-fennel, Yankee-weed. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): sandy disturbed areas; common. September-December. S. VA, KY, and OK south to s. FL and TX. This species, like *E. capillifolium*, is an excellent indicator of soil disturbance. At its northern limit, in se. VA, this species occurs on riverbanks, in the seasonally exposed drawdown zone (Fleming & Ludwig 1996). [= RAB, FNA, GW, K, S, SE, W]

Eupatorium cordigerum (Fernald) Fernald (as species), Clasping Roundleaf Eupatorium. Cp (NC, SC, VA): woodlands; rare? (VA Watch List). July-August. VA, NC, and SC west to AR and MS. This taxon is an apomictic, polyploid derivative of the hybrid *E. perfoliatum* × *rotundifolium*. [= F; > *E. rotundifolium* var. *ovatum* – RAB, G (also see *E. pubescens*); = *E. rotundifolium* var. *cordigerum* Fernald – C, K, SE; = *E.* ×*cordigerum* (Fernald) Fernald – FNA; < *E. rotundifolium* – GW; < *E. pubescens* – S]

Eupatorium glaucescens Elliott, Wedgeleaf Eupatorium, Broadleaf Bushy Eupatorium. Cp (GA, NC, SC, VA): sandhills, dry sandy woodlands; common (rare in VA). Late July-October. Widespread in the Southeastern Coastal Plain, ranging from se. VA south to FL and west to MS. The name *E. cuneifolium* must be rejected on nomenclatural grounds (Gandhi & Thomas 1991). [= K; < *E. cuneifolium* – RAB, C, G, SE (also see *E. linearifolium*); ? *E. cuneifolium* var. *cuneifolium* – F; = *E. cuneifolium* Willdenow – S; < *E. linearifolium* Walter – FNA, WH]

Eupatorium godfreyanum Cronquist, Godfrey's Eupatorium. Pd (GA, NC, VA), Mt (NC, VA), Cp (VA): dry woodlands; common (uncommon in VA Coastal Plain, rare south of VA) (GA Special Concern, NC Rare). July-September; August-October. NJ, MD, and WV south through VA to nc. NC and TN, reaching its greatest abundance in wc. VA. See Cronquist (1985) for additional information and illustrations. Siripun & Schilling (2006) confirmed that this species is of hybrid origin from *E. rotundifolium* and *E. sessilifolium*. [= C, FNA, K; < *E. sessilifolium* var. *vaseyi* (Porter) Fernald & Griscom – RAB; < *E. sessilifolium* var. *vaseyi* (Porter) Fernald & Griscom – F; < *E. vaseyi* Porter – G; < *E. sessilifolium* – SE]

Eupatorium hyssopifolium Linnaeus, Hyssopleaf Eupatorium. Cp, Pd, Mt (GA, NC, SC, VA): roadbanks, pastures, fields, disturbed areas, dry woodlands; common (rare in Mountains). Late July-October. MA south to GA and west to TN and LA. [= *E. hyssopifolium* var. *hyssopifolium* – C, FNA, G, SE, W; < *E. hyssopifolium* – RAB (also see *E. torreyanum*); > *E. hyssopifolium* var. *hyssopifolium* – F, K; > *E. hyssopifolium* var. *calcaratum* Fernald & Schubert – F, K; > *E. sessilifolium* – S; > *E. lecheifolium* Greene – S]

Eupatorium leptophyllum A.P. de Candolle, Limesink Dog-fennel. Cp (FL, GA, NC, SC): limesink depression ponds (dolines) in the outer Coastal Plain and clay-based Carolina bays in the inner Coastal Plain; common (rare in GA, NC, SC). September-November. A Southeastern Coastal Plain endemic, ranging from se. NC south to FL and west to s. GA and s. AL;

also in the Bahamas and Cuba. [= FNA, GW, K, S, SE, WH; = *E. capillifolium* var. *leptophyllum* (A.P. de Candolle) Ahles – RAB]

Eupatorium leucolepis (A.P. de Candolle) Torrey & Gray, Savanna Eupatorium. Cp (FL, GA, NC, SC, VA), Pd, Mt (VA): savannas, seepage bogs, depression ponds; common (uncommon in VA, rare in Piedmont and Mountains). August-October. Primarily of the Southeastern Coastal Plain, ranging from NY south to n. peninsular FL, Panhandle FL, and west to LA; disjunct in Coffee County, TN (Chester, Wofford, & Kral 1997). This species is often confused with members of the *E. recurvans-mohrii-anomalum* complex. The following differences are useful: *E. leucolepis* has phyllaries acuminate to attenuate (vs. acute to obtuse), leaves of the uppermost nodes below the inflorescence opposite, or rarely the uppermost 1-2 nodes subopposite (vs. leaves of the uppermost 2-15 nodes below the inflorescence alternate), and leaves generally longitudinally folded (vs. generally planar). The plants formerly called *E. leucolepis* var. *novae-angliae* Fernald and endemic to freshwater pondshores in MA and RI apparently represent a distinct allopolyploid species, *E. novae-angliae* (Fernald) V.I. Sullivan ex A. Haines & Sorrie, and should not be treated as a variety of *E. leucolepis*. [= W; = *E. leucolepis* var. *leucolepis* – C, F, G; < *E. leucolepis* – RAB, GW, S, SE, WH; < *E. leucolepis* var. *leucolepis* – FNA, K]

Eupatorium linearifolium Walter, Narrowleaf Bushy Eupatorium. Cp (FL, GA, NC, SC, VA): sandhills; uncommon (VA Watch List). Late July-October. Se. VA south to FL and west to LA. The appropriate treatment of this taxon is unclear; it may be a derivative of the hybrid *E. cuneifolium* × *hyssopifolium*. [= F; < *E. cuneifolium* – RAB, C, G, SE; = *E. hyssopifolium* var. *linearifolium* (Walter) Fernald – K; = *E. tortifolium* Chapman – S; < *E. linearifolium* – FNA, WH]

Eupatorium mikanioides Chapman, Semaphore Thoroughwort. Cp (FL): saline and brackish flats, seasonally ponded freshwater wetlands, wet flatwoods; rare. Endemic to FL, primarily in the peninsula, but also along the coast of the eastern Panhandle (Bay, Franklin, Gulf, Taylor, and Wakulla counties). July-September. [= FNA, GW, K, S, SE, WH]

Eupatorium mohrii Greene, Mohr's Eupatorium. Cp (FL, GA, NC, SC, VA): moist savannas, other wet habitats; common (rare in Mountains). August-October. Se. VA south to s. FL and west to TX. This is by far the most abundant of the *E. recurvans-anomalum-mohrii* complex in our area. Like *E. anomalum*, *E. mohrii* is believed to be a triploid and tetraploid, apomictic derivative of the hybrid *E. recurvans* × *rotundifolium*; it is more widespread than *E. recurvans* sensu stricto. Inasmuch as it is now a separate lineage (as evidenced by a distinct distribution, more-or-less recognizable morphology, and phenologic separation), treatment as a separate taxon seems warranted. [= GW; < *E. recurvans* – RAB, F, G (also see *E. anomalum* and *E. recurvans*); < *E. mohrii* – C, FNA, K, SE, W, WH (also see *E. recurvans*); < *E. anomalum* – S (also see *E. anomalum*)]

Eupatorium paludicola E.E. Schilling & LeBlond. Cp (NC, SC): cypress savannas, clay-based bays, and small depressions ponds; rare. A Cape Fear Arch endemic, ranging from the se. Coastal Plain and Sandhills of NC, to ne. Coastal Plain of SC. See LeBlond et al. (2007) and Schilling et al. (2007). [< *E. leucolepis* – RAB, GW, S, SE; < *E. leucolepis* var. *leucolepis* – FNA, K]

Eupatorium perfoliatum Linnaeus, Boneset. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): marshes, swamps, bogs, wet pastures, and other wet habitats; common (uncommon in FL). August-October. Nova Scotia west to Manitoba, south to n. peninsular FL and TX. [= RAB, FNA, GW, W, WH; *E. perfoliatum* var. *perfoliatum* –C, F, G, K, S, SE; *? E. cuneatum* Engelmann – S (actually a hybrid)]

Eupatorium petaloideum Britton, Showy White Thoroughwort. Cp (FL, GA): sandhills, scrub, dryish pinelands; uncommon? GA south to FL, west to s. MS. [= FNA, S; < *E. album* Linnaeus var. *album* – K, SE; < *E. album* – WH; = *E. album* var. *petaloideum* (Britton) Godfrey ex D.B. Ward]

Eupatorium pilosum Walter, Ragged Eupatorium. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): savannas, bogs, other moist areas; common (uncommon in Piedmont, rare in Mountains). August-October. MA south to c. peninsular FL, west to KY, c. TN, and MS. This species is clearly distinct; it should not be treated as a variety of *E. rotundifolium*. [= RAB, C, F, FNA, GW, K, WH; = *E. verbenifolium* Reichard – S; = *E. rotundifolium* var. *saundersii* (T.C. Porter) Cronquist – G, SE, W]

Eupatorium pubescens Muhlenberg ex Willdenow, Inland Roundleaf Eupatorium. Mt (GA, NC, SC, VA), Pd, Cp (NC, SC, VA): forests and woodlands, woodland edges, roadbanks; common (uncommon in Mountains and Coastal Plain). July-September. The distribution, abundance, and phenology of *E. pubescens* in our area need additional study. Where growing together, *E. pubescens* apparently flowers about a month earlier than *E. rotundifolium*. Primarily in the Appalachians and adjacent provinces, ranging from ME south to n. GA and n. AL. This taxon appears to be a stabilized polyploid complex originating from hybridization of *E. rotundifolium* and (perhaps) *E. sessilifolium*; in that it now functions as a more-or-less independent evolutionary lineage, with distinctive morphology, habitat, and distribution, it is here treated as a species. [= F; < *E. rotundifolium* var. *ovatum* (Bigelow) Torrey – RAB (also see *E. cordigerum*); = *E. rotundifolium* var. *ovatum* (Bigelow) Torrey – C, FNA, G, K, SE, W; < *E. rotundifolium* – GW; < *E. pubescens* – S (also see *E. cordigerum*); = *E. rotundifolium* Linnaeus ssp. *ovatum* (Bigelow) Montgomery & Fairbrothers]

Eupatorium recurvans Small, Recurved Eupatorium. Cp (FL, GA, NC, SC): moist savannas; rare (NC Watch List). August-October. Se. NC south to GA and s. FL. The diploid sexual *E. recurvans* (sensu stricto) is rare in our area; GW gives its range as se. and sc. GA and FL. *E. mohrii* is believed to be a triploid and tetraploid, apomictic derivative of the hybrid *E. recurvans* × *rotundifolium*; it is more widespread. [= GW, S; < *E. recurvans* – RAB, WH (also see *E. anomalum* and *E. mohrii*); < *E. mohrii* – C, FNA, K, SE]

Eupatorium resinosum Torrey ex A.P. de Candolle, Resinous Boneset, Pinebarren Eupatorium. Cp (NC, SC): seepage bogs, beaver ponds, frequently burned streamhead pocosins, in the Sandhills and inner Coastal Plain of sc. NC; rare. August-October. A "bimodal endemic," known from the NJ, DE, and (formerly) NY, thence disjunct to the Sandhills and upper Coastal Plain of NC. [= RAB, C, FNA, G, GW, K, SE; > *E. resinosum* var. *resinosum* – F]

Eupatorium rotundifolium Linnaeus, Common Roundleaf Eupatorium. Cp, Pd, Mt (GA, NC, SC, VA): savannas, seepage bogs, woodlands; common (uncommon in Piedmont, rare in Mountains). August-October. MA, NY, IN, and OK south to s. FL and TX. [= F, S; = *E. rotundifolium* var. *rotundifolium* – RAB, C, FNA, G, K, SE, W; < *E. rotundifolium* – GW, WH (also see *E. pubescens* and *E. cordigerum*); *E. rotundifolium* Linnaeus ssp. *rotundifolium*]

Eupatorium saltuense Fernald, Tall Boneset, Pasture Eupatorium. Pd (NC, VA), Cp (VA): upland forests, woodland borders, marsh edges; uncommon (rare in NC). August-October. Known from e. and c. VA and NC. Considered by some to be a hybrid of *E. album* and *E. altissimum*. [= RAB, F, G; < *E. altissimum* – C, FNA, K]

Eupatorium scabridum Elliott, Roughleaf Eupatorium. Cp (GA, SC): savannas, wet pinelands; uncommon. Late July-October. SC south to n. FL, west to AR, LA, and OK. This plant is believed to be an allopolyploid derivative of the hybrid *E. rotundifolium* × *semiserratum*. In some areas it apparently consists only of short-lived diploids, but in others (according to GW especially in SC, AR and LA) to occur as populations of polyploid apomicts. It resembles *E. rotundifolium*, but has cuneate leaves with a less prominent pair of lateral veins, narrower leaves, and is more likely to have 3-whorled leaves (as *E. semiserratum* often does). [= GW, S; = *E. rotundifolium* var. *scabridum* (Elliott) A. Gray – FNA, K, SE; < *E. rotundifolium* – WH]

Eupatorium semiserratum A.P. de Candolle. Cp (GA, NC, SC, VA): swamp forests, seepage bogs, savannas, clay-based Carolina bays, other wetlands; uncommon. Late July-October. Se. VA south to ne. FL, Panhandle FL, west to TX and AR; disjunct in sc. TN. This species often has 3 leaves per node; most similar species rarely or never have whorled leaves. [= RAB, C, FNA, G, GW, K, S, SE, WH; = *E. cuneifolium* var. *semiserratum* (A.P. de Candolle) Fernald & Griscom – F]

Eupatorium serotinum Michaux, Late Eupatorium. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): interdune swales, fields, open forests, powerline rights-of-way, tidal marshes; common. Late August-October. MA, NY, MI, WI, MN, and NE south to s. FL, LA, and TX. This species was apparently largely or strictly coastal in our area, but has spread inland rapidly along corridors of disturbance, somewhat similarly to *Baccharis halimifolia*. [= RAB, C, F, FNA, G, GW, K, S, SE, W, WH]

Eupatorium sessilifolium Linnaeus *var.* ***brittonianum*** Porter, Britton's Eupatorium. Mt (NC): circumneutral soils of woodlands at moderate elevation; rare. August; September. Fairly widespread in ne. North America, south to NJ, PA, MD, NC, KY, and MO. The only collection from NC known to me is from Cedar Cliff, Buncombe County, in 1897. I provisionally disagree with Cronquist's equation of this taxon with *E. godfreyanum*. [= F, K; < *E. sessilifolium* var. *sessilifolium* – RAB; < *E. sessilifolium* – C, FNA, G, S, SE, W]

Eupatorium sessilifolium Linnaeus *var.* ***sessilifolium***, Sessile-leaf Eupatorium. Pd, Mt (GA, NC, VA), Cp (VA): open upland woodlands and woodland borders; common (uncommon in VA Piedmont, rare in VA Coastal Plain). July-October. NH west to MN, south to GA, AL, MS, AR, and KS. [= F, K; < *E. sessilifolium* var. *sessilifolium* – RAB (also see var. *brittonianum*); < *E. sessilifolium* – C, FNA, G, S, SE, W]

Eupatorium torreyanum Short & Peter, Torrey's Eupatorium. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC): dry woodlands, marshes; common (rare in FL, rare in Mountains). Late July-October. NY south to n. peninsular FL, Panhandle FL, and west to OH, TN, and LA. SE considers this taxon a "well-marked variety," "probably originated through hybridization between *E. hyssopifolium* and some other species, but now a stable entity." The other parent is postulated by Sullivan (1978) to be *E. semiserratum*. For reasons stated in the comments before the species accounts, the taxon is here treated as a species. [= S; = *E. hyssopifolium* var. *laciniatum* Gray – C, F, FNA, G, K, SE, W, WH; < *E. hyssopifolium* – RAB]

Eupatorium vaseyi T.C. Porter, Vasey's Eupatorium. Mt (GA, NC, VA), Pd (NC, VA): moist to dry woodlands and openings; uncommon, rare in upper Piedmont (VA Watch List). July-October. VA and MD south to se. TN (Chester, Wofford, & Kral 1997), n. GA, and n. AL. This species is apparently a tetraploid derivative of *E. album* × *sessilifolium*. It is sometimes treated as a variety of *E. album*, but seems better regarded as a species of hybrid origin. [< *E. album* var. *vaseyi* – RAB, W (also see *E. godfreyanum*); = *E. album* var. *vaseyi* (T.C. Porter) Cronquist – C, FNA, SE; = *E. album* var. *monardifolium* (Fernald) – F; < *E. vaseyi* – G; = *E. sessilifolium* var. *vaseyi* (Porter) Fernald & Griscomb – K; *E. fernaldii* Godfrey]

Eupatorium album Linnaeus var. *subvenosum* A. Gray. Pine barrens, open woodlands. DC, DE, NJ, NY. July-September. [= C, F, FNA, K, SE] {add to synonymy}

Eupatorium lancifolium (Torrey & A. Gray) Small. Prairies, open woodlands. AL west to s. AR and TX. [= FNA, GW, K, S, SE; = *E. semiserratum* A.P. de Candolle var. *lancifolium* Torrey & A. Gray]

Eupatorium ×*pinnatifidum* Elliott. E. VA south to Panhandle FL. It is variously considered a species (as by S), a species of hybrid origin (as by SE), or a hybrid (as by GW and K). The parents are variously listed as *E. capillifolium* × *perfoliatum* (as by K) or *E. capillifolium* or *compositifolium* × *perfoliatum* (as by GW and SE). I have seen the plant in Pender County, NC, where it appears to be a first-generation hybrid, growing with *E. capillifolium* and *E. perfoliatum*. Until and unless additional evidence appears that it reproduces itself and exists in independent populations I am inclined to treat it as a hybrid rather than a species of hybrid origin. It is recognizable by its pinnatifid or bipinnatifid leaves (the segments broader than in the dog-fennels) and its corymbose-paniculate inflorescence. [= FNA, K, WH; = *E. pinnatifidum* Elliott – GW, S, SE] {not keyed}

Eurybia (Cassini) Cassini 1820 (Wood-aster)

A genus of about 23 species, perennial herbs, of North America and n. Eurasia. References: Brouillet in FNA (2006b); Nesom (1994b)=X; Lamboy (1987)=Y; Lamboy (1992, 1988). Key based in part on SE.

1 Basal and lower cauline leaves both distinctly petioled and with a cordate or subcordate blade; ["*Aster* section *Biotia*"].
  2 Outer phyllaries squarrose-reflexed; rhizomes short or absent, the plants not forming extensive clonal colonies; [of rich slopes and bottomlands of the lower Piedmont of NC, SC, GA, and AL].
    3 Involucre >11 mm tall; phyllaries acute to acuminate at the apex; phyllaries squarrose in life, often only the innermost squarrose in dried specimens, the reflexed portion with a distinct hyaline margin; [of the lower Piedmont of GA and AL]..... ***E. jonesiae***
    3 Involucre <10 mm high; phyllaries acute, obtuse, or rounded at the apex; phyllaries squarrose in life, generally remaining so in dried specimens, the reflexed portion herbaceous with a narrow hyaline margin or none at all; [of the lower Piedmont of s. NC and SC] ..... ***E. mirabilis***
  2 Outer phyllaries appressed (or slightly and irregularly spreading); rhizomes long, the plants forming extensive clonal colonies; [of various habitats and distribution].

4 Ray flowers purplish or bluish; branches of the inflorescence glandular-pubescent ..... ***E. macrophylla***
4 Ray flowers white; branches of the inflorescence not glandular-pubescent.
5 Plants with basal leaves on well-developed shoots separate from the flowering shoots ..... ***E. schreberi***
5 Plants without basal leaves on well-developed shoots separate from the flowering shoots.
6 Longest peduncle in inflorescence > 1.5 cm long; involucre > 6.5 mm tall; rays mostly > 13 mm long; [mostly of high mountain forests, primarily over 1200 m in elevation] ..... ***E. chlorolepis***
6 Longest peduncle in inflorescence < 1.5 cm long; involucre < 6.5 mm tall; rays mostly < 14 mm long; [mostly of lower elevation forests, primarily below 1200 m in elevation] ..... ***E. divaricata***
1 Basal and lower cauline leaves not as above.
7 Leaves linear, up to about 10 mm wide; leaves strongly basally disposed.
8 Inflorescence flat-topped (corymbiform).
9 Pappus fine, the bristles not thickened above; ray florets often 8-15 (-25); [of the Piedmont and low mountains of GA, SC, and possibly sw. NC] ..... ***E. avita***
9 Pappus coarse, the larger bristles thickened above (clavellate-flattened); ray flowers 15-35; [of the Coastal Plain, of ne. NC south to ne. FL] ..... ***E. paludosa***
8 Inflorescence elongate (spike-like or raceme-like).
10 Stem spreading-hairy throughout; ray florets 25-60, white or pinkish; disc florets; [endemic of FL Panhandle and adjacent sw. GA] ..... ***E. eryngiifolia***
10 Lower stem glabrous, upper stem variously hairy; ray florets 8-35, deep lavender or purple; [collectively widespread]
11 Upper stem strigillose; phyllaries 48-64; disc florets (40-) 52-80+; [widespread] ..... ***E. hemisphaerica***
11 Upper stem villous to glabrescent; phyllaries 20-40; disc florets 18-30; [endemic of FL Panhandle] ..... ***E. spinulosa***
7 Leaves broader, the largest on a plant over 15 mm wide; leaves somewhat basally disposed, the lowermost sometimes withering before flowering.
12 Leaves obviously veined beneath, usually toothed, hairy on the undersurface.
13 Larger leaves < 2.5 (-3.6) cm wide; rays purple; [of w. VA, WV, northward] ..... ***E. radula***
13 Larger leaves > 4.0 cm wide; rays white to pale purple; [of the Cumberland Plateau of KY and n. TN] ..... ***[E. saxicastellii]***
12 Leaves very obscurely veined beneath, entire or nearly so, glabrous on the undersurface.
14 Ray florets 9-14; rays 5-15 mm long ..... ***E. compacta***
14 Ray florets 15-35; rays 10-25 mm long.
15 Phyllaries glandular-pubescent on the back and also glandular-ciliate; involucre 8-16 mm high ..... ***E. spectabilis***
15 Phyllaries slightly or not at all glandular-pubescent on the back (sometimes glandular-ciliate); involucre 7-12 mm high ..... ***E. surculosa***

Eurybia avita (Alexander) Nesom, Alexander's Rock Aster. Pd (GA, SC), Mt (NC?): in shallow soils on granitic flatrocks and granitic domes where moist from seasonal seepage; rare (GA Special Concern, NC Rare, SC Rare). Upper Piedmont endemic: w. SC (or sw NC?) to wc. GA. [= FNA, K, X; = *Aster avitus* Alexander – SE, W]

Eurybia chlorolepis (Burgess) Nesom, Blue Ridge White Heart-leaved Aster. Mt (GA, NC, SC, VA): northern hardwood forests, spruce-fir forests; common (rare in VA). August-October. A Southern Appalachian endemic: sw. VA south through w. NC and e. TN to nw. SC and n. GA (Lamboy 1992). Lamboy (1992) has shown that *Eurybia chlorolepis* is a species distinct from *Eurybia divaricata*. *E. chlorolepis* is tetraploid (2n=36); *E. divaricatus* is diploid. [= FNA, K, X; = *Aster chlorolepis* Burgess – G, S, Y; = *A. divaricatus* Linnaeus var. *chlorolepis* (Burgess) Ahles – RAB, C, SE, W; < *A. divaricatus* – F]

Eurybia compacta Nesom, Slender Aster. Cp (GA, NC, SC, VA), Pd? (VA?): pine savannas; uncommon (rare in GA). Late July-October. An Atlantic Coastal Plain endemic: NJ to e. GA. [= FNA, K, X; = *Aster gracilis* Nuttall – RAB, C, F, G, S, SE]

Eurybia divaricata (Linnaeus) Nesom, Common White Heart-leaved Aster. Mt, Pd (GA, NC, SC, VA), Cp (NC, VA): moist to fairly dry forests and woodlands; common (uncommon in VA Coastal Plain). August-October. N. NH west to s. Ontario, sw. Québec, and n. OH, south to e. NC, c. SC, n. GA, and c. AL. The many species described by Burgess and here treated as synonyms may deserve further assessment; see S for details. *E. divaricata* is diploid (2n=18). [= FNA, K, X; = *Aster divaricatus* Linnaeus – G, Y; = *A. divaricatus* var. *divaricatus* – RAB, C, SE, W; < *A. divaricatus* – F (also see *Eurybia chlorolepis*); > *A. boykinii* Burgess - S; > *A. castaneus* Burgess – S; > *A. divaricatus* – S; > *A. excavatus* Burgess – S; > *A. flexilis* Burgess – S; > *A. stillettiformis* Burgess – S; > *A. tenebrosus* Burgess – S]

Eurybia eryngiifolia (Torrey & A. Gray) Nesom, Eryngo-leaved Aster. Cp (FL, GA): pine savannas; rare. East Gulf Coastal Plain endemic: sw. GA and Panhandle FL west to AL. [= FNA, K, WH, X; = *Aster eryngiifolius* Torrey & A. Gray – S, SE]

Eurybia hemispherica (Alexander) Nesom, Prairie Grass-leaved Aster. Mt (GA), Cp (FL, GA?): glades, barrens, rocky woodlands; uncommon (rare in FL). E. TN west to MO, south to nw. GA, se. GA, and FL Panhandle. [= FNA, K, WH, X; = *Aster hemisphericus* Alexander – C, F, SE; = *A. paludosus* Aiton ssp. *hemisphericus* (Alexander) Cronquist – G; = *A. hemisphaericus* – W, orthographic variant]

Eurybia jonesiae (Lamboy) Nesom, Piedmont Big-leaved Aster. Pd (GA): moist forests; rare. August-October. Endemic to the Piedmont: e. GA west to e. AL (Lee Co.). [= FNA, K, X; = *Aster jonesiae* Lamboy; = *A. commixtus* (Nees) Kuntze – S, misapplied; < *A. commixtus* (Nees) Kuntze – SE, misapplied]

Eurybia macrophylla (Linnaeus) Cassini, Big-leaved Aster. Mt (GA, NC, SC, VA), Pd (VA): moist to dryish forests, in NC mostly at moderate to high elevations, particularly in red oak forests on ridgetops; common (uncommon in Piedmont). Late July-September. New Brunswick and Québec west to MN, south to PA, MD, VA, NC, ne. GA, e. TN, and IN. *Aster macrophyllus* var. *ianthinus* [= *Aster multiformis*] is sometimes recognized. It is alleged to differ in having the stipitate glands of the pedicels with minute heads (vs. broadly capitate), the leaves thin in texture and only slightly scabrous (vs. thick in texture and strongly scabrous). Many other varieties have been recognized by Fernald (1950), with ranges apparently north of our area; see F for a key. *E. macrophylla* is octoploid (2n=72). [= FNA, K, X; = *Aster macrophyllus* Linnaeus – RAB, C, G, SE, W, Y; > *Aster macrophyllus* var. *macrophyllus* – F; > *A. macrophyllus* var. *ianthinus* (Burgess) Fernald – F; > *A. macrophyllus* var.

pinguifolius Burgess – F; > *A. macrophyllus* var. *excelsior* Burgess – F; > *A. macrophyllus* var. *velutinus* Burgess – F; > *A. macrophyllus* var. *sejunctus* Burgess – F; > *A. macrophyllus* var. *apricensis* Burgess – F; > *A. macrophyllus* – S; > *A. multiformis* Burgess – S; > *A. riciniatus* Burgess – S]

Eurybia mirabilis (Torrey & A. Gray) Nesom, Piedmont Aster. Pd (NC, SC): nutrient-rich bottomlands and moist slopes in the lower Piedmont; rare. July-September. Endemic to the lower Piedmont of NC and SC. The related *E. jonesiae* Lamboy is endemic to GA and AL. [= FNA, K, X; = *Aster mirabilis* Torrey & A. Gray – S; < *A. commixtus* (Nees) Kuntze – RAB, SE, misapplied]

Eurybia paludosa (Aiton) Nesom, Savannah Grass-leaved Aster. Cp (FL, GA, NC, SC): wet savannas, sandhill / pocosin ectones; common (rare in FL). July-October. An Atlantic Coastal Plain endemic: ne. NC south to se. GA and ne. FL (Nassau County). [= FNA, K, WH, X; = *Aster paludosus* Aiton – RAB, C, GW, SE; = *A. paludosus* ssp. *paludosus* – G]

Eurybia radula (Aiton) Nesom, Low Rough Aster. Mt (VA): circumneutral to calcareous wet meadows, possibly stream banks; rare. Newfoundland and Labrador south to DE, MD, WV, and w. VA. [= FNA, K, X; = *Aster radula* Aiton – C, G, SE, W; > *A. radula* var. *radula* – F]

Eurybia schreberi (Nees) Nees, Schreber's Aster. Mt, Pd (VA): mesic forests and seepage slopes; uncommon. August-October. NH west to WI, south to DE, MD, c. and w. VA, ne. TN (Chester, Wofford, & Kral 1997), AL, and KY. *E. schreberi* is hexaploid (2n=54). [= FNA, K, X; = *Aster schreberi* Nees – C, G, SE, W, Y; > *A. schreberi* – F; > *A. glomeratus* (Bernhart ex Nees) Burgess – F]

Eurybia spectabilis (Aiton) Nesom, Low Showy Aster. Cp (NC, SC, VA), Pd (NC): pine barrens, dry road banks; rare. August-October. Coastal Plain (and rarely adjacent provinces) from MA south to SC; disjunct in AL. [= X; = *Aster spectabilis* Aiton – RAB, C, SE; > *A. spectabilis* Aiton var. *cinerascens* Blake – G; > *A. spectabilis* Aiton var. *spectabilis* – F, G; > *A. spectabilis* var. *suffultus* Fernald – F, G; > *A. smallii* Alexander – S; > *A. spectabilis* – S]

Eurybia spinulosa (Chapman) Nesom, Apalachicola Aster. Cp (FL): longleaf pine savannas; rare. Panhandle FL (Bay, Calhoun, Gulf, and Franklin counties). May-July. [= FNA, K, WH, X; = *Aster spinulosus* Chapman – GW, S, SE]

Eurybia surculosa (Michaux) Nesom, Creeping Aster. Mt (NC, SC, VA): rock outcrops, glades, rocky woodlands; uncommon (rare in VA). Late August-October. A Southern Appalachian endemic: se. KY and w. VA south to w. NC, e. TN, nw. SC, and n. GA. Alleged occurrences of *E. surculosa* on the Coastal Plain in se. SC and e. GA are based on misidentifications of *E. compacta*. [= FNA, K, X; = *Aster surculosus* Michaux – RAB, C, F, G, S, SE, W]

Eurybia saxicastellii (J.J.N. Campbell & Medley) Nesom, Rockcastle Wood-aster. Boulder/cobble bars along the Rockcastle River. Endemic to the Cumberland Plateau region of KY and n. TN (Scott County, TN) (Chester, Wofford, & Kral 1997). [= K, X; = *Aster saxicastellii* J.J.N. Campbell & Medley – C; = *E. saxicastelli* – FNA, orthographic variant]

Euthamia (Nuttall) Cassini 1825 (Flat-topped Goldenrod)

A genus of about 8-10 species, herbs, of North America. There are a number of serious problems remaining in our knowledge of *Euthamia*. References: Haines in FNA (2006b); Sieren (1981)=Z; Taylor & Taylor (1983)=Y; Johnson (1995)=X; Cronquist (1980)=SE. Key adapted from FNA.

1 Involucres obconic, 4-6.2 mm; ray florets 7-14 (-16); disc florets 3-9.
  2 Leaves linear to linear lanceolate, 1.4-4 (-8) mm wide, 12-49× as long as wide, gradually narrowed distally; leaf glands abundant, prominent; array heights (25-) 35-60% of total plant height ..... ***[E. gymnospermoides]***
  2 Leaves lanceolate to narrowly lanceolate, 3-6 (-9) mm wide, 8-18× as long as wide, abruptly narrowed distally; leaf glands few, obscure; array heights 6-35% of total plant height ..... ***[E. leptocephala]***
1 Involucres broadly campanulate to turbinate, 3-5.3 mm long; ray florets 7-22 (-35); disc florets3-22.
  3 Larger leaves 3-7 cm long, 1-3 (-4) mm wide, 1-3-nerved, 8-45× as long as wide, the faces glabrous or nearly so; axillary leaf fascicles usually many; punctae on leaves many, conspicuous ..... ***E. caroliniana***
  3 Larger leaves 4-13 cm long, 3-10 (-12) mm wide, 3-5-nerved, 7-20× as long as wide, the faces glabrous or ± pubescent; axillary leaf fascicles absent to few; punctae on leaves few and inconspicuous to many and conspicuous.
    4 Heads mostly sessile or subsessile; larger leaves 4-13 cm long, 3-12 mm wide; leaf surfaces moderately to densely hirtellous; disc flowers (4-) 5-7 (-13) per head; ray flowers (11-) 17-22 (-35) per head; [of various, often weedy habitats] ..... ***E. graminifolia***
    4 Heads mostly pedunculate; larger leaves 4-8 cm long, 3-5 mm wide; leaf surfaces moderately hirtellous; disc flowers 3-5 per head; ray flowers 7-12 per head; [of tidewater habitats in the outer Coastal Plain of se. VA southward] ..... ***E. hirtipes***

Euthamia caroliniana (Linnaeus) Greene ex Porter & Britton. Cp (FL, GA, NC, SC, VA), Pd, Mt (VA): pine savannas, moist forests, ditches, pastures, disturbed areas; common. September-December. Nova Scotia west to MI, south to s. FL and LA. [= FNA, K, WH, X; > *Solidago microcephala* (Nuttall) Bush – RAB, F, G; >< *Solidago tenuifolia* Pursh – RAB; > *E. tenuifolia* (Pursh) Nuttall var. *microcephala* Nuttall – C; > *E. tenuifolia* var. *tenuifolia* – C; > *Solidago tenuifolia* var. *tenuifolia* – F; > *Solidago tenuifolia* – G; < *E. tenuifolia* – GW (also see *E. hirtipes*); > *E. minor* (Michaux) Greene – GW, SE; = *E. minor* – S; > *E. tenuifolia* (Pursh) Nuttall – SE; = *E. tenuifolia* – W, Z]

Euthamia graminifolia (Linnaeus) Nuttall. Mt (NC, VA), Pd (VA), Cp (SC, VA): moist to dry weedy situations, riverbanks, bottomlands, bog margins; common (rare south of VA) (NC Watch List). August-September. Newfoundland west to MN, south to e. VA, w. NC, KY, TN, and MO; a SC Coastal Plain report (Hill & Horn 1997) is probably an introduction. [= S, SE, W; = *Solidago graminifolia* (Linnaeus) Salisbury – RAB; < *Euthamia graminifolia* – FNA; > *E. graminifolia* var. *graminifolia* – C, X, Y, Z; > *E. graminifolia* (Linnaeus) Nuttall var. *nuttallii* (Greene) W. Stone – C, X, Y, Z; > *Solidago graminifolia* var. *polycephala* Fernald – F; > *S. graminifolia* var. *graminifolia* – F, G; > *S. graminifolia* var. *nuttallii* (Greene) Fernald – F, G; = *E. graminifolia* var. *graminifolia* – K]

Euthamia hirtipes (Fernald) Sieren, Marsh Flat-topped Goldenrod. Cp (FL, NC, SC, VA): brackish marshes, salt marshes, marsh edges, wet hammocks; uncommon (rare in VA). September-December. Se. VA south to c. peninsular FL and west to s. LA. *E. hirtipes* has been variously treated: considered by Fernald to be a hybrid of "*minor*" and "*graminifolia* var. *nuttallii*," by Sieren to be a species endemic to NC-SC-VA, by Taylor and Taylor to be a variety of *E. graminifolia* ranging from se. VA south to FL and west to LA, and by GW to be equivalent to *E. tenuifolia*. [= Z; < *Solidago tenuifolia* Pursh – RAB; < *Euthamia graminifolia* – FNA; = *Euthamia* ×*hirtipes* (Fernald) Sieren (pro sp.) – C; > *Solidago* ×*hirtipes* Fernald – F; >< *Solidago gymnospermoides* (Greene) Fernald – F, G, misapplied as to our plants; >< *Solidago leptocephala* Torrey & A. Gray – F, misapplied as to our plants; < *E. tenuifolia* – GW; = *E. graminifolia* (Linnaeus) Nuttall var. *hirtipes* (Fernald) C. & J. Taylor – K, WH, X, Y]

Euthamia gymnospermoides Greene, Texas Goldentop, east to sc. TN (Chester, Wofford, & Kral 1997). [= FNA, K, SE, Z; < *Solidago gymnospermoides* (Greene) Fernald – F, G]

Euthamia leptocephala (Torrey & A. Gray) Greene, east to sc. TN (Chester, Wofford, & Kral 1997) and MS. [= C, FNA, GW, K, S, SE, Z; = *Solidago leptocephala* Torrey & A. Gray – F, G]

Eutrochium Rafinesque 1838 (Joe-pye-weed)

The much debated separation of *Eutrochium (Eupatoriadelphus)* from *Eupatorium* has been supported by Schmidt & Schilling (2000). Lamont (2004) makes the necessary combinations under the oldest available generic name, *Eutrochium* Rafinesque. References: Lamont in FNA (2006c); Lamont (2004)=X; Schmidt & Schilling (2000)=Y; Lamont (1995)=Z.

1 Florets (4-) 6-9 (-12) per head; leaves more or less 3-nerved from the base, rather abruptly contracted to the short petiole, thick in texture, 5-12 (-15) cm long, strongly resin-dotted beneath; leaves in whorls of (2-) avg. 3-4 (-5); stem generally purple-speckled (sometimes uniformly purple); [primarily of the Coastal Plain] ..... ***E. dubium***

1 Florets **either** (8-) 9-22 **or** 4-7 per head; leaves generally pinnately veined (rarely with a tendency to be 3-nerved), usually cuneate and less abruptly contracted to the petiole, thick or thin in texture, 6-35 cm long, weakly or not at all resin-dotted beneath (except often strongly resin-dotted in *E. maculatum*); leaves in whorls of (2-) 3-7; stem purple-speckled, purple at the nodes, purple throughout, or green; [collectively widespread in our area].

2 Florets (8-) 9-22 per head; leaves mostly in whorls of (3-) avg. 4-5 (-6), 6-20 cm long; inflorescence more or less flat-topped; stem usually speckled with purple (rarely evenly purplish) ..... ***E. maculatum var. maculatum***

2 Florets 4-7 per head; leaves in whorls of (2-) 3-7, 8-35 cm long; inflorescence rounded; stem usually purple throughout, purple at the nodes, or lacking purplish pigment.

3 Stem hollow (with a large central cavity), purple throughout, strongly glaucous when fresh; flowers bright pink-purple; leaves in whorls of (3-) avg. 5 (-7); leaves mostly 3.5-5.5× as long as broad ..... ***E. fistulosum***

3 Stem solid (rarely with a slender central cavity), dark purple at the nodes or greenish purple throughout, not glaucous or only slightly so when fresh; flowers pale pink-purple; leaves in whorls of (2-) avg. 3-4 (-5); leaves mostly 2-4× as long as broad.

4 Stem persistently glandular-pubescent throughout; lower surface of leaves glandular-pubescent; leaves mostly 2-2.5× as long as wide; stem greenish-purple (or evenly purple); [of the Mountains] ..... ***E. steelei***

4 Stem glandular-puberulent in the inflorescence, glabrous below the inflorescence; lower surface of leaves with few, sessile resin dots; leaves mostly 2.5-4× as long as broad; stem greenish, often dark purple at the nodes, particularly when sun-grown; [widespread in our area] ..... ***E. purpureum var. purpureum***

Eutrochium dubium (Willdenow ex Poiret) E.E. Lamont, Three-nerved Joe-pye-weed. Cp (NC, SC, VA), Pd (NC, SC), Mt (NC): swamp forests, pocosins, other wet, acidic habitats; common (uncommon in Piedmont). July-October. Nova Scotia, s. ME, and NH south to se. SC, on or near the Coastal Plain. [= FNA, X; = *Eupatoriadelphus dubius* (Willdenow ex Poiret) King & H.E. Robinson – GW, Y; = *Eupatorium dubium* Willdenow ex Poiret – RAB, C, F, G, K, SE, W, Z; = *Eupatorium purpureum* – S, misapplied]

Eutrochium fistulosum (Barratt) E.E. Lamont, Hollow-stem Joe-pye-weed. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests, marshes, ditches; common (uncommon in Coastal Plain). July-October. S. ME, NY, IL, and MO, south to c. peninsular FL, Panhandle FL, and e. TX. [= FNA, X; = *Eupatoriadelphus fistulosus* (Barratt) King & H.E. Robinson – GW, Y; = *Eupatorium fistulosum* Barratt – RAB, C, F, G, K, SE, W, WH, Z; = *Eupatorium maculatum* – S, misapplied]

Eutrochium maculatum (Linnaeus) E.E. Lamont *var.* ***maculatum***, Spotted Joe-pye-weed. Mt (NC, VA), Pd (VA): marl fens, wet calcareous meadows, cove forests, grassy balds; uncommon (rare in VA). Late July-October. The species is widespread across n. North America. Newfoundland, ME, Québec, Ontario, and MN, south to PA, OH, n. KY, c. IL, and c. IA, and in the Mountains south to e. WV, w. VA, and w. NC. Var. *bruneri* (A. Gray) E.E. Lamont is more western; var. *foliosum* (Fernald) E.E. Lamont, is more northern. Further investigation is needed of the peculiar and implausible change in habitat of this species, from calcareous wetlands in c. VA northward, to mesic high elevation slopes and forests (in acidic to very acidic soils) from sw. VA southward. Such a change is suggestive of the presence of an unrecognized, cryptic taxon in the Southern Appalachians. [= FNA, X; = *Eupatorium maculatum* Linnaeus var. *maculatum* – F, G, K, SE; < *Eupatorium maculatum* – RAB, W; = *Eupatorium maculatum* ssp. *maculatum* var. *maculatum* – C, Z; < *Eupatoriadelphus maculatus* – Y]

Eutrochium purpureum (Linnaeus) E.E. Lamont *var.* ***purpureum***, Purple-node Joe-pye-weed. Mt, Pd, Cp (GA, NC, SC, VA): upland, usually mesic forests; common (rare in Coastal Plain). July-October. NH west to se. MN, IA, and e. NE, south to SC, GA, panhandle FL, n. LA, and e. OK; var. *holzingeri* (Rydberg) E.E. Lamont, differing in having the lower leaf surface densely and persistently pubescent (vs. glabrous or nearly so) is found in the Midwest (Lamont 1990). *Eupatorium purpureum* var. *amoenum* is smaller, more slender, with narrower leaves which are nearly glabrous below; it is probably only a form. [= FNA, X; = *Eupatorium purpureum* Linnaeus var. *purpureum* – K, Z; < *E. purpureum* – RAB, C, F, SE, W, WH; > *Eupatorium*

purpureum var. *amoenum* (Pursh) Gray – G; > *Eupatorium purpureum* var. *purpureum* – G; = *Eupatorium trifoliatum* Linnaeus – S]

Eutrochium steelei (E.E. Lamont) E.E. Lamont, Appalachian Joe-pye-weed, Steele's Joe-pye-weed. Mt (NC, VA): cove hardwood and northern hardwood forests, up to at least 1600 m; uncommon (NC Watch List). July-October. A Southern Appalachian endemic: e. KY and w. VA south w. NC and e. TN. [= FNA, X; = *Eupatoriadelphus steelei* (E. Lamont) G.J. Schmidt & Schilling – Y; = *Eupatorium steelei* E.E. Lamont – Z]

Facelis Cassini 1819

A genus of 3 species, herbs, of South America. References: Nesom in FNA (2006a); Arriagada (1998)=Z; Cronquist (1980)=SE; Anderberg (1991)=Y.

* ***Facelis retusa*** (Lamarck) Schultz 'Bipontinus', Trampweed. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (SC): fields, roadsides, disturbed areas; common, native of s. South America. Late April-June. [= RAB, FNA, K, SE, WH, Y, Z; *? F. apiculata* Cassini – S]

Filago Linnaeus 1753 (Cotton-rose, Herba Impia, Rabbit-tobacco)

A genus of about 40 species, herbs, of Eurasia, North America, and n. Africa. Arriagada (1998) favors the inclusion of *Evax* in *Filago*. References: Morefield in FNA (2006a); Arriagada (1998)=Z; Cronquist (1980)=SE; Anderberg (1991)=Y.

1 Inner flowers of the head with a well-developed capillary pappus; heads woolly, but not so densely and completely as to hide the phyllaries ... ***F. vulgaris***
1 All flowers of the head lacking a pappus of capillary bristles; heads completely surrounded by wool, the phyllaries hidden ... *[see **Diaperia**]*

* ***Filago vulgaris*** Lamarck, Herba Impia. Pd (NC, VA), Mt, Cp (VA): disturbed areas; uncommon, native of Europe. May-September. [= FNA, K, Y; = *F. germanica* – RAB, C, F, G, SE, Z; = *Gifola germanica* Dumortier – S]

Flaveria de Jussieu 1789

A genus of about 21 species, herbs and subshrubs, subcosmopolitan in tropical and subtropical areas. References: Yarborough & Powell in FNA (2006c); Cronquist (1980)=SE.

1 Heads borne in axillary glomerules; disc florets 0-1 (-2) ... ***F. trinervia***
1 Heads borne in terminal arrays; disc florets (2-) 3-8.
  2 Lower leaves petiolate, 10-25 (-70) mm wide; annual; cypselas 2.0-2.5+ mm long ... ***F. bidentis***
  2 Lower leaves sessile, 1-4 (-15) mm wide; perennial; cypselas 1.2-1.8 mm long ... ***F. linearis***

* ***Flaveria bidentis*** (Linnaeus) Kuntze. Cp (FL, GA): disturbed areas; rare, native of tropical America. FL Panhandle, s. FL, AL, GA. [= FNA, K, S, SE, WH]

Flaveria linearis Lagasca y Segura, Narrowleaf Yellowtops. Cp (FL): beaches, marshes, hammocks, pinelands; rare. Native in peninsular and panhandle FL. [= FNA, GW, K, S, WH; < *F. linearis* – SE]

* ***Flaveria trinervia*** (Sprengel) C. Mohr, Clustered Yellowtops. Cp (SC, VA): waste areas around wool-combing mill, ore piles, seaport ballast; rare, probably only a waif, introduced from sw. United States (Nesom 2004d). March-December. Also known from ballast at Mobile, AL (Cronquist 1980). [= FNA, K, S, SE, WH]

Fleischmannia Schultz 'Bipontinus' 1850

A genus of about 80 species of s. North America, south through Central America to w. (Andean) South America. References: Nesom in FNA (2006c); Wooten & Clewell (1971)=Z; Schultz & Schilling (2000).

Fleischmannia incarnata (Walter) King & H.E. Robinson, Pink Thoroughwort, Pink Eupatorium. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): nutrient-rich, moist to dry, forests and woodlands over diabase, limestone, coquina limestone, or other basic rocks, or on rich alluvium; rare. Late August-October. Se. VA west to WV, s. OH, s. IN, s. IL, s. MO, and e. OK, south to w. peninsular FL, Panhandle FL, s. TX, and e. Mexico, the distribution fragmented. See Wooten & Clewell (1971) for further information about this species. [= FNA, K, WH, Z; = *Eupatorium incarnatum* Walter – RAB, C, F, G, S, SE, W]

Gaillardia Fougeroux 1786 (Blanket-flower, Gaillardia, Fire-wheels)

A genus of about 15-30 species, herbs, of temperate North America and South America. References: Strother in FNA (2006c); Cronquist (1980)=SE; Turner & Whalen (1975)=Z; Turner et al. (2003)=Y.

1 Receptacle naked, lacking well-developed setae (if setae present, < 1 mm long) ..... ***G. aestivalis var. aestivalis***
1 Receptacle with well-developed setae 2-3 mm long.
2 Leaves fleshy; perennial or annual, strongly branching, the secondary branches spreading and therefore forming compact, rounded "bushes" ..... ***G. pulchella var. drummondii***
2 Leaves herbaceous; annual, with secondary branches ascending ..... ***G. pulchella var. pulchella***

Gaillardia aestivalis (Walter) H. Rock *var.* ***aestivalis***, Sandhills Gaillardia. Cp (FL, GA, NC, SC), Mt? (GA?): sandhills, disturbed sandy soils; common, rare northy of FL. July-October. Sc. NC south to c. peninsular FL, west to TX. The occurrence in nw. GA reported in Jones & Coile (1988) is odd. [= K, SE; < *G. aestivalis* – RAB, FNA; = *G. lanceolata* Michaux var. *lanceolata* – G; < *G. lanceolata* – S]

Gaillardia pulchella Fougeroux *var.* ***drummondii*** (Hooker) B.L. Turner, Beach Blanket-flower. Cp (FL, GA, NC, SC): sandy flats behind the dunes; common. April-December. E. NC south to FL, west to TX. [= Y; = *G. pulchella* Fougeroux var. *picta* (Sweet) A. Gray – K, Z; < *G. pulchella* – RAB, C, F, FNA, G, SE, WH; = *G. picta* Sweet – S]

* ***Gaillardia pulchella*** Fougeroux *var.* ***pulchella***, Common Blanket-flower. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): disturbed areas, persistent after cultivation; rare, introduced from further south and west. April-September. [= K, Y, Z; < *G. pulchella* – RAB, C, F, FNA, G, SE, WH; = *G. drummondii* (Hooker) A.P. de Candolle – S, misapplied]

Galinsoga Ruiz & Pavón 1794 (Peruvian-daisy, Quickweed)

A genus of about 13 species, herbs, of temperate and subtropical Central America and South America. References: Canne-Hilliker in FNA (2006c); Cronquist (1980)=SE.

1 Rays 0-1.5 (-2) mm long, lacking pappus scales (or with vestigial scales); outer phyllaries 2-4, with scarious margins; inner paleae deeply 3-lobed; pappus scales of the disc florets not awn-tipped; stem usually glabrous or sparsely pubescent with appressed (rarely spreading) hairs; gland-tipped hairs of the peduncles < 0.5 mm long; teeth of leaf margin obscure, broadly rounded or reduced to thickened bumps ..... ***G. parviflora var. parviflora***
1 Rays 2-3 mm long, with pappus scales about as long as the corolla tube; outer phyllaries 1-2, with green herbaceous margins; inner paleae usually entire; pappus scales of the disc florets awn-tipped; stem usually moderately pubescent with long, spreading hairs; gland-tipped hairs of the peduncles > 0.5 mm long; teeth of leaf margins usually well developed, acute ..... ***G. quadriradiata***

* ***Galinsoga parviflora*** Cavanilles *var.* ***parviflora***, Lesser Peruvian-daisy. Mt (NC, SC, VA), Pd, Cp (VA): disturbed areas, roadsides, barnyards; uncommon, native of Central and South America. May-October. [= FNA; < C, F, G, K, S, SE, W]

* ***Galinsoga quadriradiata*** Ruiz & Pavón, Common Peruvian-daisy. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): disturbed areas, roadsides, barnyards; uncommon (rare in FL), native of Central and South America. May-October. A serious weed, especially in the cooler climates of the Mountains; Small (1933) described it as "a particularly pestiferous weed of such rapid growth and seeding as to make eradication extremely difficult." Fortunately, it does not seem especially prone to invade undisturbed areas. [= C, K, SE, W; > *G. ciliata* (Rafinesque) Blake – RAB, F, G, S; > *G. caracasana* (A.P. de Candolle) Schultz 'Bipontinus' – F, G; > *G. bicolorata* St. John & White – F, G]

Gamochaeta Weddell 1856 (Cudweed, Everlasting)

A genus of about 50-80 species, herbs, subcosmopolitan, but primarily in South America. *Gamochaeta* is more closely related to other genera than it is to *Gnaphalium*. References: Nesom in FNA (2006a); Nesom (1990)=Z; Arriagada (1998)=Y; Nesom (2004b, 2004c)=X; Cronquist (1980)=SE; Pruski & Nesom (2004). Key based closely on FNA.

1 Leaves concolored or weakly bicolored (abaxial and adaxial faces more or less equally greenish to gray-greenish, indument usually loosely tomentose or arachnose, sometimes subpannose).
2 Blades of basal and lower cauline leaves 4-16 mm wide; bracts among the inflorescence heads spatulate to oblanceolate, the lowermost (at least) surpassing the heads ..... ***G. pensylvanica***
2 Blades of basal and lower cauline leaves 2-6 (10) mm wide; bracts among the inflorescence heads linear, oblanceolate, or oblong, surpassing the heads or not.
3 Involucres 2.5-3 mm high, seated in tomentum; capitulescence initially cylindric and uninterrupted, at least distally, the main axis obscured by clustered heads; phyllaries in 3-4 (-5) series, the outer and middle ovate-lanceolate with narrowly to broadly acute apices, the outer 1/3-½ as long as the inner, none with purplish color; flowering May-July ..... ***G. antillana***
3 Involucres 3-3.5 mm high, lightly arachnose only at the base if at all; capitulescence interrupted at least distally, the main axis visible up to the terminal heads; phyllaries in 5-7 series, the outer and middle ovate-triangular with sharply acute-acuminate apices, the outer ½-2/3 as long as the inner, at least the innermost commonly tinged with purple at the stereome-lamina junction; flowering (February-) March-May (sometimes later because of moisture or disturbance) ..... ***G. calviceps***
1 Leaves strongly to weakly bicolored with greenish glabrescent upper surfaces; leaves spatulate-obovate to oblanceolate; basal leaves present at flowering.
4 Basal and proximal cauline leaves usually withering before anthesis (clusters of smaller leaves usually present in cauline axils); stems erect or ascending; plants (30-) 50-85 cm; apices of inner phyllaries acute-acuminate; flowering mostly July-August ..... ***G. simplicicaulis***
4 Basal and proximal cauline leaves present or not at anthesis; stems erect to decumbent-ascending; plants mostly 10-50 cm; apices of inner phyllaries acute to obtuse, rounded, or blunt; flowering mostly April-June (-July in *G. calviceps*).
5 Upper leaf surfaces glabrous or glabrate; involucres 2.5-3.0 mm high, more-or-less purplish, the bases glabrous; outer phyllaries elliptic-obovate to broadly ovate-elliptic, apices rounded to obtuse; bisexual florets 2-3 ..... ***G. coarctata***

5 Upper leaf surfaces sparsely arachnose (hairs persistent, evident at 10× magnification); involucres 3.0-4.5(-5) mm high, sometimes purplish, bases (imbedded in tomentum) often sparsely arachnose on the lower 1/5-1/2; outer phyllaries ovate, ovate-triangular, or ovate-lanceolate, apices acute to acuminate; bisexual florets 2-6.
6 Stems not pannose (indument whitish, like closely appressed, polished cloth, hairs usually not individually evident); involucres 3.0-3.5(-4.0) mm high; apices of inner phyllaries acute to acute-acuminate; bisexual florets 2-4; cypselae purple ..... ***G. chionesthes***
6 Stems usually ± pannose or pannose-tomentose (hairs individually evident, longitudinally arranged); involucres 3.0-4.5 mm high; apices of inner phyllaries acute, obtuse, or truncate-rounded, sometimes apiculate; bisexual florets 3-6; cypselae tan to brownish.
7 Blades of cauline leaves oblanceolate to oblanceolate-oblong or oblanceolate-obovate; involucres 3.0-3.5 mm high; laminae of inner phyllaries elliptic-oblong to oblong, apices truncate-rounded or obtuse and apiculate; bisexual florets (3-) 4-6; plants usually fibrous-rooted, rarely taprooted ..... ***G. argyrinea***
7 Blades of cauline leaves oblanceolate to spatulate (basal cells of hairs on adaxial faces persistent, expanded, glassy); involucres 4.0-4.5 mm high; laminae of inner phyllaries triangular, apices acute (not apiculate); bisexual florets 3-4; plants fibrous-rooted or taprooted ..... ***G. purpurea***

Gamochaeta antillana (Urban) Anderberg, Caribbean Everlasting. Cp (FL, GA), {GA, NC, SC, VA}: common in FL. March-July. [= FNA, WH, X; < *Gamochaeta falcata* (Lamarck) Cabrera – K, Z; < *Gnaphalium purpureum* Linnaeus var. *falcatum* (Lamarck) Torrey & A. Gray – RAB, C, G, SE; < *Gnaphalium calviceps* Fernald – F; < *Gnaphalium falcatum* Lamarck – S; < *Gnaphalium purpureum* Linnaeus – W]

* ***Gamochaeta argentina*** Cabrera. Cp (SC): waste areas near wool-combing mill; rare, perhaps merely a waif, native of Argentina and Uruguay. See Nesom (2004d). [= FNA] {not yet keyed}

Gamochaeta argyrinea Nesom. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): March-July. South to Panhandle FL. [= FNA, WH, X; < *Gamochaeta purpurea* (Linnaeus) Cabrera – K, Y, Z; < *Gnaphalium purpureum* Linnaeus var. *purpureum* – RAB, C, G, SE; < *Gnaphalium purpureum* Linnaeus – F, S, W]

Gamochaeta calviceps (Fernald) Cabrera. Cp (VA), {GA, NC, SC}. March-July. [= FNA, X; < *Gamochaeta falcata* (Lamarck) Cabrera – K, Z; < *Gnaphalium purpureum* Linnaeus var. *falcatum* (Lamarck) Torrey & A. Gray – RAB, C, G, SE; < *Gnaphalium calviceps* Fernald – F; < *Gnaphalium falcatum* Lamarck – S; < *Gnaphalium purpureum* Linnaeus – W]

* ***Gamochaeta chionesthes*** Nesom. Cp (FL, GA, NC, SC), Pd (GA): roadsides, disturbed areas; apparently introduced from South America. March-July. [= FNA, WH, X; < *Gamochaeta purpurea* (Linnaeus) Cabrera – K, Y, Z; < *Gnaphalium purpureum* Linnaeus var. *purpureum* – RAB, C, G, SE; < *Gnaphalium purpureum* Linnaeus – F, S, W]

* ***Gamochaeta coarctata*** (Willdenow) Kerguélen. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): sandy roadsides, disturbed areas; common. Late June-August. [= FNA, WH, X; < *Gamochaeta americana* (P. Miller) Weddell – K, Y, Z, misapplied; < *Gnaphalium purpureum* Linnaeus var. *americanum* (P. Miller) Klatt – RAB, misapplied]

* ***Gamochaeta pensylvanica*** (Willdenow) Cabrera, Pennsylvanica Everlasting. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA?, NC): fields, roadsides, pastures, disturbed areas; common, apparently introduced. March-July. PA south to s. FL, west to TX, mostly on the Coastal Plain, and widespread in South America and elsewhere. [= FNA, K, WH, X, Z; >< *Gnaphalium purpureum* Linnaeus var. *spathulatum* (Lamarck) Baker – RAB; < *Gnaphalium purpureum* Linnaeus var. *purpureum* – C, G, SE; > *Gnaphalium peregrinum* Fernald – F; >< *Gnaphalium spathulatum* Lamarck – S; < *Gnaphalium purpureum* Linnaeus – W]

Gamochaeta purpurea (Linnaeus) Cabrera, Spoonleaf Purple Everlasting. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, roadsides, pastures, disturbed areas; common. Late March-early July. ME west to MI, south to s. FL and e. TX; apparently disjunct in CA and OR, adventive in w. US, Mexico, South America, and elsewhere. [= FNA, WH, X; < *Gamochaeta purpurea* (Linnaeus) Cabrera – K, Y, Z; < *Gnaphalium purpureum* Linnaeus var. *purpureum* – RAB, C, G, SE; < *Gnaphalium purpureum* Linnaeus – F, S, W]

* ***Gamochaeta simplicicaulis*** (Willdenow ex Sprengel) Cabrera. Cp (FL, GA, NC, SC): (rare in FL). March-July. Reported for NC, SC, and GA by Nesom (1999, 2000d, 2004b). [= FNA, WH, X]

Garberia A. Gray 1879 (Garberia)

A monotypic genus, a shrub, of peninsular FL. References: Lamont in FNA (2006c).

Garberia heterophylla (W. Bartram) Merrill & F. Harper, Garberia. Cp (FL): scrub; rare. October-December. Endemic from ne. FL south to s. peninsular FL. [= FNA, WH; = *G. fruticosa* (Nuttall) A. Gray] {add synonymy}

Glebionis Cassini 1826 (Chryanthemum)

A genus of 2 species, annuals, native of Eurasia and n. Africa. References: Strother in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z.

1 Leaf blades 2-3-pinnate; rays pale yellow, 15-25 mm long ..... ***G. coronaria***
1 Leaf blades not lobed or coarsely 1-pinnate; rays golden yellow, 8-20 mm long ..... ***G. segetum***

* ***Glebionis coronaria*** (Linnaeus) Cassini ex Spach, Garland Chrysanthemum, Crown-daisy. Cp (FL), {NC, SC}: disturbed areas; rare, native of Eurasia, cultivated and escapes and occurs as waifs in our area. [= FNA, WH; = *Chrysanthemum coronarium* Linnaeus – K, Z]

* ***Glebionis segetum*** (Linnaeus) Fourreau, Corn Marigold, Corn Chrysanthemum. Pd (NC): disturbed areas, trash heaps, field edges; commonly cultivated, rarely escaped, persistent, or as a waif, native of Eurasia. April-May. [= FNA; = *Chrysanthemum segetum* Linnaeus – RAB, C, F, G, K, S, SE]

Gnaphalium Linnaeus 1753 (Cudweed, Rabbit Tobacco)

A genus of about 40 species (as recircumscribed more narrowly), distributed on most continents. References: Nesom in FNA (2006a); Anderberg (1991)=Z. [also see *Gamochaeta* and *Pseudognaphalium*]

1 Involucre 2-3 mm high; plants to 2.5 dm tall; inflorescence of many, small, axillary and terminal clusters overtopped by subtending leaves..... ***Gn. uliginosum***
1 Involucre 4-7 mm high; plants generally well over 2.5 dm tall; inflorescence terminal, usually elongate ..... *[see **Pseudognaphalium**]*

Gnaphalium uliginosum Linnaeus, Low Cudweed. Mt (VA): high elevation openings, especially in ruts or mud-puddles, rocky places; rare, possibly introduced in North America (VA Rare). July-October. Newfoundland west to British Columbia, south to VA, WV, OH, IN, MN, CO, UT, and OR. [= C, F, FNA, G, K, S, SE, Z]

Grindelia Willdenow 1807 (Gum-plant, Tarweed, Rosinweed, Gumweed)

A genus of about 55 species, herbs and shrubs, of w. North America and South America. References: Strother & Wetter in FNA (2006b); Cronquist (1980)=SE.

1 Phyllaries loose (but not squarrose), only slightly imbricate ..... ***G. lanceolata** var. **lanceolata***
1 Phyllaries squarrose-reflexed, strongly imbricate..... ***G. squarrosa** var. **squarrosa***

* ***Grindelia lanceolata*** Nuttall *var.* ***lanceolata***. Mt (VA), Cp (SC, VA): disturbed areas, waste areas around wool-combing mill; rare, presumably introduced from farther west. This species is regarded as native as far east as the Nashville Basin of c. TN and scattered localities in the Ridge and Valley Province of e. TN (Chester, Wofford, & Kral 1997). [= C, K; < *G. lanceolata* – F, FNA, G, SE]

* ***Grindelia squarrosa*** (Pursh) Dunal *var.* ***squarrosa***, Curly-top Gumweed. Mt, Pd (VA): disturbed areas; rare, introduced from farther west. Other varieties are also adventive eastward, and might be expected in our area. [= C, F, G, K, SE; < *G. squarrosa* – FNA]

Guizotia Cassini in Cuvier 1829 (Niger-seed)

A genus of 6 species, herbs, of Africa. References: Strother in FNA (2006c); Sherff & Alexander (1955)=Z.

* ***Guizotia abysinica*** (Linnaeus f.) Cassini, Niger-seed, Niger-thistle, Ramtilla. Pd, Cp (VA): disturbed areas; rare, native of Africa. September-October. [= C, F, G, K; = *G. abyssinica* – FNA, Z, orthographic variant]

Gutierrezia Lagasca y Segura 1816

A genus of 28 species, annual and perennial herbs and subshrubs, of w. North America and w. South America. References: Nesom in FNA (2006b).

1 Subshrub; stems minutely hispidulous; ray florets 2-8; disc florets 2-9 ..... ***G. sarothrae***
1 Annual; stems glabrous; ray florets 5-23; disc florets 7-13..... ***G. texana** var. **texana***

* ***Gutierrezia sarothrae*** (Pursh) Britton & Rusby. Cp (SC): waste areas around wool-combing mill; rare, perhaps merely a waif, native of w. North America. See Nesom (2004d). [= FNA, K; = *Xanthocephalum sarothrae* (Pursh) Shinners]

* ***Gutierrezia texana*** (A.P. de Candolle) Torrey & A. Gray *var.* ***texana***. Cp (SC): waste areas around wool-combing mill; rare, perhaps merely a waif, native of sc. North America. See Nesom (2004d). [= FNA, K; = *Xanthocephalum texanum* (A.P. de Candolle) Shinners]

Hartwrightia A. Gray ex S. Watson 1888 (Hartwrightia)

A monotypic genus, a perennial herb, of se. United States (FL and GA). References: Nesom in FNA (2006c).

Hartwrightia floridana A. Gray ex S. Watson, Hartwrightia. Cp (FL, GA): seepages and wet pinelands; rare. July-September. Se. GA south to c. peninsular FL. [= FNA, K, S, SE, WH]

Hasteola Rafinesque 1838 (Sweet Indian-plantain)

A genus of 2 species, perennial herbs, of e. North America. *H. suaveolens* and the FL peninsular endemic, *H. robertiorum* L.C. Anderson, form a genus "not closely related" to our other cacalioids, *Arnoglossum* and *Rugelia* (Anderson 1994). This genus has been known as *Synosma*, but Anderson (1994) demonstrates that *Hasteola* has nomenclatural priority. References: Anderson in FNA (2006b); Anderson (1994)=Z; Cronquist (1980)=SE; Pippen (1978)=Y; Barkley (1999).

Hasteola suaveolens (Linnaeus) Pojarkova, Sweet Indian-plantain. Mt (NC, VA), Pd (VA): sandy bottomlands and riverbanks; rare. MA, NY, n. OH, n. IN, c. WI and se. MN, south to n. VA, sw. VA, sw. NC, wc. TN (Chester, Wofford, & Kral 1997), and se. MO; apparently rare through much of its range. This species has not been seen in NC in recent years. [= FNA, K, Z; = *Cacalia suaveolens* Linnaeus – RAB, C, F, G, GW, SE, W, Y; = *Synosma suaveolens* (Linnaeus) Rafinesque ex Britton – S; = ***Senecio suaveolens*** (Linnaeus) Elliott]

Helenium Linnaeus 1753 (Sneezeweed, Bitterweed)

A genus of about 32-40 species, herbs, of America. References: Bierner (1989)=Y; Bierner (1972)=Z; Rock (1957); Knox (1987); Rydberg (1915); Cronquist (1980)=SE.

1 Stem leaves very numerous, 0.5-2 (-4) mm wide, not decurrent on the stem or branches; plant a taprooted annual; [section *Amarum*].
  2 Disc corollas yellow, the lobes yellow or yellow-brown; lower and basal leaves usually withered at anthesis; lower leaves usually entire (rarely toothed); basal leaves entire to toothed (rarely pinnatifid)..... ***H. amarum*** *var.* ***amarum***
  2 Disc corollas yellow, the lobes (and sometimes also the upper portion of the corolla tube) purple; lower and basal leaves often persistent; lower leaves linear to ovate, entire, toothed, lobed or pinnatifid; basal leaves pinnatifid..... ***H. amarum*** *var.* ***badium***
1 Stem leaves few to numerous, at least the larger > 4 mm wide, decurrent on the stems and branches; plant a fibrous-rooted perennial **or** a taprooted annual.
  3 Ray flowers lacking a pistil and style, sterile; [section *Leptopoda*].
    4 Disc flowers with lobes brown, red, or purple.
      5 Disc flowers 5-lobed and with 5 stamens..... ***H. brevifolium***
      5 Disc flowers predominately 4-lobed and with 4 stamens..... ***H. flexuosum***
    4 Disc flowers with lobes yellow.
      6 Midstem leaves barely decurrent on the stem, the decurrency < 0.5 cm; basal leaves often pinnatifid (less commonly merely dentate, repand, or entire), the lower portion of the leaf not contracted so as to be petiolate in form; achene pubescent on the ribs; peduncle pubescent; basal leaves (3.0-) 4.5-8.0 (-19.0) cm long, 0.3-1.1 cm wide, averaging ca. 7-10× as long as wide..... ***H. pinnatifidum***
      6 Midstem leaves decurrent on the stem, the decurrency > 2 cm , and usually extending to the next leaf down; basal leaves usually repand or entire (rarely somewhat lobed or pinnatifid), the lower portion narrowed into a petiolate form which enlarges at its base to more-or-less clasp the stem; achene glabrous, or pubescent on the ribs; peduncle pubescent or glabrous; basal leaves averaging narrower or broader in shape (see below).
        7 Peduncle pubescent to tomentose or lanose between the uppermost leaf and the head; achene pubescent on the ribs; heads 1-4 per plant; basal leaves (2.5-) 4.0-10.5 (-18.0) cm long, (0.8-) 1.2-2.0 (-2.5) cm wide, averaging ca. 4-6× as long as wide..... ***H. brevifolium***
        7 Peduncle glabrous or glabrate between the uppermost leaf and the head; achene glabrous; heads 1 per plant; basal leaves (3.0-) 6.5-17.0 (-25.0) cm long, (0.4-) 0.6-1.0 (-1.5) cm wide, averaging ca. 10-15× as long as wide..... ***H. vernale***
  3 Ray flowers bearing a pistil and style, fertile.
    8 Plant a fibrous-rooted perennial; [native species, collectively widespread and common]; [section *Helenium*].
      9 Leaves not basally disposed, the basal leaves usually absent at flowering (if present, mostly < 2 cm long), the stem leaves not progressively reduced upward; pappus scales brownish, 0.3-1.2 mm long (usually < 1 mm long); upper cauline leaves serrate (rarely entire), mostly oblanceolate, usually broadest near the midpoint or beyond it, with conspicuous lateral veins apparent on the lower surface..... ***H. autumnale***
      9 Leaves basally disposed, the basal rosette usually present at flowering, the basal leaves > 4 cm long, larger than the progressively smaller stem leaves; pappus scales white-hyaline, 0.9-1.9 mm long (usually > 1 mm long); upper cauline leaves entire, lanceolate, usually broadest at or near the base and rather evenly tapered to the apex, lacking conspicuous lateral veins..... ***H. virginicum***
    8 Plant a tap-rooted annual or biennial; [alien species, rare waifs of wool-combing mills]; [section *Tetrodus*].
      10 Disc corollas 4-lobed; heads 7-11 (-14) mm high, 6-11 wide (excluding the ray flowers)..... ***H. quadridentatum***
      10 Disc corollas 5-lobed; heads 4-8 mm high, 4-8 mm wide (excluding the ray flowers).
        11 Upper leaves entire..... ***H. elegans*** *var.* ***elegans***
        11 Upper leaves serrate..... ***H. microcephalum*** *var.* ***microcephalum***

* ***Helenium amarum*** (Rafinesque) H. Rock *var.* ***amarum***, Bitterweed. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): roadsides, overgrazed pastures, urban areas; common, apparently introduced from further west. May-December. Now widespread in e. North America. Bierner (1989) discusses the taxonomy of section *Amarum*, consisting only of the 2 varieties of *H. amarum*. Var. *amarum* is widespread; var. *badium* (A. Gray ex S. Watson) Waterfall, distinguished in part by its purple disk flowers, occurs in OK, TX, and Mexico. The plant has a very bitter taste and is generally avoided by grazing animals, a point noted by Rafinesque in his original description (in 1817): "the whole plant is odoriferous and intensely bitter, it gives an abominable taste to the milk of the cows that feed on it in summer." Overgrazed areas come to be dominated by *H. amarum*. In areas where it is frequently mowed, *H. amarum* appears to evolve a genotype capable of flowering and fruiting when only a few cm tall. [= C, FNA, K, Y; = *H. tenuifolium* Nuttall – F, S; = *H. amarum* – RAB, G, W, Z; < *H. amarum* – SE, WH]

* ***Helenium amarum*** (Rafinesque) H. Rock *var.* ***badium*** (A. Gray ex S. Watson) Waterfall. Cp (SC): waste areas around wool-combing mill; rare, perhaps only a waif, native of OK and TX. May-June. See Nesom (2004d). [= FNA, K, Y; < *H. amarum* – SE; = *H. badium* (A. Gray ex S. Watson) Greene – Z]

Helenium autumnale Linnaeus, Common Sneezeweed. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist pastures, forests, woodlands, forest edges; common. September-October. Québec west to British Columbia, south to n. peninsular FL, TX, and CA. Like *H. amarum*, *H. autumnale* is bitter and unpalatable to grazing animals, becoming more abundant in pastures. [= RAB, FNA, WH; > *H. autumnale* var. *autumnale* – C, F, G, K, SE; > *H. autumnale* var. *parviflorum* (Nuttall) Fernald – F, K; > *H. latifolium* P. Miller – S; > *H. parviflorum* Nuttall – S; < *H. autumnale* – GW, W (also see *H. virginicum*)]

Helenium brevifolium (Nuttall) A. Wood. Cp (GA, NC, VA), Mt (NC, VA), Pd (GA, NC, VA): seepage bogs; rare. May-June. *H. brevifolium* has a peculiar distribution, reaching its greatest abundance on the Gulf Coastal Plain, from panhandle FL west to e. LA, and occurring at widely scattered disjunct sites in c. and n. AL, w. GA, c. and w. NC, ec. TN (Chester, Wofford, & Kral 1997), and sw. and se. VA. [= RAB, C, FNA, G, GW, K, SE, W, WH, Z; > *H. brevifolium* – F, S; > *H. curtisii* A. Gray – F, S]

* ***Helenium elegans*** A.P. de Candolle *var.* ***elegans***. Cp (SC): waste areas around wool-combing mill; rare, perhaps only a waif, native of LA, OK, and TX. May. See Nesom (2004d). [= FNA, K, Z]

Helenium flexuosum Rafinesque, Southern Sneezweed. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): moist pastures, moist forests, riverbanks; common. May-August. S. ME west to MN, south to c. peninsular FL and TX. [= RAB, C, FNA, G, GW, K, SE, W, WH, Z; > *H. nudiflorum* Nuttall – F, S; > *H. polyphyllum* Small – S]

* ***Helenium microcephalum*** A.P. de Candolle *var.* ***microcephalum***. Cp (SC): waste areas around wool-combing mills; rare, perhaps only a waif, native of OK, TX, NM, and CO. May-July. See Nesom (2004d). [= FNA, K, Z]

Helenium pinnatifidum (Nuttall) Rydberg. Cp (FL, GA, NC, SC): wet savannas and adjacent ditches; rare (NC Rare, SC Rare). April-May. A Southeastern Coastal Plain endemic: se. NC south to s. FL, west to panhandle FL, sw. GA, and s. AL. [= RAB, FNA, GW, K, SE, WH, Z; = *H. vernale* – S, misapplied]

* ***Helenium quadridentatum*** Labill. {SC}: location and habitat unknown; presumably introduced from sc. United States. Reported for SC by Rydberg (1915), Small (1933), and Kartesz (1999); also east to AL (SE). [= FNA, K, S, SE, Z]

Helenium vernale Walter. Cp (FL, GA, NC, SC): wet savannas and adjacent ditches; rare (rare in NC). April-May. A Southeastern Coastal Plain endemic: se. NC south to ne. FL, panhandle FL, and west to e. LA. [= RAB, FNA, GW, K, SE, WH, Z; = *Helenium helenium* (Nuttall) Small – S]

Helenium virginicum S.F. Blake, Virginia Sneezeweed. Mt (VA): seasonal sinkhole ponds and clearings where such ponds once occurred; rare. July-September. *H. virginicum* is bimodally endemic in VA (Augusta and Rockingham counties, VA, where a series of sinkhole ponds (dolines) on acid colluvium support numerous Coastal Plain disjuncts) and MO (Ozarkian highlands). See Knox (1987) for a comparison of this narrow endemic and *H. autumnale*. Knox (1997) presents a study of the demography and habitat of *H. virginicum*. [= C, F, FNA, G, K, SE; < *H. autumnale* – GW, W]

Helianthus Linnaeus 1753 (Sunflower)

A genus of about 50 species, herbs, of North America. References: Schilling in FNA (2006c); Heiser *et al.* (1969); Cronquist (1980)=SE; Schilling et al. (1998). Key adapted from FNA, SE, RAB, and Heiser *et al.* (1969).

1 Leaves basally disposed, the plants scapose to subscapose, the stem leaves relatively few (with 2-8 nodes below the inflorescence), those on the upper stem opposite or alternate, strongly reduced upward in size as compared to the persistent basal leaves; [section *Atrorubentes*] ..... **Key A**

1 Leaves cauline, plants leafy the length of the stem, the stem leaves many (with 10 or more nodes below the inflorescence), basal leaves lacking (at least at anthesis).
- 2 Plant a tap-rooted annual (rarely surviving a second year) ..... **Key B**
- 2 Plant a perennial from crown buds or rhizomes, the roots sometimes tuberous-thickened; [section *Atrorubentes*].
  - 3 Disk flowers red or purple (at least in part) ..... **Key C**
  - 3 Disk flowers yellow ..... **Key D**

Key A – sunflowers with basally disposed leaves

1 Disk flowers yellow.
- 2 Basal leaves 13-30 cm long, 0.7-2.0 cm wide; leaves 10-20× as long as wide, glabrous ..... ***H. longifolius***
- 2 Basal leaves 6-15 cm long, 2-8 cm wide; leaves 1.5-5× as long as wide, scabrous or hirsute (rarely glabrous) ..... ***H. occidentalis* *var. dowellianus***

1 Disk flowers red or purple (at least in part).
- 3 Basal leaves 6-20 cm long; lower several pairs of stem leaves up to 1/2 as long and wide as the basal leaves.
  - 4 Trichomes on the leaf abaxial midrib > 1 mm long; lower stem with a few pairs of leaves (< 8 nodes below the capitulescence), these strongly reduced upward; leaf blades (1.3-) 1.7-2.5 (-3)× as long as wide; petiole often > 1/3 as long as the blade, broadly winged toward the blade; plants to 2 m tall; nonflowering stems usually absent; [widespread in our area] ..... ***H. atrorubens***
  - 4 Trichomes on the leaf abaxial midrib < 1 mm long; lower stem leafy, often to above the middle (> 8 nodes below the capitulescence); leaf blades 1-1.7 (-2)× as long as wide; petiole usually < 1/3 as long as the blade, narrowly winged toward the blade; plants to 3 m tall; nonflowering stems usually present; [west of our area] ..... ***[H. silphioides]***
- 3 Basal leaves 4-15 cm long; lower several pairs of stem leaves often < 1/2 as long and wide as the basal leaves.
  - 5 Basal leaves (1.6-) 2-5× as long as wide; ray flowers present, typically 1.5-3.5 cm long; [of wet savannas and bogs] ..... ***H. heterophyllus***

5 Basal leaves 1-1.5× as long as wide; ray flowers none, or present but < 1 cm long; [of dry savannas and sandhills] ..... ***H. radula***

Key B – annual sunflowers

1 Disk flowers yellow.
2 Leaves ovate, 10-40 cm long, 5-25 cm wide, toothed, the base often cordate or subcordate; disc corollas 5-8 mm long; stems 10-30 dm tall; [section *Helianthus*] ..... ***H. annuus***
2 Leaves 5-10 cm long, 0.2-1.0 cm wide, entire or nearly so, the base cuneate; disc corollas 2.8-3.5 mm long; stems 4-10 dm tall; [section *Porteri*] ..... ***H. porteri***
1 Disk flowers red or purple (at least in part).
3 Leaves, stems and phyllaries densely covered with soft, silvery-white pubescence; [section *Helianthus*] ..... ***H. argophyllus***
3 Leaves, stems, and phyllaries nearly glabrous to scabrous or hirsute.
4 Style branches yellow; [section *Agrestes*] ..... ***H. agrestis***
4 Style branches red; [section *Helianthus*].
5 Phyllaries ovate to ovate-oblong, > 4 mm wide, abruptly contracted to an acuminate tip, the margins strongly ciliate; leaves 5-25 cm wide; disk (2-) 3-30 cm wide; plants (0.5-) 1-3 m tall ..... ***H. annuus***
5 Phyllaries lanceolate, gradually tapering to an acuminate tip, the margins not ciliate or weakly so; leaves 1.5-9 cm wide; disk 1-2.5 cm wide; plants 0.4- 1 (-1.5) m tall.
6 Tips of the receptacular bracts in the center of the head conspicuously white-bearded; stems normally not mottled ..... ***H. petiolaris var. petiolaris***
6 Tips of the receptacular bracts in the center of the head not bearded; stems normally mottled with purple
7 Peduncles 25-50 cm long; leaves usually shallowly but regularly serrate; ligules usually > 2 cm long ..... ***H. debilis ssp. cucumerifolius***
7 Peduncles usually < 25 cm long; leaf usually deeply irregularly serrate; ligules usually < 2 cm long ..... ***H. debilis ssp. tardiflorus***

Key C – perennial sunflowers with leafy stems and red disk flowers

1 Leaf blades long and narrow, linear or lanceolate and usually > 10× as long as wide.
2 Stems glabrous and glaucous; leaf margins not revolute ..... ***[H. salicifolius]***
2 Stems pubescent; leaf margins often revolute.
3 Plants short, < 1.5 m tall; leaves < 1 cm wide; rhizomes lacking or poorly developed ..... ***H. angustifolius***
3 Plants robust, > 1.5 m tall; leaves > 1 cm wide; rhizomes well developed ..... ***H. simulans***
1 Leaf blades shorter and broader, lanceolate, lance-ovate, deltoid, deltoid-ovate and usually < 5× as long as wide.
4 Phyllaries 1.5-3 mm broad, lanceolate ..... ***H. floridanus***
4 Phyllaries 3-5 mm broad, oblong, ovate, or obovate.
5 Abaxial surfaces of leaves and ligules lacking subsessile glandular trichomes; leaves usually broadly ovate to orbicular and with a petiole > 1 cm long ..... ***[H. silphioides]***
5 Abaxial surfaces of leaves and ligules with subsessile glandular trichomes; leaves usually lanceolate to lance-ovate or rhombic-ovate and with a petiole usually < 1 cm long.
6 Phyllaries oblong-lanceolate, apex acuminate, abaxially usually pubescent ..... ***H. laetiflorus***
6 Phyllaries elliptical to oblong-ovate, apex acute, abaxially glabrate ..... ***H. pauciflorus ssp. pauciflorus***

Key D – perennial sunflowers with leafy stems and yellow disk flowers

1 Stems below the capitulescence glabrous or nearly so, sometimes glaucous.
2 Leaves whorled ..... ***H. verticillatus***
2 Leaves either alternate or opposite (or both).
3 Leaves grayish-green or bluish green in color, sessile, and abaxially glabrous and glaucous.
4 Rays 5-10; leaves glabrous or glabrate adaxially, smooth or only slightly rough to the touch; phyllaries 2-3 mm wide .... ***H. laevigatus***
4 Rays 10-14; leaves strumose adaxially, rough to the touch; phyllaries 3.5-4.5 mm wide ..... ***H. eggertii***
3 Leaves light to dark green, sometimes whitish abaxially, but not grayish or bluish green in color; leaves sessile or petiolate, glabrous or pubescent.
5 Leaves linear-lanceolate, with only a single main vein ..... ***H. smithii***
5 Leaves linear-lanceolate to lanceolate, lance-ovate, or ovate, triplinerved at base.
6 Rays few, usually 5 or 8; heads small, the involucres 9 mm broad or less.
7 Leaves abaxially whitish in color and glabrous and glaucous, lacking subsessile glandular trichomes ("resin dots") ..... ***H. glaucophyllus***
7 Leaves abaxially greenish in color, usually tomentulose (sometimes glabrate), with abundant subsessile glandular trichomes ..... ***H. microcephalus***
6 Rays usually 10 or more in larger heads; heads larger, the involucres usually > 9 mm broad.
8 Leaves sessile, rounded to cordate at base, and trinerved, with the 2 lateral veins diverging from the midrib at the very base of the leaf ..... ***H. divaricatus***
8 Leaves sessile to petiolate, but narrowing gradually to base and triplinerved, the 2 lateral veins diverging from the midrib above the base of the blade.
9 Anther appendages yellow.
10 Leave blade lanceolate to lance-ovate, sessile to petiolate but the petiole usually < ¼ as long as the blade; phyllaries not conspicuously graduated and imbricate, usually loose and spreading ..... ***H. grosseserratus***

10 Leaf blade ovate to elliptic, with a distinct petiole usually > 2 cm long and ½ as long as blade or longer; phyllaries conspicuously graduated and imbricate, usually appressed, not exceeding disk ..... ***H. occidentalis* var. *dowellianus***

9 Anther appendages dark or reddish-brown.

11 Plants producing abundant tubers; leaves subsessile, the petioles < 1 cm long; [endemic to the Piedmont of NC and SC] ... ***H. schweinitzii***

11 Plants rhizomatous, but not producing tubers; leaves petiolate, the petioles 1-5 cm long; [collectively widespread in our area].

12 Phyllaries equal to or slightly exceeding disk, apex acute; leaves moderately serrate to entire, with a petiole 1-3 cm long, and abaxially with usually abundant subsessile glandular trichomes ("resin dots") ..... ***H. strumosus***

12 Longer phyllaries usually exceeding disk by ½ their length or more, apex acuminate; larger leaves moderately to conspicuously serrate, with a petiole 2-5 cm long, and abaxially with usually relatively few subsessile glandular trichomes ..... ***H. decapetalus***

1 Stems pubescent throughout, not glaucous.

13 Leaves sessile and cordate, mostly or all opposite ..... ***H. mollis***

13 Leaves petiolate or sessile, but not cordate, and alternate or opposite.

14 Phyllaries attenuate, conspicuously exceeding the disk in length and reflexed, apically with numerous subsessile glandular trichomes ("resin dots"); leaf bases often convex, the basically ovate or lance-ovate blade joined to a broadly winged and gradually narrowed petiole ..... ***H. resinosus***

14 Phyllaries acute to attenuate, but not reflexed, subsessile glandular trichomes present or absent; leaf bases usually attenuate to truncate or rounded, the blade lance-linear or lanceolate, or if ovate or lance-ovate either sessile or with a petiole that is at most narrowly winged.

15 Leaves conduplicate and entire, usually with only a single prominent main vein; inflorescence when well developed spiciform or racemose ..... ***H. maximilianii***

15 Leaves not conduplicate, entire or serrate, triplinerved (with a prominent lateral pair of veins near the base); inflorescence not spiciform or racemose.

16 Phyllaries conspicuously graduated and imbricate, usually appressed.

17 Leaf blades lanceolate to ovate, 1-5 cm long and usually < ½ as long as blade; anther appendages with dark pigment; cypselas 4-5 mm, usually sterile ..... ***H. laetiflorus***

17 Leaf blades ovate to elliptic, petiole distinct, > 2 cm and usually > ½ as long as the blade; anther appendages yellow; cypselas 3-4 mm long, fertile ..... ***H. occidentalis* var. *dowellianus***

16 Phyllaries not conspicuously graduated and imbricate, usually loose or spreading.

18 Leaves with a prominent petiole > 2 cm long, blades lance-ovate to ovate and > 5 cm broad; cypselas 5-7 mm long; tubers produced late in growing season ..... ***H. tuberosus***

18 Leaves sessile or with a short petiole usually < 2 cm long; blades linear to lanceolate, < 4.5 cm broad; cypselas 3-5 cm long; tubers present or absent.

19 Leaves truncate to broadly rounded at base, shortly but distinctly petiolate ..... ***H. hirsutus***

19 Leaves cuneate, gradually narrowing to base, sessile to petiolate.

20 Ligules lacking subsessile glandular trichomes; leaves not strongly revolute ..... ***H. giganteus***

20 Ligules abaxially with subsessile glandular trichomes ("resin dots"); leaves usually revolute.

21 Heads relatively small, the discs usually < 15 mm across; tubers present ..... ***H. schweinitzii***

21 Heads larger, the discs (at least the larger) > 15 mm across; tubers absent.

22 Leaves conspicuously undulate, lanceolate to elliptical to ovate and rarely > 5× as long as broad; outer phyllaries often obtuse ..... ***H. floridanus***

22 Leaves not conspicuously undulate, linear to lanceolate and > 5× as long as broad; outer phyllaries acute to slightly acuminate.

23 Plants short, < 1.5 m tall; leaves < 1 cm wide; rhizomes lacking or poorly developed ..... ***H. angustifolius***

23 Plants robust, > 1.5 m tall; leaves > 1 cm wide; rhizomes well developed ..... ***H. simulans***

Helianthus agrestis Pollard, Southeastern Sunflower. Cp (FL, GA): mucky areas in pine flatwoods; rare (GA Special Concern). August-December. S. GA south to s. FL. [= FNA, GW, K, S, SE, WH]

Helianthus angustifolius Linnaeus, Narrowleaf Sunflower. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC, VA): savannas, ditches, marshes, other wet habitats; common (uncommon in Piedmont, rare in nVA Piedmont, rare in Mountains). (July-) September-October (-frost). Primarily Coastal Plain, from Long Island, NY south to c. peninsular FL and west to TX, irregularly inland to OH, IN, and MO. This plant is very showy when in flower on roadsides, especially in October. [= RAB, C, FNA, G, GW, K, S, SE, W, WH; > *H. angustifolius* var. *angustifolius* – F; > *H. angustifolius* var. *planifolius* Fernald – F]

* ***Helianthus annuus*** Linnaeus, Common Sunflower. Cp (FL, GA, NC, SC, VA), Pd, Mt (NC, SC, VA): disturbed areas, often cultivated in gardens, sometimes cultivated in fields; uncommon, native of the Plains states. June-October. This is the sunflower grown for its seeds. [= RAB, C, F, FNA, G, K, S, SE, W, WH]

* ***Helianthus argophyllus*** Torrey & A. Gray, Silverleaf Sunflower. Cp (FL, NC): dunes and disturbed sandy soil on a barrier island; rare, native of TX. July-October. Native to s. TX. Heiser *et al.* (1969) noted a collection from NC, but stated their uncertainty as to its establishment. *H. argophyllus* is well-established near Captain Charlie's on Bald Head Island, Brunswick County, where it has apparently persisted and spread over the last 30 years (at least). [= F, FNA, K, S, SE, WH]

Helianthus atrorubens Linnaeus, Appalachian Sunflower. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): dry soils of rocky, sandy, or clayey woodlands and roadbanks; common (uncommon in VA Mountains, rare in FL). Late July-October. VA west to w. TN, and south to c. GA, Panhandle FL, AL, and se. LA. Related to the Ozarkean *H. silphioides* Nuttall. [= RAB, C, FNA, G, K, SE, W; > *H. atrorubens* var. *alsodes* Fernald – F; > *H. atrorubens* var. *atrorubens* – F; < *H. atrorubens* – S (also see *H. silphioides* Nuttall)]

Helianthus debilis Nuttall *ssp.* ***cucumerifolius*** (Torrey & A. Gray) Heiser, Cucumber-leaf Sunflower. Cp (FL, GA*?, NC*, SC*, VA*), Mt (VA*): sandy soils of fields and roadsides; common (uncommon in FL, rare in VA), native from FL westward along the Gulf Coast states. May-August. [= FNA, K; = *H. debilis* var. *cucumerifolius* (Torrey & A. Gray) A. Gray – RAB, C,

F; = *H. cucumerifolius* Torrey & A. Gray – G, S; = *H. debilis* ssp. *cucumerifolius* (Torrey & A. Gray) Heiser var. *cucumerifolius* (Torrey & A. Gray) A. Gray – SE; < *H. debilis* ssp. *cucumerifolius* – WH]

Helianthus debilis Nuttall *ssp.* ***tardiflorus*** Heiser. Cp (FL, GA): sandy beaches, dry pinelands; uncommon. March-September. GA, FL, AL, and MS. [= FNA, K; < *H. debilis* – S; = *H. debilis* ssp. *cucumerifolius* (Torrey & Gray) Heiser var. *tardiflorus* (Heiser) Cronquist – SE; < *H. debilis* ssp. *cucumerifolius* – WH]

Helianthus decapetalus Linnaeus, Forest Sunflower. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): mesic woodlands and forests; common (rare in Coastal Plain). July-October. ME and Québec west to WI and IA, and south to GA and MO. [= RAB, C, FNA, G, K, S, SE, W; > *H. decapaetalus* – F; > *H. trachelifolius* P. Miller – F]

Helianthus divaricatus Linnaeus, Spreading Sunflower. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): mesic to dry woodlands and forests, forest edges; common (rare in Coastal Plain). June-August. ME, Québec, Ontario, and IA south to Panhandle FL, LA, and OK. [= RAB, C, FNA, G, K, S, SE, W, WH; > *H. divaricatus* var. *angustifolius* Kuntze – F; > *H. divaricatus* var. *divaricatus* – F]

Helianthus eggertii Small, Eggert's Sunflower. Pd (SC): diabase barrens; rare. C. TN (Chester, Wofford, & Kral 1997), sc. KY, and n. AL; apparently disjunct in nc. SC (McMillan pers. comm. 2003, specimen at CLEMS), though there is controversy about the identity. [= FNA, K, S, SE]

Helianthus floridanus A. Gray ex Chapman, Florida Sunflower. Cp (GA, NC, SC): wet savannas and pocosin edges; common (rare in NC and SC). September-October. A Southeastern Coastal Plain species: se. NC south to c. peninsular FL, and west to se LA. [= RAB, FNA, GW, K, S, SE, WH]

Helianthus giganteus Linnaeus, Tuberous Sunflower, Swamp Sunflower. Pd (NC, SC, VA), Mt (GA, NC, VA), Cp (NC, VA): bog edges, moist thickets, ditches; common (uncommon south of VA). Late July-October. New Brunswick and ME west to MN, south to n. SC, n. GA, e. and c. TN, c. KY, n. IN, n. IL, and WI. [= RAB, C, F, FNA, G, GW, K, S, SE, W; > *H. giganteus* – S; > *H. alienus* E.E. Watson – S; > *H. validus* E.E. Watson – S]

Helianthus glaucophyllus D.M. Smith, Whiteleaf Sunflower. Mt (NC, SC), Pd (SC): moist forests, woodlands, and woodland edges, at medium elevations, mostly from 1000-1500m (but sometimes lower), generally flowering only when in a canopy gap (as caused by a tree-fall) or along banks of narrow roads; rare (NC Watch List, SC Rare). July-September. A narrow Southern Appalachian endemic: w. NC, nw. SC, and ne. TN (Chester, Wofford, & Kral 1997). First reported for South Carolina by Hill & Horn (1997). [= RAB, FNA, K, SE, W]

* ***Helianthus grosseserratus*** Martens, Sawtooth Sunflower. Pd (GA, NC, VA), Mt, Cp (VA): disturbed areas; uncommon (rare in GA, NC, VA Coastal Plain, and VA Mountains), introduced from farther west. The original range of this species was apparently centered in OH, IN, IL, IA, and MO, but its exact extent is obscured by its subsequent spread. Reported for NC by Matthews & Mellichamp (1989). [= C, F, FNA, G, K, W; = *H. grosse-serratus* – S, SE, orthographic variant]

Helianthus heterophyllus Nuttall, Savanna Sunflower. Cp (GA, NC, SC): wet savannas, seepage bogs; uncommon (GA Special Concern). August-October. A Southeastern Coastal Plain endemic: se. NC south to Panhandle FL and west to se. LA. [= RAB, FNA, GW, K, S, SE, WH]

Helianthus hirsutus Rafinesque, Hairy Sunflower. Mt, Pd (GA, NC, SC, VA), Cp (FL, SC): woodlands and other sunny or semi-sunny habitats; uncommon (rare in FL and VA). July-October. PA and MN, south to n. FL and TX. [= RAB, C, FNA, G, K, S, SE, W, WH; > *H. hirsutus* var. *hirsutus* – F; > *H. hirsutus* var. *trachyphyllus* Torrey & Gray – F; > *H. hirsutus* var. *stenophyllus* Torrey & Gray – F]

* ***Helianthus laetiflorus*** Persoon. Cp, Pd (NC, SC, VA), Mt (VA): disturbed areas; uncommon, introduced from farther west. Late July-September. Widely scattered in e. and c. North America, believed to be a derivative of the hybrid of *H. pauciflorus* Nuttall ssp. *subrhomboideus* (Rydberg) O. Spring & E. Schilling and *H. tuberosus*. [= RAB, G, S, SE; = *H.* ×*laetiflorus* Persoon (pro sp.) – C, FNA, K; = *H. laetiflorus* var. *laetiflorus* – F]

Helianthus laevigatus Torrey & A. Gray, Shale-barren Sunflower, Smooth Sunflower. Mt (NC, VA), Pd (NC, SC, VA): on dry, rocky or shaly soils, on roadbanks, powerline rights-of-way, open woodlands, in the Carolinas nearly limited to the Carolina Slate Belt; common in VA, rare in NC and SC). September-October. The primary range of *H. laevigatus* is in the mountains of c. and w. VA and e. WV, from whence it is disjunct to a few areas in the Piedmont of NC and SC, most notably the Carolina Slate Belt in Montgomery and Stanly counties, NC. [= RAB, C, F, FNA, G, K, SE, W; > *H. laevigatus* – S; > *H. reindutus* (Steele) E.E. Watson – S]

Helianthus longifolius Pursh, Longleaf Sunflower. Mt (GA, NC*), Pd, Cp (GA): sandstone and granite glades and woodlands; rare (NC Watch List). August-October. This species is apparently rare, occurring in ne. AL, n. GA (introduced in sw. NC). [= RAB, FNA, K, S, SE]

* ***Helianthus maximilianii*** Schräder, Maximilian Sunflower. Pd, Mt (NC, SC, VA), Cp (NC, VA): moist roadsides and disturbed areas; uncommon, introduced from farther west. September-October. MI and Manitoba west to British Columbia and south to TX; introduced in the East. [= C, SE, W; = *H. maximiliani* – RAB, F, FNA, G, K, S, orthographic variant]

Helianthus microcephalus Torrey & A. Gray, Small-headed Sunflower. Pd, Mt (GA, NC, SC, VA), Cp (GA, NC, SC): dry woodlands and roadbanks; common (uncommon in Coastal Plain, rare in VA Piedmont). August-October. NJ west to MN, south to Panhandle FL and se. LA. [= RAB, F, FNA, G, K, S, W, WH; < *H. microcephalus* – C, SE]

* ***Helianthus mollis*** Lamarck, Ashy Sunflower. Cp (NC, SC, VA), Pd, Mt (GA, NC, VA): disturbed places; rare, introduced from farther west. July-September. Apparently native of the Midwest, centered in IN, IL, MO, AR, c. TN, and w. KY, its original distribution obscured by its subsequent spread. {perhaps native in nw. GA?} [= RAB, C, FNA, G, K, S, SE, W; > *H. mollis* var. *cordatus* S. Watson – F; > *H. mollis* var. *mollis* – F]

Helianthus occidentalis Riddell *var.* ***dowellianus*** (M.A. Curtis) Torrey & A. Gray, Naked-stem Sunflower. Mt (GA, NC, VA), Pd (VA), Cp (FL): rocky or sandy flood-scoured riversides, dry hammocks (in FL); rare. August-October. MD and DC west to MN, and south to w. NC, n. GA, Panhandle FL, and TX. Ssp. *occidentalis* occupies most of the range of the species. Ssp. *plantagineus* (Torrey & Gray) Shinners occurs in sw. LA, se. TX, and AR. Var. *dowellianus* Torrey & Gray, of uncertain status (if valid, then usually treated as a variety under ssp. *occidentalis*), occurs in the Appalachian portion of the range. The

species has been collected only twice in NC, the type collection of *H. dowellianus* M.A. Curtis, from "near Franklin, Macon Co.," and in 1897, near Asheville, Buncombe County ("sandy bottoms along the French Broad River near Biltmore"). GAHP reports *H. occidentalis* as a rare species in the state, from "limestone glades and barrens, rocky or cherty soils" (GAHP 2003); it is uncertain what variety is represented. [= C, F, SE; < *H. occidentalis* ssp. *occidentalis* – FNA, K; < *H. occidentalis* – RAB, G, S, W, WH; = *H. dowellianus* M.A. Curtis]

* ***Helianthus pauciflorus*** Nuttall *ssp.* ***pauciflorus***, Stiff Sunflower. Pd (GA, VA), Cp (VA): disturbed areas; rare, native of midwestern United States. July-September. Reported for VA by Fernald (1950) under the name *H. laetiflorus* var. *rigidus* and for nc. GA by Jones & Coile (1988) under the name *H. rigidus* (Cassini) Desf. [= FNA, K; = *H. pauciflorus* var. *pauciflorus* – C; > *H. laetiflorus* var. *rigidus* (Cassini) Fernald – F; > *H. rigidus* (Cassini) Desfontaines – S; ? *H. rigidus* var. *rigidus* – SE]

* ***Helianthus petiolaris*** Nuttall *ssp.* ***petiolaris***, Plains Sunflower. Cp (NC, SC, VA): disturbed areas in sandy soil; rare, native of the Great Plains. May-August. [= FNA, K; < *H. petiolaris* – RAB, F, G, S; = *H. petiolaris* var. *petiolaris* – C, SE]

Helianthus porteri (A. Gray) Pruski, Confederate Daisy. Pd (GA, NC*, SC): in shallow soils over granite on low-elevation granite domes or flatrocks; uncommon, native in GA and SC, introduced and vigorously established in NC (SC Rare). August-September. A Piedmont endemic: nw. SC south to GA and ec. AL. The species has often been treated in *Viguiera*; see Pruski (1998) and Schilling et al. (1998) for discussion of the reasons for treating this species in *Helianthus*. It is well-established at two sites in NC, on Rocky Face Mountain (Alexander County, NC) and Mitchell Mill Flatrock (Wake County, NC), where it was introduced with soil blocks of *Diamorpha smallii* as part of a ecological experiment (Mellinger 1972; McCormick & Platt 1964). [= FNA, K; = *Viguiera porteri* (A. Gray) Blake – S, SE]

Helianthus radula (Pursh) Torrey & A. Gray, Roundleaf Sunflower, Rayless Sunflower. Cp (FL, GA, SC): sandhills, dryish savannas, and dry pine flatwoods; common (rare in SC). Late August-October. S. SC south to s. peninsular FL and west to se. LA. It is readily distinguishable from all other species by its rosette of orbicular to nearly round leaves, borne flat against the ground. [= RAB, FNA, GW, K, S, SE, WH]

Helianthus resinosus Small, Resinous Sunflower. Pd, Mt (GA, NC, SC), Cp (FL, GA, NC, SC): woodlands, thickets, roadsides; uncommon. June-October. Nc. and w. NC south to Panhandle FL and west to MS. Listed for VA by F; documentation unknown. [= FNA, K, S, SE, W, WH; = *H. tomentosus* Michaux – RAB, F, S, misapplied]

Helianthus schweinitzii Torrey & A. Gray, Schweinitz's Sunflower. Pd (NC, SC): clayey soils of woodlands and roadsides, in areas formerly with post oak-blackjack oak savannas, xeric oak-pine woodlands, or "Piedmont prairies," now primarily on mowed road or powerline rights-of-way; rare. Late August-October. Piedmont of nw. NC and nc. SC, primarily within 100 km of Charlotte, NC. Some earlier reports (as in Heiser *et al.* 1969) of occurrences in se. NC, e. SC, and c. SC are based on misidentifications. See Matthews, Barden, & Matthews (1997) for an informative discussion about this species. [= RAB, FNA, K, S, SE]

Helianthus simulans E. Watson. Cp (FL, GA, SC), Pd (GA, SC): wet soils, ditches, roadsides; uncommon (rare in GA and SC). October-November. SC south to c. peninsular FL, FL Panhandle, and west to LA. [= FNA, GW, K, S, SE, WH]

Helianthus smithii Heiser, Smith's Sunflower. Mt (GA): dry forests and woodlands; rare. August-September. Known from n. GA, e. AL, and se. TN. It has small heads (like *H. microcephalus*, *H. laevigatus*, *H. schweinitzii*), the leaves narrowly lanceolate and subsessile (like *H. schweinitzii* or *H. laevigatus*), the leaves resin-dotted below (like *H. microcephalus*), but nearly glabrous. It may be a hybrid derivative of *H. microcephalus* and *H. strumosus*. [= FNA, K; < *H. microcephalus* – C, SE]

Helianthus strumosus Linnaeus, Roughleaf Sunflower. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): woodlands and roadsides; common (rare in Coastal Plain). Late July-September. ME, MN, and KA south to ne. FL, Panhandle FL, and TX. [= RAB, C, F, FNA, G, K, SE, W, WH; > *H. strumosus* – S; > *H. montanus* E.E. Watson – S; > *H. saxicolus* – S]

* ***Helianthus tuberosus*** Linnaeus, Jerusalem Artichoke. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): disturbed areas, cultivated in gardens for the edible tubers; common, native of farther west (rare in FL). July-October. [= RAB, C, FNA, K, S, SE, W, WH; > *H. tuberosus* var. *tuberosus* – F, G]

Helianthus verticillatus Small, Whorled Sunflower. Mt (GA): wet calcareous prairies; rare. August-October. Nw. GA, ne. AL, and sc. TN. This taxon is a species, not a hybrid; its morphological characteristics alone (with its unique whorled leaves) make hybrid status implausible. See Matthews et al. (2002) for additional information. [= FNA, S; = *H.* ×*verticillatus* E.E. Watson (pro sp.) – K; = "a hybrid of *H. angustifolius* with either *H. eggertii* or *H. grosseserratus*"– C, SE]

Helianthus carnosus Small, Flatwoods Sunflower. Cp (FL): wet flatwoods, wet prairies; rare. September-November. Endemic to ne. FL (including Clay County in our area). [= FNA, K, S, SE, WH] {not yet keyed}

* *Helianthus salicifolius* A. Dietrich. Reported for MD by Kartesz (1999). Not in our area in FNA. [= C, F, FNA, G, K, SE] {not keyed; check for documentation}

Helianthus silphioides Nuttall. East to se. TN (Chester, Wofford, & Kral 1997) and e. AL. [= C, F, FNA, K, SE; = *H. atrorubens* Linnaeus var. *pubescens* Kuntze] {synonymy incomplete}

Heliomeris Nuttall 1848 (Golden-eye)

A genus of 4-5 species, annuals and perennials, of sw. United States and Mexico. References: Schilling in FNA (2006c).

* ***Heliomeris multiflora*** (Nuttall) Blake *var.* ***multiflora***, Golden-eye. Cp (SC): waste areas around wool-combing mill; rare, perhaps only a waif, native of western United States and Mexico. May. [= FNA, K; = *Viguiera multiflora* (Nuttall) Blake]

Heliopsis Persoon 1807 (Sunflower-everlasting, Oxeye)

A genus of about 18 species, herbs, of America. References: Smith in FNA (2006c); Fisher (1957)=Z; Cronquist (1980)=SE. Key adapted in part from Z.

1 Plants 3-8 dm tall; larger leaves on a plant generally 3-8 cm long; heads 1 (-3) per plant; rays 6-10 (-13) per head; rays 1-2 (-2.4) cm long; [of the Coastal Plain]..... ***H. helianthoides var. gracilis***
1 Plants (4-) 8-15 dm tall; larger leaves on a plant generally 7-15 cm long; heads (1-) 3-8 per plant; rays (8-) 10-16 per head; rays (1.5-) 2-4 cm long; [widespread in our area, rare in the Coastal Plain].
  2 Leaves smooth on both sides (or slightly scabrous above); leaves 4.5-6.0 cm wide; stem glabrous and glaucous below, slightly pubescent above, the hairs generally all slender and ascending..... ***H. helianthoides var. helianthoides***
  2 Leaves scabrous on both sides; leaves 3.0-3.5 cm wide; stem also scabrous with short, broad-based hairs..... ***[H. helianthoides var. scabra]***

Heliopsis helianthoides (Linnaeus) Sweet *var.* ***gracilis*** (Nuttall) Gandhi & Thomas, Smooth Oxeye, Pineywoods Oxeye, Coastal Plain Sunflower-everlasting, Coastal Plain Oxeye. Cp (FL, GA, SC): moist calcareous forests; rare. April-July; May-July. A Southeastern Coastal Plain endemic: se. SC (Berkeley, Dorchester, and Charleston counties) south to GA (Jones & Coile 1988) and Panhandle FL, and west to LA (Thomas & Allen 1996). [= K, WH; = *H. minor* (Hooker) C. Mohr – S; = *H. gracilis* Nuttall – SE, Z]

Heliopsis helianthoides (Linnaeus) Sweet *var.* ***helianthoides***, Eastern Sunflower-everlasting, Eastern Oxeye. Mt, Pd (GA, NC, SC, VA), Cp (VA): forests, woodlands, woodland borders; common (rare in Coastal Plain). May-October. VT, Ontario, and WI south to GA and LA. [= C, G, K, SE; < *H. helianthoides* – RAB, W; > *H. helianthoides* var. *helianthoides* – F; > *H. helianthoides* var. *solidaginoides* (Linnaeus) Fernald – F; = *H. helianthoides* – S; = *H. helianthoides* ssp. *helianthoides* – Z]

Heliopsis helianthoides (Linnaeus) Sweet var. *scabra* (Dunal) Fernald, Western Sunflower-everlasting, Western Oxeye. Pd (VA): forests, woodlands, woodland borders; rare? May-October. Newfoundland and Saskatchewan south to KY, GA, LA, TX, and NM. This taxon has been ascribed to our area by various authors; its distribution in our area needs confirmation. [= C, F, G, K, SE; = *H. scabra* Dunal – S; = *H. helianthoides* ssp. *scabra* (Dunal) Fisher – Z]

Helminthotheca Zinn 1757 (Oxtongue)

A genus of 4 species, herbs, of Europe. References: Strother in FNA (2006a).

* ***Helminthotheca echioides*** (Linnaeus) Holub, Bristly Oxtongue. Cp (VA?): disturbed areas; rare, native of Europe. July-September. Reported from DC and VA; uncertain whether documented from our area. [= FNA; = *Picris echioides* Linnaeus – C, F, G, K, SE]

Heterotheca Cassini 1817 (Camphorweed, Golden-aster)

A genus of about 28 species, herbs, of North America. References: Semple in FNA (2006b); Wagenknecht (1960)=Z; Semple (1996)=Y; Gandhi & Thomas (1989)=X; Semple (2004)= Q; Cronquist (1980)=SE; Semple (1983). Key adapted in part from Z and X. [also see *Chrysopsis* and *Pityopsis*]

1 Ray flowers with pappus; perennial, from creeping rhizomes; upper and lower leaves cuneate to a sessile base..... ***H. camporum var. glandulissimum***
1 Ray flowers without pappus; annual or biennial, taprooted; upper leaves rounded to clasping at the sessile base, lower leaves (deciduous by late in the season) petiolate.
  2 Plants erect, 0.5-2 m tall; leaves hirsute-pilose on both sides or scabrous above; phyllaries moderately hirsute and glandular on the back; [of a variety of weedy habitats, mainly inland]..... ***H. latifolia var. latifolia***
  2 Plants erect or decumbent, 0.3-1 m tall; leaves scabrous on both sides or only beneath; phyllaries densely hirsute and glandular on the back; [of coastal dunes] ..... ***H. subaxillaris***

* ***Heterotheca camporum*** (Greene) Shinners *var.* ***glandulissima*** Semple, Nashville Camphorweed. Mt , Pd (GA, NC, VA), Cp (NC): roadsides, disturbed areas; rare, native of c. TN. This variety is apparently native in the Nashville Basin of Tennessee. [= FNA; = *H. camporum* var. *glandulissimum* – K, Y, orthographic variant; = *Chrysopsis camporum* Greene var. *glandulissima* (Semple) Cronquist – C; < *Chrysopsis camporum* – F, SE, W; < *Chrysopsis villosa* (Pursh) Nuttall var. *camporum* (Greene) Cronquist – G]

* ***Heterotheca latifolia*** Buckley *var.* ***latifolia***, Common Camphorweed. Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA), Mt (NC, SC): roadsides, disturbed areas; common, native of the sc. United States and adjacent Mexico. [= Y; = *H. subaxillaris* (Lamarck) Britton & Rusby var. *latifolia* (Buckley) Gandhi & Thomas – X; < *H. subaxillaris* – RAB, C, F, G, K, S, SE, W, WH; *H. latifolia* var. *latifolia* – Z; = *H. subaxillaris* (Lamarck) Britton & Rusby ssp. *latifolia* (Buckley) Semple – FNA, Q]

Heterotheca subaxillaris (Lamarck) Britton & Rusby, Dune Camphorweed. Cp (FL, GA, NC, SC, VA), Pd (GA): coastal dunes and sand-flats; common. July-October (-December). NJ south to FL, west to TX and Mexico, along the coast. This taxon is apparently native in our area, and is a conspicuous component of the flora of ocean dunes. [= Y; = *H. subaxillaris* (Lamarck) Britton & Rusby var. *subaxillaris* – X; < *H. subaxillaris* – RAB, C, F, G, K, S, SE, WH (also see *H. latifolia*); = *H. subaxillaris* ssp. *subaxillaris* – FNA, Q; = {} – Z]

Hieracium Linnaeus 1753 (Hawkweed, King-devil)

ASTERACEAE

A genus of 250-1000 species, herbs, primarily temperate. *Hieracium* is a complicated genus, with many apomictic races sometimes recognized as taxa. Sometimes separated into *Hieracium* and *Pilosella*. References: Strother in FNA (2006a); Cronquist (1980)=SE. Key adapted from C.

1 Leaves primarily cauline, the largest leaves definitely on the stem, basal leaves usually absent; [*Hieracium* s.s.].
  2 Florets 8-20 (-30) per head; leaves nearly glabrous, or with a few long hairs on the lower surface; upper stem glabrous..... ***H. paniculatum***
  2 Florets 30-110 per head; leaves setose, with long hairs on the upper and lower surfaces; upper stem stipitate-glandular, stellate-pubescent, or glabrous.
    3 Leaves with entire margins, rounded to obtuse at the tip; [widespread in our area]..... ***H. scabrum***
    3 Leaves with toothed to laciniate margins, acute to obtuse at the tip; [disjunct at high elevations in WV]..... ***[H. umbellatum]***
1 Leaves primarily basal, the largest leaves basal, leaves in some species extending onto the lower portion of the stem.
  4 Plants stoloniferous; [aliens of weedy habitats, especially pastures, roadsides, and lawns]; [*Pilosella*].
    5 Heads 1 (-3) per plant..... ***H. pilosella***
    5 Heads (1-) 2-many per plant.
      6 Heads (1-) 2-6 per plant, leaves nearly glabrous on the upper surface..... ***H. flagellare***
      6 Heads (3-) 5-50 per plant; leaves nearly glabrous or distinctly long-pubescent on the upper surface.
        7 Flowers deep orange..... ***H. aurantiacum***
        7 Flowers yellow.
          8 Leaves not glaucous; leaves hairy on the upper surface..... ***H. caespitosum***
          8 Leaves glaucous; leaves glabrous (or nearly so) on the upper surface..... ***H. floribundum***
  4 Plants not stoloniferous; [primarily natives (except *H. caespitosum* and *H. piloselloides*), of various (mostly dry) habitats].
    9 Cypselas 1.5-2 mm long, truncate at the tip; basal leaves mostly 5-12× as long as wide (the petiole included); well-developed basal leaves rarely over 3 cm wide; [alien]; [*Pilosella*].
      10 Leaves and stem not glaucous; leaves hairy on the upper surface..... ***H. caespitosum***
      10 Leaves and stem glaucous; leaves sparsely hairy to nearly glabrous on the upper surface..... ***H. piloselloides***
    9 Cypselas 2-4 mm long, usually distinctly narrowed to the tip (except *H. scabrum*); basal leaves mostly 1.5-5× as long as wide (the petiole included); well-developed basal leaves often over 3 cm wide; [native]; [*Hieracium* s.s.].
      11 Leaves purple-veined (when fresh).
        12 Lower stem strongly pilose; leaves weakly purple-veined..... ***H. marianum***
        12 Lower stem glabrous or nearly so; leaves strongly purple-veined..... ***H. venosum***
      11 Leaves not purple-veined.
        13 Inflorescence a narrow panicle.
          14 Cypselas truncate, broadest at the tip; flowers 40-100 per head..... ***H. scabrum***
          14 Cypselas narrowed to the tip; flowers 20-40 per head
            15 Hairs of the lower stem 1-4 mm long; inflorescence 2-4× as long as wide; [widespread in our area]..... ***H. gronovii***
            15 Hairs of the lower stem 6-15 mm long; inflorescence 4-7× as long as wide; [of KY and TN westward]..... ***[H. longipilum]***
        13 Inflorescence corymbiform.
          16 Cypselas 2-3 mm long, truncate, broadest at the tip; flowers 40-100 per head..... ***H. scabrum***
          16 Cypselas 2.2-5 mm long, at least the longer achenes narrowed to the tip; flowers 15-40 per head.
            17 Stem with several well-developed leaves slightly smaller than the basal leaves; inflorescence corymbiform or tending toward paniculate.
              18 Involucre mostly 6-9 mm high; inflorescence generally elongate and cylindric (appearing corymbiform in depauperate individuals); achenes 2.5-4 mm long; corollas 8-9 mm long..... ***H. gronovii***
              18 Involucre mostly 8-11 mm high; inflorescence broadly corymbiform; achenes 3.5-5 mm long; corollas 10-13 mm long..... ***H. megacephalum***
            17 Stem leafless, or with only a few leaves distinctly smaller than the basal leaves; inflorescence strongly corymbiform.
              19 Involucre glabrous or with short stipitate glands, but lacking long setae (either gland-tipped or glandless)..... ***H. marianum***
              19 Involucre with long setae (either gland-tipped or glandless).
                20 Involucral setae gland-tipped; [of the Coastal Plain]..... ***H. megacephalum***
                20 Involucral setae not gland-tipped (but with shorter gland-tipped hairs); [of the Mountains (and Piedmont?) of VA]..... ***H. traillii***

* ***Hieracium aurantiacum*** Linnaeus, Orange Hawkweed, Devil's-paintbrush, Orange King-devil, Fox-and-cubs. Mt (GA, NC, VA), Pd (VA): pastures, roadsides; rare, native of Europe. May-July. [= RAB, F, FNA, G, K, SE, W, WH; = ***Pilosella aurantiaca*** (Linnaeus) F. Schultz & Schultz 'Bipontinus']

* ***Hieracium caespitosum*** Dumortier, Yellow King-devil, Yellow Fox-and-cubs. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (VA): pastures, fields, roadsides; common (rare in VA Coastal Plain), native of Europe. May-July. [= C, FNA, K, SE, W; ? *H. pratense* Tausch – RAB, F, G; = ***Pilosella caespitosa*** (Dumortier) Sell & C. West]

* ***Hieracium flagellare*** Willdenow, Whiplash Hawkweed. Mt? (VA): roadsides; rare, native of Europe. Considered to derive from hybridization between *H. caespitosum* Dumortier and *H. pilosella* Linnaeus. [= C, F, FNA, SE; = *H.* ×***flagellare*** Willdenow (pro sp.) var. *flagellare* – K; = ***Pilosella flagellaris*** (Willdenow) Sell & C. West]

* ***Hieracium floribundum*** Wimmer & Grabowski, Glaucous Hawkweed. Mt, Pd (VA): roadsides, pastures; rare, native of Europe. Considered to derive from hybridization between *H. caespitosum* Dumortier and *H. lactucella* Wallroth. [= C, F, G; = *H.* ×***floribundum*** Wimmer & Grabowski (pro sp.) – K; = ***Pilosella floribunda*** (Wimmer & Grabowski) Arvet-Touvet]

Hieracium gronovii Linnaeus, Beaked Hawkweed. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): sandhills, dry forests, woodland margins, roadsides; common. July-November. MA west to s. Ontario and KS, south to c. peninsular FL and TX. [= RAB, C, F, FNA, G, K, S, SE, W, WH]

Hieracium marianum Willdenow, Maryland Hawkweed. Cp, Pd, Mt (NC, SC, VA): dry forests, woodland margins, roadsides; common. May-November. NH west to OH, south to FL and MS. Considered to derive from hybridization between *H. gronovii* Linnaeus and *H. venosum* Linnaeus. [= F, K, S; = *H.* ×***marianum*** Willdenow (pro sp.) – RAB, C, SE]

Hieracium megacephalum Nash, Bigheaded Hawkweed. Cp (GA): dry sandy soils of pinelands and hammocks; uncommon. S. GA south to s. FL. [= FNA, SE; = *Hieracium megacephalon* Nash – K, WH, orthographic variant; > *H. megacephalon* – S; > *H. argyraeum* Small – S]

Hieracium paniculatum Linnaeus, Leafy Hawkweed. Mt (GA, NC, SC, VA), Pd (NC, VA): dry to mesic forests, especially along dirt roads; common. July-October. Nova Scotia and Québec west to MN, south to w. NC, n. GA, and OH. The leafy stem and lack of basal leaves of *H. paniculatum* readily distinguish it from our other species of *Hieracium*. In fact, it often puzzles the inexperienced botanist, who may overlook the possibility that this plant is a *Hieracium*! The milky sap and obscure teeth on the leaves are good corroborative characters. [= RAB, C, F, FNA, G, K, S, SE, W]

* ***Hieracium pilosella*** Linnaeus, Mouse-ear Hawkweed. Mt (GA, NC, VA), Pd (NC, VA), Cp (VA): pastures, roadsides, disturbed areas; uncommon, native of Europe. May-July. [= RAB, C, FNA, G, SE, W; > *H. pilosella* var. *pilosella* – F, K; = ***Pilosella officinarum*** F. Schultz & Schultz 'Bipontinus']

* ***Hieracium piloselloides*** Villars, Glaucous King-devil. Mt (GA, NC, SC, VA), Pd, Cp (VA): fields, pastures, roadsides, rare, native of Europe. May-September. [= C, FNA, K; *? H. florentinum* Allioni – RAB, F, G, SE, W; = ***Pilosella piloselloides*** (Villars) Soják]

Hieracium scabrum Michaux, Rough Hawkweed. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (VA): dry forests, woodland margins, roadsides; common (rare in GA, rare in Coastal Plain). July-November. Nova Scotia and Québec west to MN, south to VA, n. GA, KY, and MO. [= RAB, C, FNA, G, S, SE, W; > *H. scabrum* var. *scabrum* – F, K]

Hieracium traillii Greene, Shale-barren Hawkweed. Mt, Pd? (VA): shale barrens and dry shaley woodlands, other xeric woodlands; uncommon. Sc. PA south to w. VA and e. WV. [= C, F, FNA, G, SE, W; = *H. greenii* Porter & Britton – K, S, a preoccupied name]

Hieracium venosum Linnaeus, Veiny Hawkweed. Mt, Pd, Cp (GA, NC, SC, VA): dry forests, woodland margins, roadsides; common. April-July. NY west to MI, south to GA, AL, and TN; apparently disjunct in FL. [= RAB, C, FNA, G, S, SE, W; > *H. venosum* var. *venosum* – F, K; > *H. venosum* var. *nudicaule* (Michaux) Farwell – F, K]

Hieracium longipilum Torrey. Ontario, OH, KY, and TN west to MN, NE, KS, OK, and TX. [= C, F, FNA, G, K, SE]

Hieracium umbellatum Linnaeus, Northern Hawkweed. Circumboreal, south in North America to PA, WV (Spruce Knob), IN, MO, CO, and OR. [= C, FNA, K; > *H. canadense* Michaux var. *fasciculatum* (Pursh) Fernald – F, G; > *H. canadense* var. *hirtirameum* Fernald – F, G]

Many of our species hybridize, and some of the species listed above are apparently hybrid derivatives. I prefer to treat taxa such as *H. marianum* as species (even if hybridization-derived) because they occur independently of the parental taxa (see above). Other hybrids of native species known in our area include:

H. gronovii × *H. paniculatum* [*H.* ×*alleghaniense* Britton (pro sp.)]
H. gronovii × *H. venosum*
H. paniculatum × *H. scabrum*
H. paniculatum × *H. venosum* [*H.* ×*scribneri* Small (pro sp.); *H. scribneri* – K]
H. scabrum × *H. venosum*

Hymenopappus L'Héritier 1788 (Woolly-white)

A genus of about 11-14 species, herbs, of s. North America. References: Strother in FNA (2006c); Cronquist (1980)=SE.

Hymenopappus scabiosaeus L'Héritier *var. **scabiosaeus***. Cp (FL, GA, SC): turkey oak sandhills and adjacent sandy fields; common (rare in GA and SC). Sc. SC south to n. peninsular FL, west to AR, MO, and OK, and north in the interior to n. IN, c. and s. IL, and se. MO. Var. *corymbosus* (Torrey & A. Gray) B.L. Turner is distributed in the s. Great Plains and adjacent areas, from NE south to TX and Coahuila. [= C, FNA, K, SE; < *H. scabiosaeus* – RAB, F, G, S, WH]

Hymenoxys Cassini 1825

A genus of about 25 species, herbs, of w. North America, south through Central America to South America. References: Bierner in FNA (2006c).

* ***Hymenoxys odorata*** A.P. de Candolle. Cp (SC): waste areas around wool-combing mill; rare, perhaps only a waif, native of sw. United States. See Nesom (2004d). [= K; = *Picradenia odorata* (A.P. de Candolle) Britton]

Hypochaeris Linnaeus 1753 (Cat's-ear)

A genus of about 60 species, herbs, of South America, Europe, Asia, and n. Africa. The controversial spelling of the genus name is now resolved in favor of *Hypochaeris*. References: Bogler in FNA (2006a); Cronquist (1980)=SE.

1 Stem with at least a few well-developed leaves, clasping and similar to the basal; pappus of one length, all long and plumose.
  2 Flowers yellow; middle and outer phyllaries hispid; heads usually 5-8 mm across at anthesis, the involucre campanulate..... ***H. chillensis***
  2 Flowers white; middle and outer phyllaries glabrous or puberulent; heads usually 2-4 mm wide at anthesis, the involucre cylindric..... ***H. microcephala* *var. albiflora***
1 Stem naked, or only with few and very small bracts; pappus of two lengths, the outer short and barbellate, the inner long and plumose.

2 Plants glabrous or apparently so; plants mostly annual ..... ***H. glabra***
2 Plants conspicuously pubescent, as on the hispid leaves; plants mostly perennial ..... ***H. radicata***

* ***Hypochaeris chillensis*** (Kunth) Britton, Brazilian Cat's-ear. Cp (FL, GA, NC, SC), Pd (GA, SC), Mt (SC): roadsides, fields, other disturbed places; common, native of South America. Late April-July. More common in the NC Coastal Plain than shown in RAB (common in Duplin, Sampson, and Wayne cos.) (A.J. Bullard, pers. comm. 2003). [= FNA; ? *Hypochaeris brasiliensis* (Less.) Grisebach var. *tweediei* (Hooker & Arnott) Baker – K, SE, WH; ? *Hypochoeris elata* (Weddell) Grisebach – RAB, misapplied]

* ***Hypochaeris glabra*** Linnaeus, Smooth Cat's-ear. Cp (FL, GA, NC, SC), Pd (NC, SC): roadsides, fields, disturbed areas; common (rare in NC, uncommon in FL), native of Europe. Late March-July. [= FNA, K, S, WH; = *Hypochoeris glabra* – RAB, C, SE, orthographic variant]

* ***Hypochaeris microcephala*** (Schultz 'Bipontinus') Cabrera *var.* ***albiflora*** (Kuntze) Cabrera, White-flowered Cat's-ear. Cp (GA): disturbed areas; rare, native of South America. This species has been found as a naturalized introduction at Fort Pulaski (Chatham County, GA) (T. Govus, pers. comm.). [= FNA, K, SE]

* ***Hypochaeris radicata*** Linnaeus, Spotted Cat's-ear. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): roadsides, fields, disturbed areas; common (rare in FL), native of Eurasia. April-July (or later). [= FNA, G, K, S, WH; = *Hypochoeris radicata* – RAB, C, F, SE, orthographic variant]

Inula Linnaeus 1753 (Elecampane)

A genus of about 90-100 species, of temperate and subtropical Old World. References: Arriagada (1998)=Z; Cronquist (1980)=SE.

* ***Inula helenium*** Linnaeus, Elecampane. Mt (NC, VA), Pd (VA): disturbed areas; rare, native of Europe. May-July. [= RAB, C, F, FNA, G, K, S, SE, W, Z]

Ionactis Greene 1897 (Stiff-leaved Aster)

A genus of 5 species, herbs, of North America. *Ionactis* has usually been included in *Aster*, but differs in many characters and is more closely related to *Heterotheca* (Nesom & Leary 1992). References: Nesom in FNA (2006b); Nesom & Leary (1992)=Z; Cronquist (1980)=SE.

Ionactis linariifolia (Linnaeus) Greene, Stiff-leaved Aster. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry savannas, sandhills, pine flatwoods, prairie-like openings, glades, and barrens, high elevation rock outcrops and glades, to at least 1450 m, dry roadbanks, woodland edges, rocky woodlands; common. Late September-November. ME and Québec west to WI, south to ne. FL, Panhandle FL, and TX. There appears to be substantial variation in *I. linariifolius*, with montane (and northern) populations having considerably longer and broader leaves than Coastal Plain (and southern) populations; additional study is needed. [= FNA, WH, Z; = *I. linariifolius* – K, S, orthographic variant; = *Aster linariifolius* Linnaeus – RAB, C, G, SE, W]

Iva Linnaeus 1753 (Marsh-elder)

A genus of about 9 species, shrubs and herbs, of North America and West Indies, as circumscribed more narrowly by recent authors. References: Cronquist (1980)=SE; Jackson (1960); Strother in FNA (2006c). [also see *Cyclachaena*]

1 Plants annual, not fleshy, more-or-less pubescent (at least in the inflorescence); [of inland wetlands or disturbed areas].
2 Leaves 0.5-3 mm wide, linear, < 8 mm wide; staminate flowers usually 2-6 per head.
3 Involucres 2.5-3 mm high; outer phyllaries connate; leaves 1-4 (-7) mm wide ..... ***I. angustifolia***
3 Involucres 1.5-2 mm high; outer phyllaries distinct; leaves 0.5-3 mm wide ..... ***I. microcephala***
2 Leaves 20-70 mm wide, ovate; staminate flowers usually 8-16 (-20) per head; [mostly of disturbed ground].
4 Heads subtended by bracts (in addition to the phyllaries); phyllaries 3-5 ..... ***I. annua***
4 Heads lacking bracts (other than the phyllaries); phyllaries 5 ..... ***[see Cyclachaena xanthiifolia]***
1 Plants perennial, fleshy, glabrous (or strigillose on the leaf faces); [mostly of maritime situations, such as brackish marshes, marsh edges, or ocean dunes].
5 Outer phyllaries united; [rare waif of disturbed areas] ..... ***I. axillaris***
5 Outer phyllaries distinct; [collectively common and widespread natives of the outer Coastal Plain].
6 Leaves 1.5-4.5 (-6.0) cm long, 0.4-1.0 (-1.5) cm wide, 1-3 mm thick when fresh, mostly untoothed; involucres 4-7 mm high; leaves alternate from midstem upward; [mostly of dunes and the upper beach] ..... ***I. imbricata***
6 Leaves 4-10 cm long, 0.7-4.0 cm wide, 0.5-1 mm thick when fresh, usually toothed; involucres 2-4 mm high; leaves opposite (alternate above or in the inflorescence); [mostly of marshes, marsh edges, and wet hammocks].
7 Larger leaves 4-7 (-8.5) cm long, 0.7-1.5 (-2.1) cm wide, 4-10× as long as wide, subentire or with 1-8 (rarely more) teeth on each side; [of NJ southward] ..... ***I. frutescens var. frutescens***
7 Larger leaves 6-10 cm long, 2.0-4.0 cm wide, 1.5-4× as long as wide, usually with 8-17 teeth on each side; [of n. NC northward] ..... ***I. frutescens var. oraria***

* ***Iva angustifolia*** Nuttall ex deCandolle, Narrowleaf Marsh-elder. Cp (FL): wet disturbed areas; rare, native of sw. United States and Mexico. August-September. [= FNA, K, SE, WH; ? *Iva asperifolia* Lessing – S, misapplied] {not yet keyed}

Iva annua Linnaeus, Sumpweed, Rough Marsh-elder. Cp (FL, GA*?, NC*, SC*, VA*), Pd* (NC, SC, VA): fields, disturbed places; rare, in the eastern and inland part of area probably introduced (by native Americans) from further west. September-November. PA, ND, and CO south to FL, NM, and Mexico (the original distribution uncertain). This species was apparently an important crop of native Americans. The so-called var. *macrocarpa* (Blake) R.C. Jackson [*I. ciliata* var. *macrocarpa* Blake], known only from archeological remains and presumed extinct, is almost certainly a cultivated form, selected for its large seeds. [= RAB, C, FNA, GW, SE, W, WH; = *I. ciliata* Willdenow – F; > *I. ciliata* Willdenow var. *ciliata* – G; > *I. ciliata* var. *macrocarpa* Blake – G; > *I. annua* var. *annua* – K; > *I. annua* var. *caudata* (Small) R.C. Jackson – K; > *I. annua* var. *macrocarpa* (Blake) R.C. Jackson – K; > *I. ciliata* – S; > *I. caudata* Small – S]

* ***Iva axillaris*** Pursh, Deer-root. Cp (SC): waste areas around wool-combing mill; rare, perhaps only a waif, native of w. United States. May-October. See Nesom (2004d). [= FNA, K]

Iva frutescens Linnaeus ***var. frutescens***, Southern Maritime Marsh-elder. Cp (FL, GA, NC, SC, VA): brackish marshes and marsh edges, normally on the back side of barrier islands; common. Late August-November. NJ south to s. FL, west to TX. See *I. frutescens* var. *oraria* for discussion of the two taxa. [= C, F, G, SE; = *I. frutescens* ssp. *frutescens* – GW, K; < *I. frutescens* – RAB, FNA, S, WH]

Iva frutescens Linnaeus ***var. oraria*** (Bartlett) Fernald & Griscom, Northern Maritime Marsh-elder. Cp (MD, NC, VA): brackish marshes and marsh edges, normally on the back side of barrier islands; common (uncommon south of MD). Late August-November. Nova Scotia south to Dare County, NC. The two varieties are morphologically distinct, except in the zone of overlap (NJ south to Dare County, NC), where intermediates will be encountered. Even in the zone of overlap, though, most plants are readily identified to variety. There might be some merit in considering these taxa species, with limited hybridization in a small portion of their total distributions. [= C, F, G, SE; = *I. frutescens* ssp. *oraria* (Bartlett) R.C. Jackson – K; < *I. frutescens* – RAB, FNA, S; = *I. oraria* Bartlett]

Iva imbricata Walter, Dune Marsh-elder. Cp (FL, GA, NC, SC, VA): dunes, upper beach, island-end flats; common (rare in VA). Late August-November. Se. VA south to s. FL, west to LA; also in the Bahamas and Cuba. This plant is often the most oceanward perennial plant, often the first perennial to colonize the upper beach or incipient dunes on island-end flats, where it occurs with such upper beach annuals as *Chamaesyce polygonifolia*, *Ch. bombensis*, *Cakile edentula*, and *Amaranthus pumilus*. [= RAB, C, F, FNA, G, K, S, SE, WH]

Iva microcephala Nuttall, Small-headed Marsh-elder. Cp (FL, GA, NC, SC): wet pine flatwoods, flatwood ponds, clay-based Carolina bays; common (rare north of FL). September-October. C. NC south to s. FL, west to se. AL. A seed-banking annual, locally abundant some years and absent others depending on the variable hydrologic conditions of Carolina bays and other seasonally flooded wetlands. [= RAB, FNA, GW, K, S, SE, WH]

Ixeris (Cassini) Cassini 1822

A genus of ca. 20 species, herbs, of e. and se. Asia. References: Strother in FNA (2006a).

* *Ixeris stolonifera* A. Gray, Creeping Lettuce. Established as a weed in lawns, gardens, and plant nurseries in se. PA (Rhoads & Klein 1993) and NY (Long Island). Native of e. Asia. June-August. [= C, FNA, K; = *Lactuca stolonifera* (A. Gray) Bentham ex Maximowicz – F] {not keyed}

Jamesianthus Blake & Sherff 1940 (Warbonnet)

A monotypic genus, a perennial herb, endemic to c. AL and wc. GA. References: Strother in FNA (2006c).

Jamesianthus alabamensis Blake & Sherff, Alabama Warbonnet. Mt (GA): streambanks over limestone or other calcareous rocks; rare (GA Special Concern). Endemic to stream banks in c. AL and wc. GA. The opposite leaves are squared off at the base in a distinctive manner. [= FNA, K, SE]

Krigia Schreber 1791 (Cynthia, Dwarf-dandelion)

A genus of 7 species, herbs, of (mainly e.) North America. References: Chambers & O'Kennon in FNA (2006a); Kim & Turner (1992)=Z; Cronquist (1980)=SE; Chambers (2004)=Y.

1 Phyllaries erect in fruit, 2-4× as long as wide; pappus absent (or represented by minute scales or bristles < 2 mm long); plant a leafy-stemmed winter annual.
  2 Phyllary midveins evident but not forming curved keels; cypselae fusiform, ca. 2× as long as broad..... ***K. cespitosa var. cespitosa***
  2 Phyllary midveins becoming prome9inent and curving inward at bases to form keels; cypselae obovoid, ca. 1.5× as long as broad..... ***[K. wrightii]***
1 Phyllaries reflexed in fruit, 3-8× as long as broad; pappus present, consisting of 5 or more scales and 5 or more bristles (the bristles > 4 mm long); plant a scapose, subscapose, or leafy-stemmed perennial or a scapose or subscapose winter annual.
  3 Pappus of 5 scales and 5 bristles; plant a winter annual; stem leafless or leafy at the base only..... ***K. virginica***
  3 Pappus of 15-40 scales and 15-40 bristles; plant a perennial; stem leafless, leafy at the base only, or with many leaves extending up the stem.

4 Stems leafless, the peduncles terminal; perennial from ovoid tubers, with long slender stolons which form new plants or tubers; pappus bristles (5.0-) 5.3-7.7 (-10.0) mm long ..... ***K. dandelion***
4 Stems leafy, at least at the base, the peduncles axillary; perennials from stout creeping rhizomes or short caudices, not bearing tubers; pappus bristles 4.0-7.0 mm long.
5 Peduncles usually 1 per leaf axil; leaves linear-lanceolate, the larger 1-12 mm wide; perennial from an underground rhizome (to 5 mm in diameter), larger plants with an extensive rootmat and multiple stems ..... ***K. montana***
5 Peduncles usually 2 per leaf axil; leaves oblanceolate, the larger 15-45 mm wide; solitary-stemmed perennial from a short caudex ..... ***K. biflora var. biflora***

Krigia biflora (Walter) S.F. Blake *var.* ***biflora***, Orange Dwarf-dandelion. Mt (GA, NC, VA), Pd (GA, NC): rich, moist forests; rare. Late May-early July. Var. *biflora* ranges from MA s. Ontario and MN south to GA, AL, MS, AR, and e. OK; the smaller var. *viridis* (Standley) Kim occurs in CO, AZ, and NM. [= K, Z; < *K. biflora* – RAB, C, F, FNA, G, SE, W; = *Cynthia virginica* (Linnaeus) D. Don – S]

Krigia cespitosa (Rafinesque) K.L. Chambers *var.* ***cespitosa***, Opposite-leaf Dwarf-dandelion. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): fields, roadsides, disturbed places; common (rare in VA). Late March-early June. Se. VA and NE south to c. peninsular FL and TX. *K. cespitosa* var. *gracilis* (A.P. de Candolle) K.L. Chambers occurs in TX, OK, and LA; it may be better considered as a species, as it is sympatric and generally distinct. [= FNA, Y; < *K. cespitosa* – GW, WH, Z; = *K. oppositifolia* Rafinesque – RAB, C, G, SE, W; = *Serinia oppositifolia* (Rafinesque) Kuntze – F, S; < *K. caespitosa* – K, orthographic variant]

Krigia dandelion (Linnaeus) Nuttall, Colonial Dwarf-dandelion. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): rocky woodlands, roadsides, disturbed areas; common (rare in Coastal Plain). April-May. NJ, IL, and KA, south to Panhandle FL and ne. TX. [= RAB, C, F, FNA, G, GW, K, SE, W, Z; = *Cynthia dandelion* (Linnaeus) A.P. de Candolle – S]

Krigia montana (Michaux) Nuttall, Mountain Dwarf-dandelion. Mt (GA, NC, SC): cliffs and rock outcrops at medium to high elevations; uncommon (rare in SC). May-September. A Southern Appalachian endemic: w. NC, e. TN, nw. SC, and ne. GA. [= RAB, FNA, K, SE, W, Z; = *Cynthia montana* (Michaux) Standley – S].

Krigia virginica (Linnaeus) Willdenow, Virginia Dwarf-dandelion. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): rocky woodlands, roadsides, disturbed areas; common. Late March-early June. ME west to MN, south to c. peninsular FL and c. TX. [= RAB, C, F, FNA, G, GW, K, S, SE, W, WH, Z]

Krigia occidentalis Nuttall. {GA}. March-May. MO and KS south to LA and TX; disjunct eastwards in GA. [= FNA, K] {add to synonymy}

Krigia wrightii (A. Gray) K.L. Chambers ex K.J. Kim, Wright's Dwarf-dandelion. AR and OK south to LA and TX. [= FNA]

The natural hexaploid hybrid *Krigia* ×*shinnersiana* K.L. Chambers *[K. biflora* × *montana]* is documented from the Craggy Mountains, Buncombe County, NC (Chambers 2004; Kim & Turner 1992).

Lactuca Linnaeus 1753 (Lettuce)

A genus of about 75 species, herbs, nearly cosmopolitan (especially north temperate). References: Strother in FNA (2006a); Cronquist (1980)=SE; McVaugh (1972). [also see *Ixeris*]

Identification notes: Most species are highly variable in leaf lobing.

1 Achene beaks stout and short, 0.1-0.5 (-1.0) mm long (< ½ as long as the body of the achene); rays blue to violet (rarely yellow or white).
2 Pappus tawny; flowers mostly 20-30 per head ..... ***L. biennis***
2 Pappus bright white; flowers mostly 10-15 per head ..... ***L. floridana***
1 Achene beaks filiform and long, 1-4 mm long (> ½ as long as the body of the achene); rays yellow or blue (sometimes white or drying bluish).
3 Each face of the achene with (3-) 5-9 nerves; stems typically white or pale green; rays yellow (sometimes drying blue); [aliens].
4 Unlobed cauline leaves lanceolate to linear ..... ***L. saligna***
4 Unlobed cauline leaves oblong, obovate, or spatulate.
5 Phyllaries usually erect in fruit; midribs of leaves usually smooth ..... ***L. sativa***
5 Phyllaries usually reflexed in fruit; midribs of leaves prickly setose ..... ***L. serriola***
3 Each face of the achene with 1 (-3) nerves; stems typically medium to dark green or reddish; rays yellow or blue; [natives, though often weedy].
6 Unlobed leaves and lobes of lobed leaves narrow, usually < 1 cm wide; leaves basally disposed, the basal and lower-stem leaves the largest and most persistent; plants 3-12 dm tall; [primarily of the Coastal Plain, rare elsewhere] ..... ***L. graminifolia var. graminifolia***
6 Unlobed leaves and lobes of lobed leaves wider, usually > 1 cm wide; leaves well-distributed on the stem; plants 3-33 dm tall; [collectively widespread].
7 Fruiting involucres 10-15 mm tall; achenes 2.5-3.5 mm long (excluding the beak) ..... ***L. canadensis***
7 Fruiting involucres 15-22 mm tall; achenes 4.5-6 mm long (excluding the beak).
8 Leaf margins not prickly (or barely so); flowers 13-25 per head; [widespread in our area] ..... ***L. hirsuta***
8 Leaf margins prickly; flowers 20-56 per head; [of KY and MS westward] ..... ***[L. ludoviciana]***

Lactuca biennis (Moench) Fernald, Tall Blue Lettuce. Mt, Pd (NC, VA): pastures, roadsides, forest edges; uncommon. August-November. Labrador and AK south to NC, TN, IA, CO, UT, and CA. [= RAB, C, F, FNA, G, K, SE, W; > *Mulgedium spicatum* (Lamarck) Small var. *spicatum* – S; > *Mulgedium spicatum* var. *integrifolium* (Torrey & A. Gray) Small – S]

Lactuca canadensis Linnaeus, American Wild Lettuce. Mt (NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): fields, roadsides, disturbed ground; common (uncommon in FL). June-November. Nova Scotia and British Columbia

south to n. peninsular FL, TX, and CA. [= RAB, C, FNA, K, SE, W, WH; > *L. canadensis* var. *canadensis* – F, G; > *L. canadensis* var. *latifolia* Kuntze – F, G; > *L. canadensis* var. *longifolia* (Michaux) Farwell – F, G; > *L. canadensis* var. *obovata* Wiegand – F, G; > *L. canadensis* – S; > *L. sagittifolia* – S]

Lactuca floridana (Linnaeus) Gaertner, Woodland Lettuce. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): mesic and dry-mesic forests; common (rare in GA Coastal Plain). August-November. NY, Manitoba and MN south to s. FL and TX. [= RAB, C, FNA, SE, W, WH; > *L. floridana* var. *floridana* – F, G, K; > *L. floridana* var. *villosa* (Jacquin) Cronquist – F, G, K; > *Mulgedium floridanum* (Linnaeus) de Candolle – S; > *Mulgedium villosum* (Jacquin) Small – S]

Lactuca graminifolia Michaux *var. **graminifolia***, Coastal Plain Lettuce. Cp (GA, NC, SC), Pd (GA, SC): mesic to dry-mesic pine-oak woodlands and forests, longleaf pine sandhills, sandy fields, and sandy roadsides; common (rare in Piedmont). April-July. E. NC south to s. FL, west to c. LA; disjunct in s. NJ. Var. *arizonica* McVaugh is distributed in mesic canyons in montane w. TX, s. CO, NM, and AZ, south into w. Mexico. Var. *mexicana* McVaugh is distributed in Tamaulipas, Veracruz, Oaxaca, Chiapas, and Guatemala. [= K; < *L. graminifolia* – RAB, F, FNA, SE, W, WH; = *L. graminifolia* – S]

Lactuca hirsuta Muhlenberg ex Nuttall, Downy Lettuce. Cp (GA, NC, SC, VA), Pd, Mt (NC, SC, VA): forests and forest edges; uncommon (rare in Piedmont and Mountains and in GA Coastal Plain). Late May-November. Nova Scotia and Ontario south to n. FL and TX. [= RAB, C, FNA, S, SE, W; > *L. hirsuta* var. *hirsuta* – F, G, K; > *L. hirsuta* var. *sanguinea* (Bigelow) Fernald – F, G, K]

* ***Lactuca saligna*** Linnaeus, Willowleaf Lettuce. Mt (NC, VA), Pd (SC, VA), Cp (VA), {GA}: fields, roadsides, disturbed ground, perhaps associated with circumneutral soils; rare, native of Europe. August-November. [= RAB, C, F, FNA, G, K, SE, W]

* ***Lactuca sativa*** Linnaeus, Garden Lettuce. Mt, Pd, Cp (GA, NC, SC, VA): cultivated throughout our area in home gardens and commercially, rarely weakly persistent; common as a cultivated plant, rare as a short-lived waif, native of Eurasia. June-October. [= F, FNA, G, K]

* ***Lactuca serriola*** Linnaeus, Prickly Lettuce. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): roadsides, disturbed ground, pastures; common (rare in FL and GA), native of Europe. June-November. [= C, FNA, K, SE, WH; = *L. scariola* Linnaeus – RAB, F; > *L. serriola* var. *integrata* Gren. & Godr. – G, W; > *L. scariola* – S; > *L. virosa* – S, misapplied]

Lactuca ludoviciana (Nuttall) Riddell, Louisiana Lettuce. Manitoba and British Columbia, south to IN, KY, MS, LA, TX, and CA. [= C, F, FNA, G, K, S, SE]

* *Lactuca virosa* Linnaeus, Bitter Lettuce. Reported for DC and AL (Kartesz 1999; FNA); no specimens have been seen that document this distribution. [= FNA, K] {not keyed}

Lagascea Cavanilles 1803

A genus of 8 species, herbs and shrubs, of sw. United States, Mexico, and Central America, not pantropical by introduction. References: Harris in FNA (2006c); Stuessy (1978)=Z.

* *Lagascea mollis* Cavanilles, Silkleaf. Cp (FL): disturbed areas (on ballast); rare (not recently collected), native of Mexico (but now pantropical). Collected at Apalachicola, Franklin County, FL by A.W. Chapman and previously in FL by Rugel. [= FNA, WH, Z] {not keyed}

Lapsana Linnaeus 1753 (Nipplewort)

A monotypic genus (after the removal of most members to *Lapsanastrum*), an annual herb, of temperate Eurasia. References: Bogler in FNA (2006a); Cronquist (1980)=SE.

* ***Lapsana communis*** Linnaeus, Nipplewort. Mt (GA, NC, VA), Pd, Cp (VA): fields, forests, disturbed areas; uncommon (rare in GA, NC, and Coastal Plain of VA), native of Europe. June-August. First reported for GA (Rabun County) by Stiles & Howel (1998). See Poindexter (2006). [= RAB, C, F, FNA, G, K, SE, W]

Leontodon Linnaeus 1753 (Hawkbit)

A genus of about 50 species, herbs, primarily of temperate Eurasia. Samuel et al. (2006) show that *Leontodon* subgenus *Oporinia* (including *L. autumnalis* among the species treated below) should be recognized as a separate genus from *Leontodon* sensu stricto. References: Samuel et al. (2006); Bogler in FNA (2006a); Cronquist (1980)=SE.

1 Heads (solitary-) several; scapes usually scaly-bracted above; pappus of plumose bristles; [genus *Oporinia*]..... ***L. autumnalis***
1 Head solitary; scapes usually naked; pappus type mixed, at least the outer pappus of the outer florets in each head of scales; [genus *Leontodon*].
  2 Pappus type mixed on each cypsela (with the scales outward and the plumose bristles inwards; phyllaries densely and coarsely hispid or hirsute..... ***[L. hispidus]***
  2 Pappus type mixed in each head (the outer cypselas with scales, the inner cypselas with plumose bristles); phyllaries glabrate to coarsely hirsute..... ***L. saxatilis ssp. saxatilis***

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* ***Leontodon autumnalis*** Linnaeus, Fall-dandelion. Cp (VA): roadsides, fields; rare, native of Europe. June-October. [= FNA, SE; > *Leontodon autumnalis* Linnaeus var. *autumnalis* – C, F, G; > *L. autumnalis* ssp. *autumnalis* – K; = ***Oporinia autumnalis*** (Linnaeus) D. Don]

* ***Leontodon saxatilis*** Lamarck *ssp.* ***saxatilis***, Little Hawkbit. Cp (VA), Mt (NC): roadsides, fields; rare, native of Europe. July-October. [= FNA; = *Leontodon taraxacoides* (Villars) Willdenow ex Mérat ssp. *taraxacoides* – K; < *L. taraxacoides* – C, W; *? L. nudicaulis* (Linnaeus) Banks ex Schinz & R. Keller – RAB, apparently misapplied; *? L. leysseri* (Wallroth) G. Beck – F, G]

* *Leontodon hispidus* Linnaeus, Bristly Hawkbit. Scattered states in eastern North America. {GA, PA (FNA)} {MD, DC (Kartesz 1999) – investigate} [= FNA; > *Leontodon hispidus* ssp. *hispidus* – K; > *L. hirtus* Linnaeus – K]

Leucanthemum P. Miller 1754 (Oxeye Daisy)

A genus of about 35 species, herbs, of Eurasia. References: Strother in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z.

1 Leaves larger near or slightly below mid-stem; leaves toothed only ..... ***L. lacustre***
1 Leaves larger toward the base of the plant; leaves usually at least partly lobed or pinnatisect, as well as toothed ..... ***L. vulgare***

* ***Leucanthemum lacustre*** (Brotero) Sampaio, Portuguese Daisy. Cp (NC, SC, VA), Pd (NC, SC): old fields, ditches, disturbed areas; rare, native of Europe. June-July. [= FNA, K, Z; = *Chrysanthemum lacustre* Brotero – RAB, C, SE]

* ***Leucanthemum vulgare*** Lamarck, Oxeye Daisy, White Daisy, Common Daisy, Marguerite. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): fields, roadsides, pastures, disturbed areas; common, native of Eurasia. April-August. [= FNA, K, Z; = *Chrysanthemum leucanthemum* Linnaeus – RAB, C, G, SE, W; > *Ch. leucanthemum* var. *pinnatifidum* Lecoq & Lamotte – F; = *Leucanthemum leucanthemum* (Linnaeus) Rydberg – S]

Liatris Schreber 1791 (Blazing-star, Gayfeather)

A genus of 40-50 species, herbs, of e. and c. North America. References: Nesom in FNA (2006c); Gaiser (1946)=Z; Cronquist (1980)=SE; Stucky & Pyne (1990); Godfrey (1948)=Y; Stucky (1991); Stucky (1992); Mayfield (2002). Key adapted in large part from FNA.

1 Pappus plumose, the barbels mostly 0.5-1.0 mm long.
  2 Inner phyllaries with apices prolonged, loosely spreading, slightly dilated, and petaloid (white to yellow, pink, or purplish); heads 3-5 mm in diameter, with 4-6 flowers per head; corolla lobes glabrous within; [of the Coastal Plain from SC southward].
    3 Heads sessile; petaloid phyllary apices lavender, pink, or magenta, recurved, the petaloid portion short relative to the green phyllary bases ..... ***L. elegans var. elegans***
    3 Heads pedunculate on short peduncles; petaloid phyllary apices light yellow or cream (rarely pale lavender), divergent with tips ascending, the petaloid portion elongate relative to the green phyllary bases ..... ***L. elegans var. kralii***
  2 Inner phyllaries not prominently petaloid; heads 10-20 mm in diameter, with 10-60 flowers per head; corolla lobes coarsely hairy within; [collectively widespread].
    4 Outer phyllaries as long as or (more usually longer than) the inner phyllaries, spreading or reflexed, the spreading portion typically > 2 mm long ..... ***L. squarrosa var. squarrosa***
    4 Outer phyllaries shorter than the inner phyllaries, erect-appressed to spreading or reflexed, the spreading portion 0-2 mm long.
      5 Stems and leaves usually glabrous; inner phyllaries usually apically rounded to truncate, apiculate, all essentially erect and appressed, usually with a narrow hyaline border ..... ***L. cylindracea***
      5 Stems and leaves hirsute to hirsute-pilose; inner phyllaries apically acute-acuminate, all usually spreading to reflexed on the distal 1/3 (outer) to 1/5 (inner), usually without a hyaline border ..... ***L. hirsuta***
1 Pappus barbellate, the barbels 0.1-0.3 (-0.4) mm long.
  6 Heads mostly 1–7(–10) in a subcorymbiform arrangement; [of Bibb Co., AL] ..... ***L. oligocephala***
  6 Heads usually > 10 in a spiciform or racemiform arrangement; [collectively widespread].
    7 Leaves 3-5-veined.
      8 Basal and lower cauline leaves (2-) 4-8 mm wide, cauline usually abruptly reduced in size at ca. midstem, continuing distally as linear, bract-like leaves; heads in a densely (- to loosely) spiciform arrangement; involucres 7-9 mm, purplish to greenish; florets 5-6 (-8) per head; [mainly of the Coastal Plain] ..... ***L. spicata var. resinosa***
      8 Basal and lower cauline leaves 4-10 (-20) mm wide, cauline usually gradually reduced in size distally; heads in a densely to loosely spiciform arrangement; involucres (7-) 8-11 mm, usually greenish; florets (4-) 6-8 (-12) per head; [of the Mountains and Piedmont] ..... ***L. spicata var. spicata***
    7 Leaves 1-veined.
      9 Mid and inner phyllaries either apically acute or rounded-retuse and minutely involute-cuspidate to apiculate.
        10 Stems hirtellous with spreading to slightly deflexed hairs or variously puberulent to hirsute.
          11 Stems hirsute to puberulent to pilose-puberulent or strigose-puberulent ..... ***L. gracilis***
          11 Stems hirtellous with spreading to slightly deflexed hairs.
            12 Heads sessile, relatively crowded in a cylindric arrangement, rigidly ascending, appressed to the rachis and to each other, densely overlapping ..... ***L. chapmanii***
            12 Heads sessile to short-pedunculate, in a relatively loose, spiciform, racemoid, or paniculate, commonly secund arrangement. ..... ***L. pauciflora***
        10 Stems glabrous.

13 Phyllaries apically usually rounded-retuse and minutely involute-cuspidate to apiculate; corolla tubes glabrous within.
14 Stems and basal leaves glabrous; basal leaves mostly arising from congested nodes at very base of plant, (1-) 2-6 (-9) mm wide, abruptly reduced in size distally, surfaces minutely white-dotted by stomates, not glandular-punctate ..... ***L. laevigata***
14 Stems and basal leaves glabrous to very sparsely pilose, leaves usually with a few, spreading cilia near insertion; basal and lower cauline leaves arising from numerous, separated nodes on proximal part of stem, 1-2 (-2.5) mm wide and relatively even-sized, surfaces glandular-punctate ..... ***L. tenuifolia***
13 Phyllaries apically acute; corolla tubes pilose within.
15 Heads often in a secund arrangement; involucres 11-15 mm; phyllaries obovate; florets 3-6 ..... ***L. pauciflora***
15 Heads in a secund arrangement or not; involucres (6-) 7-9 mm; phyllaries ovate-triangular to generally oblong; florets 4-10 (-12).
16 Heads densely arranged, on internodes 1-2 (-5) mm long, often secund; phyllary apex sharply acuminate-acute, distinctly involute, lamina relatively thin, glands consistently present and superficial at least on proximal portion; florets 4-7 (-9); basal and lower cauline leaves 2-5 mm wide, gradually reduced in length distally ..... ***L. cokeri***
16 Heads loosely arranged, on internodes 6-15 (-20) mm long, not secund; phyllary apex sharply acute to obtuse-angled with a thickened apiculum, not markedly involute, lamina relatively thick, usually with evidently sunken punctate glands, without superficial glands; florets 7-10 (-12); basal and lower cauline leaves 4-9 (-12) mm wide, quickly reduced in width and length distally ..... ***L. virgata***

9 Mid and inner phyllaries apically rounded, not rounded-retuse or cuspidate to apiculate.
17 Stems glabrous (rarely sparsely to moderately pilose in *L. pilosa*).
18 Involucres 5-7 (-9) mm; florets 4-5 (-6); corolla tubes glabrous within; pappus bristles usually about half the length of corolla tubes ..... ***L. microcephala***
18 Involucres 6-10 mm; florets (6-) 7-13 (-17); corolla tubes internally pilose; pappus bristles as long as the corolla tubes (shorter in some populations of *L. helleri*).
19 Stems 15-55 cm; leaves and phyllaries weakly or not at all punctate; pappus bristles 1/3-2/3 to equal the corolla tube length; montane ..... ***L. helleri***
19 Stems 40-120 cm; leaves and phyllaries distinctly punctate-glandular to weakly punctate; pappus bristles equal the corolla tube length; coastal plain and piedmont.
20 Stems glabrous; heads loosely arranged, on internodes (2-) 5-10 (-14) mm; peduncles 0-2 (-7) mm; involucres 6-8 mm; phyllaries in 3-4 (-5) series ..... ***L. elegantula***
20 Stems glabrous to sparsely or moderately pilose; heads densely arranged, on internodes (1-) 2-5 (-7) mm; peduncles 0-10 (-17, -80 in proximal part of capitulescence) mm; involucres (7-) 8-10 mm, phyllaries in (3-) 4-5 (-6) series ..... ***L. pilosa***
17 Stems puberulent to strigose.
21 Involucres 2.5-7 mm wide; florets 3-12.
22 Stems and peduncles puberulent to pilose-puberulent or strigose-puberulent; heads usually on ascending peduncles 2-10(-12) mm; involucres 2.5-4(-5) mm wide; phyllaries apically rounded or obtuse to acute or acuminate; florets 3-6 (-9).... ***L. gracilis***
22 Stems and peduncles stiffly short-strigose with closely ascending hairs; heads on divergent, arcuate-ascending peduncles 10-25 (-30) mm; involucres 5-7 mm wide; phyllaries apically rounded to nearly flat; florets 7-12 ..... ***L. patens***
21 Involucres 13-22 (-25) mm wide or (6-) 8-15 mm wide (*L. squarrulosa*); florets 11-80.
23 Heads usually on peduncles usually 8-50 mm (rarely subsessile); phyllaries erect, not reflexing; florets ca. 30-80 (19-33 in *L. scariosa*); corolla tubes glabrous or pilose within.
24 Leaves or leafy bracts 8-20 (-25) below the heads, cauline usually abruptly reduced above the basal; florets 19-33; [plants of the Central and Southern Appalachians] ..... ***L. scariosa var. scariosa***
24 Leaves or leafy bracts 20-85 below the heads, usually continuing relatively even-sized upward above the basal; florets ca. 30-80; [plants of WV and PA northward] ..... ***[L. scariosa var. nieuwlandii]***
23 Heads usually sessile, less commonly subsessile on peduncles 1-8 mm (rarely more); at least outer phyllaries usually reflexing; florets 11-26 (-30); corolla tubes pilose within.
25 Phyllaries glabrous, bullate, with broad, conspicuous, often erose to lacerate or irregular, hyaline border ..... ***L. aspera***
25 Phyllaries glabrous to puberulent or puberulent-hirtellous, essentially flat (not bullate), without hyaline border or border narrow and inconspicuous ..... ***L. squarrulosa***

Liatris aspera Michaux, Rough Blazing-star. Mt (GA, NC, VA), Pd (GA, NC?), Cp (FL, GA), {SC}: prairies, barrens, glades; rare (NC Rare, VA Rare). August-September (-October). Ontario and ND south to Panhandle FL and TX. [= RAB, C, FNA, G, SE, W, WH; > *Liatris aspera* var. *aspera* – F; > *Liatris aspera* Michaux var. *intermedia* (Lunell) Gaiser – F, K, Y; > *Laciniaria aspera* (Michaux) Greene var. *aspera* – S; > *Liatris spheroidea* Michaux – K; > *Laciniaria aspera* (Michaux) Greene var. *spheroidea* (Michaux) Alexander – S]

Liatris chapmanii Torrey & A. Gray, Chapman's Blazing-star. Cp (FL, GA): xeric sands of scrub; common (rare in GA). August-October. Sw. GA, s. AL, south to s. FL. [= FNA, K, SE, WH; = *Laciniaria chapmanii* (Torrey & A. Gray) Kuntze – S] {synonymy incomplete}

Liatris cokeri Pyne & Stucky, Sandhills Blazing-star. Cp (NC, SC): sandhills; common. (August-) September-October. Sc. and se. NC south to nc. SC. [= FNA; = *Liatris regimontis* (Small) K. Schumann – RAB, SE, W, Y, misapplied; > *Liatris cokeri* – K; > *Liatris regimontis* – K]

Liatris cylindracea Michaux, Barrelhead Blazing-star. Mt (GA): limestone glades, prairies; rare. July-September. NY, Ontario, and MN south to se. TN (Ridge and Valley) (Chester, Wofford, & Kral 1997), nw. GA, and c. AL (Bibb County), and OK. [= C, F, FNA, G, K, SE] {synonymy incomplete}

Liatris elegans (Walter) Michaux *var.* ***elegans***, Common Elegant Blazing-star. Cp (FL, GA, SC): sandhills; common. SC south to FL, west to TX. See Mayfield (2002) for discussion of infraspecific taxa in this species. [= FNA; < *Liatris elegans* – RAB, SE, WH; < *L. elegans* var. *elegans* – K, Z; > *Liatris elegans* var. *flabellata* (Small) Gaiser – K, Z; >< *Laciniaria elegans* (Walter) Kuntze – S; > *Laciniaria flabellata* Small – S]

Liatris elegans (Walter) Michaux *var.* ***kralii*** Mayfield. Kral's Elegant Blazing-star. Cp (FL, GA, SC): sandhills; rare. Se. SC (Allendale Co.) south to n. FL and west to s. MS. See Mayfield (2002) for discussion of infraspecific taxa in this species. [= FNA, K, WH; < *Liatris elegans* – SE, Z; < *Laciniaria elegans* (Walter) Kuntze – S]

Liatris elegantula (Greene) K. Schumann. Cp (FL, GA): sandhills; uncommon. August-October (-November). GA south to n. peninsular FL, west to MS. [= FNA, WH; = *Liatris graminifolia* Willdenow var. *elegantula* (Greene) Gaiser – Z; = *Laciniaria elegantula* Greene; < *Laciniaria graminifolia* (Willdenow) Kuntze – S; < *Liatris graminifolia* – SE] {synonymy incomplete}

Liatris gracilis Pursh, Slender Blazing-star. Cp (FL, GA, SC): sandhills, dry pine flatwoods; common (uncommon in GA and SC). (July-) August-October (-November). SC south to s. FL, west to MS. [= RAB, FNA, K, SE, WH; > *Laciniaria laxa* Small – S; > *Laciniaria gracilis* (Pursh) Kuntze – S]

Liatris helleri T.C. Porter, Heller's Blazing-star. Mt (NC, VA): high elevation rock outcrops, sometimes on ledges of precipitous cliffs, rocky openings in heath balds, shale barrens; rare (US Threatened, NC Threatened). July-mid September. E. WV and w. VA south to w. NC. [= FNA; > *Liatris helleri* T.C. Porter – RAB, K, SE, W, Y, Z; > *Liatris turgida* Gaiser – RAB, C, F, G, K, SE, W, Y, Z; > *Laciniaria helleri* (Porter) Porter ex Heller – S; > *Laciniaria pilosa* (Aiton) Heller – S, misapplied]

Liatris hirsuta Rydberg. Mt (GA): Coosa prairies; rare. IA and NE south to MS, LA, and TX; disjunct eastward in nw. GA. [= FNA; < *Laciniaria squarrosa* (Linnaeus) Hill – S; = *Liatris squarrosa* (Linnaeus) Michaux var. *hirsuta* (Rydberg) Gaiser – C, F, G, K, SE, Y, Z; < *Liatris squarrosa* – W] {add to synonymy}

Liatris laevigata (Nuttall) Small, Smooth Blazing-star. Cp (FL, GA): longleaf pine sandhills, scrub; common (rare in GA). August-October (-November). Se. GA (Charlton County) south to s. FL. [= FNA; = *Liatris tenuifolia* Nuttall *var. quadriflora* Chapman – K, SE, WH; < *Laciniaria tenuifolia* (Nuttall) Kuntze – S]

Liatris microcephala (Small) K. Schumann, Small-head Blazing-star. Mt, Pd (GA, NC, SC): outcrops of acidic rocks (sandstone, granite, gneiss); rare (NC Rare). August-October. W. NC and KY south to w. SC, n. and c. GA, and n. AL. [= RAB, C, F, FNA, G, K, SE, W, Y, Z; = *Laciniaria microcephala* Small – S]

Liatris oligocephala J. Allison, Cahaba Blazing-star, Cahaba Torch. Mt (AL): dolomitic Ketona glades. Endemic to Bibb County, c. AL (Allison & Stevens 2001). June-July (-August). [= FNA]

Liatris patens Nesom & Kral, Georgia Blazing-star. Cp (FL, GA, SC): longleaf pine sandhills and dry flatwoods; uncommon (rare in FL). Late August-early November. SC south to e. Panhandle FL. See Kral & Nesom (2003) for detailed information. [= FNA, WH]

Liatris pauciflora Pursh, Few-flower Blazing-star. Cp (FL, GA): xeric sands of scrub; uncommon (rare in GA). August-October. GA (Tatnall Co.) south to c. peninsular FL; alleged by Small (1933) to extend to SC. [< *Liatris pauciflora* – K, SE (also see *L. secunda*); = *Laciniaria pauciflora* (Pursh) Kuntze – S; = *Liatris pauciflora* var. *pauciflora* – FNA, WH]

Liatris pilosa (Aiton) Willdenow. Pd, Cp (NC) {GA, SC, VA}: sandhills, pine barrens, fields, roadbanks; common. (August-) September-October (-November). NJ, DE, and PA south to SC. [= FNA, K; < *Liatris graminifolia* Willdenow – RAB, SE, W (also see *Liatris virgata*); = *Liatris graminifolia* – C, G; > *Liatris graminifolia* var. *graminifolia* – F; > *Liatris graminifolia* var. *lasia* Fernald & Griscom – F; > *Liatris graminifolia* var. *racemosa* (A.P. de Candolle) Venard – F; > *Liatris graminifolia* var. *typica* – Y, Z; > *Liatris graminifolia* var. *dubia* (Barton) A. Gray – Y, Z; = *Laciniaria graminifolia* (Walter) Kuntze – S]

Liatris scariosa (Linnaeus) Willdenow *var. **scariosa***, Northern Blazing-star. Mt (NC, VA): shale barrens, dry rock outcrops, roadbanks; rare? (NC Watch List). August-September (-October). PA, MD, and WV south to NC and TN. [= C, FNA, K, SE; < *Liatris scariosa* – RAB, W; = *Liatris scariosa* – F, G; < *Laciniaria scariosa* (Linnaeus) Hill – S (also see *Liatris squarrulosa*); > *Liatris scariosa* var. *scariosa* – Y, Z; > *Liatris scariosa* var. *virginiana* (Lunell) Gaiser – Y, Z]

Liatris secunda Elliott, Sandhill Blazing-star. Cp (FL, GA, NC, SC): sandhills; common (rare in GA, NC, and SC). August-September (-October). S. NC south to w. Panhandle FL and s. AL. [= RAB, Y; < *Liatris pauciflora* Pursh – K, SE; = *Laciniaria secunda* (Elliott) Small – S; = *L. pauciflora* Pursh var. *secunda* (Elliott) D.B. Ward – FNA, WH]

Liatris spicata (Linnaeus) Willdenow *var. **resinosa*** (Nuttall) Gaiser. Cp (FL, GA, NC, SC, VA), Pd, Mt (NC), {GA, NC, SC, VA}: bogs, wet pine savannas, seepages; common. (July-) August-October (-November). NJ south to s. FL, west to LA. [= RAB, F, FNA, G, K, Y, Z; < *Liatris spicata* – C, SE, W, WH; < *Laciniaria spicata* (Linnaeus) Kuntze – S]

Liatris spicata (Linnaeus) Willdenow *var. **spicata***, Florist's Gayfeather. Mt, Pd (NC) {GA, NC, VA}: prairies, roadsides, seepages, bogs, grassy balds; common. July-September. MA, Ontario, and MI, south to GA, AL, MS, and AR. [= RAB, F, FNA, G, K; = *Liatris spicata* var. *typica* – Y, Z; < *Liatris spicata* – C, SE, W; < *Laciniaria spicata* (Linnaeus) Kuntze – S]

Liatris squarrosa (Linnaeus) Michaux *var. **squarrosa***. Cp (FL, GA, NC, SC), Pd, Mt (GA, NC, SC) {VA}: [= C, FNA, G, K, SE; > *Liatris squarrosa* var. *squarrosa* – F; > *L. squarrosa* var. *gracilenta* Gaiser – F, Y, Z; < *L. squarrosa* – RAB, W, WH; < *Laciniaria squarrosa* (Linnaeus) Hill – S; > *Liatris squarrosa* var. *typica* Gaiser – Y, Z]

Liatris squarrulosa Michaux. Mt, Pd (GA, NC, SC), Cp (FL, GA, NC, SC) {VA}: diabase barrens, other glades and barrens, prairies, open woodlands; rare (NC Rare, VA Watch List). August-October (-November). WV, KY, IL, and MO south to GA, Panhandle FL, AL, and TX. Highly variable and needing additional study to determine if multiple taxa should be recognized. [= C, FNA, K, SE, W, WH; > *Liatris earlei* (Greene) Schumann – RAB, F, Y, Z; > *Liatris squarrulosa* – G; > *Liatris scabra* (Greene) K. Schumann – F, G; > *Laciniaria ruthii* Alexander – S; > *Laciniaria shortii* Alexander – S; = *Liatris scariosa* var. *squarrulosa* – Y, Z]

Liatris tenuifolia Nuttall. Cp (FL, GA, SC): longleaf pine sandhills; common. August-November. SC south to s. FL, west to AL. [= RAB, FNA; = *Liatris tenuifolia* Nuttall *var. tenuifolia* – K, SE, WH; < *Laciniaria tenuifolia* (Nuttall) Kuntze – S (also see *Liatris laevigata*)]

Liatris virgata Nuttall. Mt (GA, NC, SC, VA), Pd (GA, NC), Cp (NC, SC): open woods, roadbanks; common. (July-) August-October (-November). [= FNA, K; < *Liatris graminifolia* – RAB, SE, W; > *Liatris graminifolia* var. *smallii* (Britton) Fernald & Griscom – F, Y, Z; > *Liatris regimontis* (Small) K. Schumann – C, G, Y; > *Liatris regiomontis* – F, orthographic varaint; > *Laciniaria regimontis* Small – S; > *Laciniaria smallii* Britton – S; > *L. graminifolia* var. *virgata* (Nuttall) Fernald – F]

Liatris gholsonii L.C. Anderson, Gholson's Gayfeather. Cp (FL): mesic sandy sites; rare. (July-) August-October (-November). Endemic to Liberty and Leon counties, FL. [= FNA, WH] {not yet keyed; add to synonymy}

Liatris provincialis R.K. Godfrey. Cp (FL): sandhills, scrub, dunes; rare. (August-) September-October. Endemic to FL Panhandle (Franklin and Wakulla counties). [= FNA, WH] {not yet keyed; add to synonymy}

Liatris scariosa (Linnaeus) Willdenow var. *nieuwlandii* (Lunell) E.G. Voss. Prairies, glades, woodlands. South to PA, WV. [= FNA, C, G, K, SE; < *Liatris borealis* Nuttall – F; = *Liatris novae-angliae* (Lunell) Shinners var. *nieuwlandii* Lunell] {synonymy incomplete}

Ligularia Cassini 1816 (Ligularia)

A genus of 125 species (or more), perennial herbs, natives of temperate Eurasia. References: Barkley in FNA (2006b).

* *Ligularia dentata* (A. Gray) H. Hara. Commonly cultivated horticulturally in ne. North America, locally established or persistent, as in MD; native of China and Japan. [= FNA, K; *Senecio clivorum* (Maximowicz) Maximowicz – C]

Lygodesmia D. Don 1829 (Rush Pink, Skeletonplant)

A genus of about 5-7 species, herbs, of w. and s. North America. References: Bogler in FNA (2006a); Tomb (1980)=Z; Cronquist (1980)=SE.

Lygodesmia aphylla (Nuttall) Torrey & A. Gray, Flowering Straws, Rose-rush. Cp (FL, GA): xeric sandhills; uncommon. C. GA south to s. FL and west to c. Panhandle FL. [= FNA, K, S, SE, WH, Z]

Madia Molina 1782 (Tarweed)

A genus of about 10 species, of w. North America and Chile. References: Baldwin & Strother in FNA (2006c); Cronquist (1980)=SE.

* *Madia sativa* Molina, Tarweed, native of Chile, south to se. PA. [= K; *M. capitata* Nuttall; > *M. sativa* var. *sativa* – SE; > *M. sativa* var. *congesta* Torrey & A. Gray – SE]

Marshallia Schreber 1791 (Barbara's-buttons)

A genus of about 11 species, perennial herbs, of the se. United States. *Marshallia* ranges from sc. VA, sw. PA, WV, s. KY, s. MO, and c. OK, south to c. peninsular FL, and sw. TX. References: Channell (1957)=Z; Watson in FNA (2006c); Watson & Estes (1990)=Y; Cronquist (1980)=SE; Watson, Elisens, & Estes (1991); Watson, Jansen, & Estes (1991); Beadle & Boynton (1901)=X.

1 Leaves not basally disposed, the leaves all about the same size; plants glabrous throughout; plants colonial by persistent rhizomes; internodes 10-25 (and leaves 2-5× as long as wide) ..... ***M. trinervia***
1 Leaves basally disposed, either all of the leaves below the midpoint of the stem, or the upper leaves markedly smaller than the lower stem and basal leaves (the basal leaves sometimes withered); plants pubescent at least below the heads; plants producing lateral offsets which are separated from the parent in less than a year; internodes 1-12 (and leaves 3-15× as long as wide) or 10-35 (and leaves 8-20× as long as wide).
  2 Phyllaries with acuminate-subulate tips; receptacular bracts (paleae) with acuminate-subulate tips; plants usually with 2 or more heads; flowering late July-mid October.
    3 Lower stem leaves (and basal leaves) erect, narrowly lanceolate to linear-lanceolate, with attenuate or long-acuminate apices, relatively thick in texture, the 2-4 lateral nerves (parallel to the midnerve) prominent; caudex with fibrous remnants of the previous year's leaves (if not burned off); phyllaries thick, ovate-attenuate; [of NC, SC, and extreme e. GA] ..... ***M. graminifolia***
    3 Lower stem leaves (and basal leaves) spreading, oblanceolate or spatulate, with rounded or obtuse apices, relatively thin in texture, the 2 lateral nerves (parallel to the midnerve) often obscure; caudex lacking fibrous remnants of the previous year's leaves; phyllaries thin, linear-subulate; [of e. GA southward] ..... ***M. tenuifolia***
  2 Phyllaries with rounded to acute apices; receptacular bracts (paleae) slightly to strongly broadened or clavate-thickened just below the acute to obtuse apex; plants with 1 head (or more in *M. mohrii* and *M. ramosa*); flowering in late April-July.
    4 Heads 2-10 (-20) (rarely solitary on rare, depauperate plants).
      5 Leaves 6-10 cm long, 8-23 mm wide, mostly 3-10× as long as wide; heads 2-5 (-10), 22-37 mm in diameter; [of sandstone, limestone, and dolostone glades of nw. GA and c. AL] ..... ***M. mohrii***
      5 Leaves 8-20 cm long, 2-7 (-10) mm wide, mostly > 15× as long as wide; heads (2-) 4-10 (-20), 10-25 mm in diameter; [of Altamaha Grit glades pinelands, and ultramafic outcrop barrens of e. GA and Panhandle FL] ..... ***M. ramosa***
    4 Head solitary.
      6 Leafy portion of the stem 0-20 (-30) cm long, the naked peduncle 1.5-10× (or more) as long as the leafy portion of the stem; stem leaves (if present) not reduced upward, the uppermost > 1/2 as long and wide as the largest leaves on the plant; basal leaves obovate to oblanceolate, the apex obtuse to rounded (often emarginate); outer well-developed phyllaries with obtuse to rounded apex; corollas white to very pale pink; plants flowering late April-May (-early June).
        7 Plant with 3-10 leaves on the lower stem, extending (5-) 8-20 (-30) cm up the stem; pappus scales (0.5-) 1.0-1.5 mm long; plant (2-) 3-5 (-7) dm tall; [of the Piedmont from sc. VA southward] ..... ***M. obovata var. obovata***
        7 Plant scapose (all of the leaves basal) or nearly scapose, with 1-5 leaves extending 1-5 (-10) cm up the stem; pappus scales (1.0-) 1.5-2.5 (-3.0) mm long; plant (0.5-) 1.5-3.5 (-5.0) dm tall; [of the Coastal Plain from NC southward] ..... ***M. obovata var. scaposa***
      6 Leafy portion of the stem 23-50 cm long, the naked peduncle 0.4-1.2× as long as the leafy portion of the stem; stem leaves reduced upward, the uppermost < 1/3 as long and wide as the largest leaves on the plant; basal leaves obovate to oblanceolate, the apex

obtuse to acute or acuminate; outer well-developed phyllaries with acute to obtuse apex; corollas medium pink; plants flowering late June-July.

8 Basal and lower cauline leaves (2-) 3-13 (-20) cm long (including the petiole), (5-) 10-20 (-30) mm wide, averaging about 6× as long as wide (including the petiole), the apex obtuse to rounded; pappus scales ca. 2 mm long; plants (2-) 3-5 (-8.5) dm tall; achenes without resin-dots between the ridges; [of the Mountains] ..... ***M. grandiflora***

8 Basal and lower cauline leaves (8-) 15-25 (-32) cm long (including the petiole), (3-) 7-12 (-15) mm wide, averaging about 10× as long as wide (including the petiole), the apex acute to acuminate; pappus scales ca. 1.2 mm long; plants (4-) 6-9 (-10) dm tall; achenes with copious resin-dots between the ridges; [of the Piedmont] ..... ***M. species 1***

Marshallia graminifolia (Walter) Small, Grassleaf Barbara's-buttons. Cp (GA, NC, SC): pine savannas; common. Late July-mid October. Ne. NC south to se. SC, and rarely to e. GA (Emanuel County) (Sorrie 1998b). Closely related to *M. tenuifolia* Rafinesque,; which differs in having a well-developed horizontal rosette of thin-textured spatulate leaves, which do not leave fibrous remains (vs. with firm, ascending, linear-lanceolate basal leaves, which leave fibrous remains). [= RAB, GW, SE, Z; < *M. graminifolia* – FNA; = *M. graminifolia* var. *graminifolia* – K; > *M. laciniarioides* Small - S; > *M. williamsonii* Small – S; > *M. graminifolia* var. *graminifolia* – X; > *M. graminifolia* var. *lacinarioides* (Small) Beadle & F.E. Boynton – X; = *M. graminifolia* ssp. *graminifolia* – Y]

Marshallia grandiflora Beadle & F.E. Boynton, Appalachian Barbara's-buttons, Large-flowered Barbara's-buttons. Mt (NC): bog margins, dry slopes over mafic rocks; rare (US Species of Concern, NC Rare). June-July. Sw. PA south to sw. NC, e. TN (Cumberland Plateau) (Chester, Wofford, & Kral 1997), and se. KY. [= C, F, FNA, G, K, S, SE, W, X, Y, Z; < *M. grandiflora* – RAB (also see *M. species 1*)]

Marshallia mohrii Beadle & F.E. Boynton, Coosa Barbara's-buttons. Mt (GA): sandstone, limestone, and dolostone glades; rare (US threatened, GA Threatened). Nw. GA and n. and c. AL. It somewhat resembles *M. grandiflora*, but typically has 2-10 heads per plant (or solitary in depauperate individuals). [= FNA, K, S, SE, X, Y, Z]

Marshallia obovata (Walter) Beadle & F.W. Boynton *var. **obovata***, Piedmont Barbara's-buttons, Spoon-leaved Barbara's-buttons. Pd (GA, NC, SC, VA), Cp (FL, GA): clay flats, woodland borders, dry woodlands; common (rare in FL and VA). Late April-May (-early June). Sc. VA south to se. TN (Chester, Wofford, & Kral 1997), sw. GA, panhandle FL, and c. AL, primarily in the Piedmont. [= RAB, C, G, K, SE, Y, Z; = *M. obovata* var. *platyphylla* (M.A. Curtis) Beadle & F.E. Boynton – F, X; < *M. obovata* – FNA, S, W, WH]

Marshallia obovata (Walter) Beadle & F.W. Boynton *var. **scaposa*** Channell. Cp (GA, NC, SC): pine savannas; common. Late April-May. E. NC south to se. AL, in the Coastal Plain. [= RAB, K, SE, Y, Z; = *M. obovata* var. *obovata* – F, X, misapplied; < *M. obovata* – FNA, S]

Marshallia ramosa Beadle & F.E. Boynton, Pineland Barbara's-buttons, Southern Barbara's-buttons. Cp (FL, GA): pinelands, Altamaha Grit outcrops, woodlands over ultramafic rocks; rare (GA Rare). Coastal Plain from e. GA south to ne. FL and Panhandle FL. It somewhat resembles *M. graminifolia* in its linear leaves, but differs in the phyllaries acute (vs. subulate-acuminate), and flowering period (late May-June vs. July-mid-October). [= FNA, K, S, SE, WH, X, Y, Z]

Marshallia species 1, Oak Barrens Barbara's-buttons. Pd (NC, VA): diabase barrens and fire-maintained woodlands over greenstone; rare (NC Rare, VA Rare). Late June-July; August-September. This species is known from three extant and one extirpated population, in Granville County, NC and Halifax Co. VA, where associated with numerous rare and disjunct taxa of prairie or barren affinities: *Oligoneuron album, O. rigidum* var. *glabratum, Symphyotrichum depauperatum, Echinacea laevigata, Silphium terebinthinaceum, Baptisia australis* var. *aberrans, Linum sulcatum* var. *sulcatum, Carex meadii, Eryngium yuccifolium* var. *yuccifolium, Scutellaria leonardii, Lithospermum canescens,* and others. [< *M. grandiflora* – RAB]

Marshallia tenuifolia Rafinesque. Cp (FL, GA): pine savannas; common. E. GA south to c. peninsular FL, west to e. TX. See *M. graminifolia* for additional discussion. [= GW, SE, WH, Z; < *M. graminifolia* – FNA; = *M. graminifolia* (Walter) Small var. *cynanthera* (Elliott) Beadle & F.E. Boynton – K, X; = *M. graminifolia* – S, misapplied; = *M. graminifolia* (Walter) Small ssp. *tenuifolia* (Rafinesque) L. Watson – Y]

Marshallia trinervia (Walter) Trelease, Colonial Barbara's-buttons, Broadleaf Barbara's-buttons. Mt (GA, NC, VA?), Pd (GA), Cp? (SC?): moist rocky streambanks and in calcareous clays; rare (GA Special Concern, NC Rare, VA Watch List). July. E. SC (?), sw. NC, and sc. TN, south to s. AL and s. MS (Sorrie & Leonard 1999). Reported for VA by C; documentation is unknown. [= RAB, C, F, FNA, G, K, S, SE, W, X, Y, Z]

Matricaria Linnaeus 1740 (Mayweed)

A genus of about 7 species, herbs, of Eurasia and n. Africa. References: Brouillet in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z. [also see *Tripleurospermum*]

1 Heads with evident white rays (very rarely lacking rays); plant chamomile-scented; disc flowers 5-lobed ..... ***M. chamomilla***

1 Heads discoid (lacking rays); plant pineapple-scented; disc flowers 4-lobed ..... ***M. discoidea***

* ***Matricaria chamomilla*** Linnaeus, German Chamomile, False Chamomile, Scented Mayweed. Cp (VA), {NC, SC}: roadsides; rare, native of Europe. July-September. [= F, FNA, G, SE; = *Matricaria recutita* Linnaeus – C, K, Z; = *Chamomilla recutita* (Linnaeus) Rauschert]

* ***Matricaria discoidea*** A.P. de Candolle, Pineapple-weed, Rayless Chamomile. Mt (NC, VA): barnyards, pastures, roadsides; uncommon, native of w. North America. June-November. [= FNA, K, Z; = *M. matricarioides* (Less.) T.C. Porter – RAB, C, F, G, SE, illegitimate name; *? Lepidotheca suaveolens* (Pursh) Nuttall; *? Chamomilla suaveolens* (Pursh) Rydberg]

Melampodium Linnaeus 1753

A genus of about 36 species, herbs, of tropoical and subtropical America. References: Strother in FNA (2006c).

* ***Melampodium divaricatum*** (Richard) DC. Cp (FL): disturbed areas; rare, native of tropical America. [= FNA, WH] {add synonymy}

Melanthera Rohr 1792

A genus of about 35 species, herbs, of tropical and subtropical areas. References: Parks in FNA (2006c); Cronquist (1980)=SE; Wagner & Robinson (2001)=Z.

Melanthera nivea (Linnaeus) Small. Cp (FL, GA, SC): calcareous outcrops, sandy woodlands; common (uncommon in GA and SC). June-October. E. SC south to s. FL, west to LA; also widespread in the West Indies, Mexico, Central America, and northern South America (Colombia, Ecuador, Peru, and Venezuela). [= FNA, K, SE, WH, Z; > *M. hastata* Michaux – RAB, S]

Mikania Willdenow 1803 (Climbing Hempweed)

A genus of about 430-450 species, vines, perennial herbs, and shrubs, primarily pantropical in distribution, but with extensions into temperate areas (Holmes 1995). References: Holmes in FNA (2006c); Cronquist (1980)=SE.

1 Involucre 6.5-8 mm; achenes 3.5-4.5 mm long; pubescence of the stems, leaves, and involucres spreading; [of se. SC southward] ..... ***M. cordifolia***
1 Involucre 4-5.5 (-6) mm high; achenes 1.5-2.5 (-2.7) mm long; pubescence of the stems, leaves, and involucres puberulent or nearly smooth; [widespread in our area] ..... ***M. scandens***

Mikania cordifolia (Linnaeus f.) Willdenow, Heartleaf Climbing Hempweed. Cp (FL, GA, SC): bottomland hardwood forests, mesic hammocks near the coast, margins of tidal marshes; rare. Se. SC (Beaufort and Colleton counties) (P. McMillan, pers. comm. 2005) south to s. FL, west to s. LA. [= K, S, SE, WH]

Mikania scandens (Linnaeus) Willdenow, Climbing Hempweed. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): marshes, swamp forests, wet thickets; common (rare in Mountains). July-October. ME to s. Ontario, south to s. FL and e. TX, south into the tropics. [= RAB, C, G, GW, K, S, SE, W, WH; > *M. scandens* var. *pubescens* (Nuttall) Torrey & A. Gray – F; > *M. scandens* var. *scandens* – F]

Oclemena E.L. Greene 1903 (Aster, Nodding-aster)

A genus of 3 species, perennial herbs, of e. North America. There now appears to be strong evidence (morphologic and molecular) and something approaching a consensus for the recognition of *Oclemena* as distinct from *Aster*. It appears that *Oclemena* is most closely related to *Ionactis*, and that these two genera are more closely related to *Solidago* and *Heterotheca* than to *Aster* (in a narrower sense). References: Brouillet in FNA (2006b); Nesom (1994)=Z; Semple, Heard, & Xiang (1996)=Y; Cronquist (1980)=SE; Nesom (1997).

1 Leaves 30-100 or more per plant, 1-8 mm wide ..... ***[O. nemoralis]***
1 Leaves 11-30 per plant, 10-50 mm wide.
  2 Leaves obovate, acuminate at the tip, thin in texture; [of the Mountains] ..... ***O. acuminata***
  2 Leaves narrowly elliptic, acute to obtuse at the tip, coriaceous in texture; [of the Coastal Plain, from se. SC southward] ..... ***O. reticulata***

Oclemena acuminata (Michaux) Greene, Whorled Aster, Whorled Nodding-aster. Mt (GA, NC, VA): spruce-fir forests, northern hardwood forests, mountain seepages and streambanks, other cool, moist situations; common. July-September. Newfoundland and Québec south to w. NC, ne. GA, and e. TN. [= FNA, K, Y, Z; = *Aster acuminatus* – RAB, C, F, G, SE, W]

Oclemena reticulata (Pursh) Nesom, Pine-barren Aster. Cp (FL, GA, SC): wet pine flatwoods; uncommon. Late April-early June. Se. SC south through e. GA to c. peninsular FL. [= FNA, K, WH, Z; = *Aster reticulatus* Pursh – RAB, GW, SE; = *Doellingeria reticulata* (Pursh) Greene – S]

Oclemena nemoralis (Aiton) Greene, Leafy Bog Aster, Bog Nodding-aster. Peaty bogs. Labrador and Ontario south to nc. PA, MD, DE, and NJ. [= FNA, K, Z; = *Aster nemoralis* Aiton – C, F, G]

Onopordum Linnaeus 1753 (Scotch Thistle, Cotton-thistle)

A genus of about 60 species, herbs, of the Mediterranean region and w. Asia. References: Keil in FNA (2006a); Cronquist (1980)=SE.

* ***Onopordum acanthium*** Linnaeus *ssp.* ***acanthium***, Scotch Thistle, Cotton-thistle. Mt (VA): disturbed areas; rare, native of Europe. July-October. [= FNA; > *O. acanthium* – C, F, G, K, S, SE, WH]

Packera Á. & D. Löve 1976 (Ragwort)

A genus of about 64 species, annual and perennial herbs, of subtropical, temperate, and arctic North American, with a few species in Siberia. These species have usually been considered part of *Senecio*, and have often been given informal status as "the Aureoid group". According to recent interpretations, this group warrants generic status, as *Packera* (Bremer 1994). References: Trock in FNA (2006b); Barkley (1962)=Z; Cronquist (1980)=SE; Barkley (1999)=Y; Barkley (1978)=X; Bremer (1994); Mahoney & Kowal (in press).

1 Plant an annual (rarely a biennial); leaf with lateral lobes broadly rounded, resembling the terminal lobe; [of wet soil of swamps and wet fields] ..... ***P. glabella***
1 Plant a perennial (rarely a biennial); leaf with lateral lobes absent, or distinctly narrower than the terminal lobe; [of dry to mesic soils, but not generally as above].
2 Principal leaves (especially the basal) 2-3-pinnatifid, the segments mostly 1-3 mm wide ..... ***P. millefolium***
2 Principal leaves entire, toothed, or irregularly and raggedly 1-pinnatifid.
3 Plants densely tomentose or floccose when young, remaining visibly tomentose throughout the growing season on the leaves (these appearing grayish because of the persistent tomentum); basal leaves entire, obscurely crenate, or serrate (rarely lobed).
4 Basal leaves (including petioles) mostly 10-25 cm long, held in a vertical posture; [of the Coastal Plain and Piedmont of NC, SC, and VA, and Mountains of SC] ..... ***P. tomentosa***
4 Basal leaves (including petioles) mostly 3-10 cm long, arching or prostrate; [of the Mountains of NC and VA].
5 Tomentum of leaf blades very fine and tight; [of shale barrens and woodlands] ..... ***P. antennariifolia***
5 Tomentum of leaf blades coarser, looser; [of calcareous, mafic, or ultramafic cliffs, barrens, and woodlands] ..... ***P. plattensis***
3 Plants glabrate to sparsely floccose when young, becoming glabrous to glabrate later in the growing season, though some species with some persistent floccose tomentum near the base or in the leaf axils (the leaves appearing green); basal leaves serrate or lobed.
6 Basal leaves ovate, orbicular, or reniform, the blade 0.8-2× as long as wide; leaf blades cordate, truncate, or abruptly narrowed at the base.
7 Basal leaves reniform, strongly cordate at the base ..... ***P. aurea***
7 Basal leaves obovate to orbicular, truncate or abruptly narrowed at the base ..... ***P. obovata***
6 Basal leaves oblanceolate, narrowly elliptic, the blade 2-8× as long as wide; leaf blades cuneate at the base (truncate in *P. schweinitziana*); plants usually not forming clonal patches by stolons or widely creeping rhizomes.
8 Basal leaves with truncate bases (typically oblique truncate); [of high elevation grassy balds] ..... ***P. schweinitziana***
8 Basal leaves cuneate at the base; [collectively widespread and of various habitats].
9 Heads many, generally 20-100; basal leaves (including petioles) up to 30 cm long and 3.5 cm wide ..... ***P. anonyma***
9 Heads few, generally 5-20; basal leaves (including petioles) up to 12 cm long and 2 cm wide ..... ***P. paupercula vars. and P. crawfordii***

Packera anonyma (Wood) W.A. Weber & Á. Löve, Appalachian Ragwort, Small's Ragwort. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): rock outcrops, roadsides, woodlands; hammocks, disturbed areas; common. May-early June. S. PA and KY, south to Panhandle FL and c. MS. [= FNA, K, WH, Y; = *Senecio anonymus* Wood – C, SE, X; = *Senecio smallii* Britton – RAB, F, G, S]

Packera antennariifolia (Britton) W.A. Weber & Á. Löve, Shalebarren Ragwort. Mt (VA): shale barrens and shale woodlands; rare. April-June. Sc. PA and w. MD south to w. VA and e. WV. [= FNA, K, Y; = *Senecio antennariifolius* Britton – C, F, G, SE]

Packera aurea (Linnaeus) Á. & D. Löve, Golden Ragwort, Heartleaf Ragwort. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (FL, VA): moist forests, bottomlands, bogs, stream banks; common (rare in FL). Late March-June. Labrador west to MN, south to NC, ne. SC, n. GA, n. AL, and c. AR; disjunct in Panhandle FL. This species is variable, and some of the more striking variants have been named; some may well warrant formal taxonomic recognition, but additional study is needed. [= FNA, K, WH, Y; *Senecio aureus* Linnaeus – RAB, C, G, GW, SE, X; > *Senecio aureus* var. *aureus* – F; > *Senecio aureus* var. *intercursus* Fernald – F; > *Senecio aureus* var. *gracilis* (Pursh) Hooker – F; > *S. aureus* – S; > *Senecio gracilis* Pursh – S]

Packera crawfordii (Britton) A.M. Mahoney & R.R. Kowal ined. Mt, Cp (NC): bogs and fens; rare. NJ, PA, and s. IN south to e. NC, w. NC, and TN. [< *Senecio pauperculus* Michaux – RAB, C, G, GW, S, SE, X; = *Senecio crawfordii* (Britton) G.W. & G.R. Douglas – F; < *Packera paupercula* (Michaux) Á. & D. Löve – FNA]

Packera glabella (Poiret) C. Jeffrey, Butterweed, Smooth Ragwort, Yellowtop. Cp (FL, GA, NC, SC), Pd (GA, SC), Mt (GA): swamp forests, bottomland forests, cleared areas in bottomlands, often in mucky soils; common. March-early June. E. NC south to s. FL, west to e. TX, north in the interior to OH, MO, and SD. [= FNA, K, WH, Y; = *Senecio glabellus* Poiret – RAB, C, F, G, GW, S, SE, X]

Packera millefolium (Torrey & A. Gray) W.A. Weber & Á. Löve, Blue Ridge Ragwort, Yarrowleaf Ragwort. Mt (GA, NC, SC, VA): granitic domes, cliffs, and rocky woodlands, over granite, gneiss, schist, and amphibolite, and in calcareous glades (in sw. VA); rare (GA Threatened, NC Threatened, SC Rare, VA Rare). Late April-early June. Endemic to sw. NC, nw. SC, and ne. GA; disjunct in sw. VA. The hybrid with *Packera anonyma* [= *Senecio* ×*memmingeri* Britton (pro sp.)] occurs with the parents. The epithet in *Packera* is often spelled "*millefolia*," ignoring that this epithet is a noun in apposition based on the pre-Linnaean genus name *Millefolium* (for *Achillea*).. [= *Senecio millefolium* Torrey & A. Gray – RAB, C, F, S, SE, X; = *Packera millefolia* – FNA, K, Y, orthographic variant]

Packera obovata (Muhlenberg ex Willdenow) W.A. Weber & Á. Löve, Roundleaf Ragwort, Running Ragwort. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, VA): nutrient rich forests and woodlands (dry or moist), usually over calcareous or mafic

rocks; common (uncommon in NC and SC, rare in FL). April-June. VT west to KS, south to Panhandle FL and TX. [= FNA, K, WH, Y; = *Senecio obovatus* Muhlenberg ex Willdenow – RAB, C, S, SE, X; > *Senecio obovatus* var. *obovatus* – F, G; > *Senecio obovatus* var. *elliottii* (Torrey & A. Gray) Fernald – F, G; > *Senecio obovatus* var. *rotundus* Britton – F; > *Senecio obovatus* – S; > *Senecio rotundus* (Britton) Small – S]

Packera paupercula (Michaux) Á. & D. Löve, Balsam Ragwort, Northern Meadow Groundsel. Mt (GA, NC, VA), Pd (NC, VA), Cp (FL, NC, VA): thickets, meadows, glades, generally over circumneutral soils derived from calcareous or mafic rocks; rare. April-May. Labrador west to AK, south to GA, Panhandle FL (Bay County), AL, and OR. Mahoney (1998) suggests that this species, as broadly defined, is a complex set of populations, many apparently warranting taxonomic recognition. [< *Packera paupercula* (Michaux) Á. & D. Löve – FNA, K, WH, X, Y; < *Senecio pauperculus* Michaux – RAB, C, G, GW, S, SE; > *Senecio pauperculus* var. *pauperculus* – F; > *Senecio pauperculus* var. *balsamitae* (Muhlenberg ex Willdenow) Fernald – F; > *Senecio pauperculus* var. *praelongus* (Greenman) House – F]

Packera plattensis (Nuttall) W.A. Weber & Á. Löve, Prairie Ragwort. Mt (NC, VA): glades, cliffs, barrens, over mafic, ultramafic, or calcareous rocks; uncommon, rare in NC (NC Rare). VT west to Saskatchewan, south to w. VA, w. NC, e. TN, nc. TN, OH, IN, LA, and TX. [< *Packera plattensis* – FNA, K, Y, misapplied to our material; < *Senecio plattensis* Nuttall – C, F, G, SE, X, misapplied to our material; = ***Packera paupercula*** (Michaux) Á. & D. Löve *var.* ***appalachiana*** A.M. Mahoney & R.R. Kowal in ed.]

Packera schweinitziana (Nuttall) W.A. Weber & Á. Löve, New England Ragwort. Mt (NC): grassy balds (in deep soil), at high elevations, in our area generally over metagabbro or amphibolite; rare (NC Endangered). May-July. Nova Scotia and Québec south to n. NY; disjunct to a few locations in w. NC and e. TN, notably on grassy balds on Roan Mountain, Snake Mountain, Rich Mountain, and Big Bald. [= FNA, K; = *Senecio schweinitzianus* Nuttall – C, SE, X; = *Senecio robbinsii* Oakes ex Rusby – RAB, F, G, S; = *Packera schweinitzianus* – Y, orthographic variant]

Packera tomentosa (Michaux) C. Jeffrey, Woolly Ragwort. Cp, Pd (GA, NC, SC, VA), Mt (SC): sandy roadsides, sandy woodlands and forests, granitic flatrocks, granitic domes; common. April-early June. S. NJ south to GA, west to TX, primarily on the Coastal Plain, but extending inland in the Piedmont and Mountains in thin sandy soils around rock outcrops, and as a roadside weed. [= FNA, K, Y; = *Senecio tomentosus* Michaux – RAB, C, F, G, GW, SE, X; > *Senecio tomentosus* – S; > *Senecio alabamensis* Britton – S]

Palafoxia Lagasca y Segura 1816 (Palafoxia)

A genus of about 12 species, shrubs and herbs, of s. North America. References: Strother in FNA (2006c); Turner & Morris (1976)=Z; Cronquist (1980)=SE.

1 Perennial suffrutescent herb or shrub, 3-15 dm tall; phyllaries unequal, the longer inner phyllaries 8-11 mm long; [longleaf pine sandhills and sandy scrub, of sc. GA and FL]..... ***P. integrifolia***
1 Annual herb, 2-8 dm tall; phyllaries equal, 3-10 mm long.
  2 Phyllaries 3-5 mm long; corollas 5-6 mm long; leaves 1-4 mm wide; [of calcareous prairies and glades, of MS westward]..... ***P. callosa***
  2 Phyllaries 5-8 mm long; corollas 7-10 mm long; leaves 5-20 mm wide; [alien in our area, of disturbed sites]..... ***P. texana var. ambigua***

Palafoxia callosa (Nuttall) Torrey & A. Gray, Small Palafoxia. Cp (MS): blackland prairies; rare. MO, AR, and OK south to c. TX and Coahuila; disjunct in c. MS. [= FNA, K, SE, Z]

Palafoxia integrifolia (Nuttall) Torrey & A. Gray, Coastal Plain Palafoxia. Cp (FL, GA): sandhills; uncommon (rare in GA). Sc. GA south to s. FL. [= FNA, K, SE, WH, Z; = *Polypteris integrifolia* Nuttall – S]

* ***Palafoxia texana*** deCandolle *var.* ***ambigua*** (Shinners) B.L. Turner & M.I. Morris, Texas Palafoxia. Cp (FL); dry, disturbed areas; rare, native of TX and Tamaulipas. [= K, WH, Z; < *P. texana* – FNA]

Panphalea Lagasca y Segura 1811

A genus of 9 species, herbs, of South America. References: Pruski (2004).

* ***Panphalea heterophylla*** Lessing. Cp (SC): waste areas around wool-combing mill; rare, perhaps merely a waif. April. See Pruski (2004) and Nesom (2004d).

Parthenium Linnaeus 1753 (Wild Quinine)

A genus of about 16 species, herbs and shrubs, of North America and the West Indies. Mears (1975) does not seem to me to be a fully satisfactory explanation of the variation within the genus. Morphologically and ecologically, *P. auriculatum* seems worthy of specific status, and I have not followed Mears's reduction of it to varietal status. *P. integrifolium* var. *henryanum*, var. *mabryanum*, and var. *integrifolium* serve to describe real patterns of variation, but are disturbingly confluent morphologically, ecologically, and geographically. References: Mears (1975)=Z; Cronquist (1980)=SE; Strother in FNA (2006c).

1 Leaves pinnatifid to bipinnatifid, the primary sinuses extending 9/10 or more of the way to the midrib; leaves thin in texture; pappus of 2 petaloid scales; [alien annual] ..... ***P. hysterophorus***
1 Leaves toothed (pinnatifid in forms of *P. integrifolium* var. *mabryanum*, the sinuses extending up to 3/4 of the way to the midrib); leaves somewhat thick in texture; pappus of 2-3 weak awns; [native perennials].

2 Stems with coarse, spreading pubescence 1-3 mm long; cauline leaves all auriculate-clasping, the upper cauline leaves sessile and auriculate-clasping, the lower cauline leaves with winged petioles, the wings expanded at the base; blades of basal leaves 11-18 (-20) cm long, 5-8 cm wide ..... ***P. auriculatum***

2 Stems glabrous or with short, appressed pubescence <1 mm long; cauline leaves only rarely auriculate-clasping, the upper cauline leaves sessile or petiolate, the lower cauline leaves petiolate, the petioles winged or not; blades of basal leaves (4-) 6-21 (-27) cm long, (1.4-) 2-12 (-13.5) cm wide.

3 Blades of basal leaves ovate-lanceolate, (4-) 6-12 (-20) cm long, (3-) 4-8 (-9.5) cm wide, never undulately lobed; heads (18-) 90-180 (-400) per inflorescence ..... ***P. integrifolium var. integrifolium***

3 Blades of basal leaves linear-lanceolate to ovate-lanceolate, (6-) 7-12 (-13.5) cm long, (1.4-) 2-4 (-4.5 cm) wide, sometimes undulately lobed throughout their length; heads (30) 40-75 (-85) per inflorescence ..... ***P. integrifolium var. mabryanum***

Parthenium auriculatum Britton, Glade Wild Quinine. Pd, Mt (NC, VA): in shallow, xeric, circumneutral soil of glades, barrens, and woodlands, over calcareous rocks (such as dolostone) or mafic rocks (such as diabase); uncommon, rare in NC (NC Rare). Mid May-August. Ne. WV south to c. NC and n. AL, west to c. TN. As indicated by the confusion over its taxonomy, the relationships and appropriate taxonomic treatment of this taxon are unclear. It is clearly a close relative of the Ozarkian *P. hispidum* Rafinesque, and perhaps not readily distinguished from it; some, at least, of our material has creeping rhizomes and heads over 7 mm in diameter, supposed to be distinguishing features of *P. hispidum*. [= C, G, K, SE; = *P. integrifolium* var. *auriculatum* (Britton) Cornelius ex Cronquist – RAB, Z; = *P. hispidum* Raf. var. *auriculatum* (Britton) Rollins – F; < *P. integrifolium* – FNA, S; < *P. hispidum* Rafinesque – W; < *P. integrifolium* – S]

* ***Parthenium hysterophorus*** Linnaeus, Santa Maria, Feverfew. Cp (FL), Pd (VA): disturbed areas; uncommon (rare in VA), native of tropical America, including the West Indies. July-November. [= C, F, FNA, G, K, S, SE, WH]

Parthenium integrifolium Linnaeus *var.* ***integrifolium***, Common Wild Quinine. Pd, Mt (GA, NC, SC, VA), Cp (NC, SC, VA): various dryish habitats, mainly open or sparsely wooded; common. Late May-August. VA west to MN, south to SC, GA; ne. MS, and nw. AR. Var. *henryanum* Mears appears to be merely a form of var. *integrifolium*. [= K; < *P. integrifolium* var. *integrifolium* – RAB; < *P. integrifolium* – C, F, FNA, G, S, SE, W; > *P. integrifolium* var. *integrifolium* – Z; > *P. integrifolium* var. *henryanum* Mears – Z]

Parthenium integrifolium Linnaeus *var.* ***mabryanum*** Mears, Mabry's Wild Quinine. Cp, Pd (NC, SC, VA): sandhills and other dry soils, in forest openings or woodlands; uncommon (rare in VA). Late May-November (blooming strongly in response to fire). Nc. SC, e. NC, and se. VA, barely extending into the e. Piedmont of NC in dry sandy soils around granitic flatrocks or in (formerly) fire-maintained communities. Var. *mabryanum* is the characteristic variety of *P. integrifolium* in the Sandhills of NC. Mears named a new species, *P. radfordii* Mears, to accomodate sinuate-lobed *Parthenium* from the fall-line sandhills of NC and SC, which he also believed to be later-blooming (August-November) than other *Parthenium*. Extensive observations in the Sandhills of NC show that "*P. radfordii*" consistently co-occurs in mixed populations with *P. integrifolium* var. *mabryanum*, and that flowering is triggered by fire. Sinuate-lobed plants are best considered a form of var. *mabryanum*. [= K; < *P. integrifolium* var. *integrifolium* – RAB; < *P. integrifolium* – RAB, C, F, G, S, SE, W; < *P. integrifolium* – FNA; > *P. integrifolium* var. *mabryanum* – Z; > *P. radfordii* Mears – Z]

Pascalia Ortega 1797

A genus of 2 species, perennial herbs, of South America. References: Strother in FNA (2006c).

* ***Pascalia glauca*** Ortega, Beach Creeping Oxeye. Cp (FL, GA): coastal dunes, disturbed areas; rare, native of South America, perhaps only a waif. Reported for FL, GA, and AL. [= FNA, K, S, WH; = *Wedelia glauca* (Ortega) O. Hoffmann – SE]

Pectis Linnaeus 1759

A genus of about 90 species, herbs, of s. North America, Mexico, Central America, West Indies, South America, and Pacific Islands. References: Keil in FNA (2006c).

* ***Pectis prostrata*** Cavanilles. Cp (FL, NC?): roadsides, other dry disturbed areas; rare, native of tropical America (probably including s. FL). July-November. Reported for NC (Basinger, pers. comm. 2006); likely to be in GA, AL, and SC. Spreading northward along roadsides. [= FNA, WH]

Peripleura (N.T. Burbidge) Nesom 1994

* ***Peripleura arida*** (N.T. Burbidge) Nesom. Cp (SC): waste areas around wool-combing mill; rare, perhaps only a waif, native of Australia. See Nesom (2004d). [= *Vittadinia arida* N.T. Burbidge]

Petasites P. Miller 1754 (Butterbur)

A genus of 15-18 species, perennial herbs, of Eurasia and boreal North America. References: Bayer, Bogle, & Cherniawsky in FNA (2006b).

* *Petasites hybridus* (Linnaeus) P.G. Gaertner, B. Meyer, & Scherbius, Butterbur, Butterfly-dock, native of Europe, is introduced and naturalizing south to DE, WV, and se. PA. [= C, F, FNA, G, K]

Phoebanthus S.F. Blake 1916

A genus of 2 species, perennial herbs, of the Southeastern United States (FL and AL). References: Schilling in FNA (2006c).

1 Leaves 3-5 mm wide; phyllaries appressed; [of ne. FL south to s. peninsular FL].....***Ph. grandiflorus***
1 Leaves 1.2 mm wide; phyllaries spreading; [of Panhandle FL and s. AL].....***Ph. tenuifolius***

Phoebanthus grandiflorus (Torrey & A. Gray) S.F. Blake. Cp (FL): sandhills; rare. March-November. Ne. FL (Clay County) south to c. peninsular FL. [= FNA, K, SE, WH] {add synonymy}

Phoebanthus tenuifolius (Torrey & A. Gray) S.F. Blake. Cp (FL): sandhills and flatwoods; rare. May-September. Endemic to s. AL and Panhandle FL. [= FNA, K, SE, WH; = *Ph. tenuifolia* – S, orthographic variant]

Picris Linnaeus 1753 (Bitterweed, Oxtongue)

A genus of about 40 species, of the Old World, particularly the Mediterranean region. References: Strother in FNA (2006a); Cronquist (1980)=SE. [also see *Helminthotheca*]

1 Phyllaries in 2 series; phyllaries 3.5-8 mm wide; inner phyllaries 12-20 mm long; plant annual or biennial .....*[see **Helminthotheca echioides**]*
1 Phyllaries imbricate; phyllaries <3 mm wide; inner phyllaries 11-13 mm long; plant biennial to perennial.....***P. hieracioides***

* ***Picris hieracioides*** Linnaeus, Hawkweed Oxtongue, Cat's-ear. Mt (NC), Cp (VA): disturbed areas; rare, native of Europe. May-October. [= RAB, C, F, FNA, G, SE, W; > *Picris hieracioides* Linnaeus ssp. *hieracioides* – K]

Pityopsis Nuttall 1840 (Grass-leaved Golden-aster)
(contributed by Bruce A. Sorrie)

A genus of about 8 species (and numerous infraspecific taxa), herbs, of se. North America south to Central America. *Pityopsis* is taxonomically and nomenclaturally a difficult genus. The problems include nomenclatural issues involving typification and application (and frequently misapplication) of a plethora of names at specific and varietal level, disagreement over whether to include *Pityopsis* within an inclusive *Chrysopsis*, whether then to include *Chrysopsis* within an even more inclusive *Heterotheca*, and differences in species concepts in a morphologically and cytologically diverse group. References: Semple in FNA (2006b); Semple & Bowers (1985)=Z; Ward (2004c)=Y; Cronquist (1980)=SE.

1 Basal leaves shorter than the stem leaves; middle and upper stem leaves similar in size to one another.
  2 Leaves and stem glabrate, not silky pubescent; leaves 0.8-1.5 mm wide; [of the fall line Sandhills, from sc. NC south to AL].....***P. pinifolia***
  2 Leaves and stems silky pubescent; leaves 2-7 mm wide; [of se. TN, **or** of s. NJ northward, **or** of FL Panhandle].
    3 Peduncles and phyllaries moderately to densely stipitate-glandular; [plants of the Mountains of TN].....*[**P. ruthii**]*
    3 Peduncles and phyllaries not stipitate-glandular (or only sparsely and minutely so); [plants of the Coastal Plain].
      4 Stems straight; involucres 508 mm high; [plants of sandy places, from s. NJ northward].....*[**P. falcata**]*
      4 Stems flexuous; involucres (7-) 8-11 mm high, equaling the pappus; [plants of Panhandle FL].....***P. flexuosa***
1 Basal leaves much longer than the stem leaves; stem leaves strongly reduced upward, the upper stem leaves much smaller than middle stem leaves.
  5 Heads < 10; cauline leaves few, generally 2-7; [of sw. GA westward and southward].....***P. oligantha***
  5 Heads > 10; cauline leaves many; [collectively widespread in our area].
    6 Peduncles and upper stem densely glandular-hairy (stipitate-glandular); phyllaries densely glandular-hairy; involucres 4.5-8 mm high; lower leaves < 10 mm wide.
      7 All stem leaves silky pubescent; [widespread in our area].....***P. aspera** var. **adenolepis***
      7 Lower leaves silky pubescent, the mid to upper stem leaves glabrate and evidently stipitate glandular along the margins; [of sc. GA south into panhandle FL].....***P. aspera var. aspera***
    6 Peduncles and upper stem eglandular to sparsely glandular; phyllaries eglandular, or the inner phyllaries sparsely to densely glandular, at least distally; involucres 5-12 mm high; lower leaves up to 20 mm wide.
      8 Involucres 8-12 mm high, with > 30 disk flowers.....***P. graminifolia** var. **latifolia***
      8 Involucres 5-8 mm high, with < 30 disk flowers.
        9 Inner phyllaries densely stipitate-glandular, at least distally.....***P. graminifolia** var. **graminifolia***
        9 Inner phyllaries eglandular to sparsely glandular.....***P. graminifolia** var. **tenuifolia***

Pityopsis aspera (Shuttleworth ex Small) Small *var.* ***adenolepis*** (Fernald) Semple & Bowers. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC): dry woodlands, forests, and disturbed places, apparently in the Mountains only in the Escarpment; common. Late June-October. E. and c. VA south to n. FL and west to s. MS. Var. *adenolepis* includes 2 chromosome numbers (2n = 18 and 36), which "account, in part, for the range of variation in involucre, floret, and fruit size" (Semple & Bowers 1985). [= FNA, K, Z; > *Heterotheca adenolepis* (Fernald) Ahles – RAB; > *Heterotheca graminifolia* (Michaux) Shinners – RAB, misapplied; < *Chrysopsis graminifolia* (Michaux) Elliott var. *aspera* (Shuttleworth ex Small) A.

Gray – C, G, SE, W; = *Chrysopsis graminifolia* (Michaux) Elliott – F, misapplied; = *P. adenolepis* (Fernald) Semple; < *Pityopsis aspera* – S, WH; < *Heterotheca aspera* (Shuttleworth ex Small) Shinners]

Pityopsis aspera (Shuttleworth ex Small) Small *var.* ***aspera***. Cp (FL, GA): sandhills, dry flatwoods; common. Sc. GA south to Panhandle FL. [= FNA, K, Z; < *Pityopsis aspera* – S, WH; < *Chrysopsis graminifolia* (Michaux) Elliott var. *aspera* (Shuttleworth ex Small) A. Gray – SE]

Pityopsis flexuosa (Nash) Small. Cp (FL): sandhills; rare. E. Panhandle FL. [= FNA, S, WH, Z; = *Chrysopsis flexuosa* Nash – SE]

Pityopsis graminifolia (Michaux) Nuttall *var.* ***graminifolia***. Cp (FL, GA, NC, SC): sandhills; uncommon. July-October. As interpreted here, *P. graminifolia* includes 5 varieties "that intergrade and hybridize, when the ploidy level is the same" (Semple & Bowers 1985). Var. *graminifolia* ranges from se. NC south to c. peninsular FL, and west to e. LA; in our area it is known only from the outer Coastal Plain. Two of the varieties do not reach our area, being restricted to peninsular FL: var. *aequilifolia* Bowers & Semple and the hexaploid (2n = 54) var. *tracyi* (Small) Semple. [= FNA, K, Z; < *Heterotheca nervosa* (Willdenow) Shinners var. *microcephala* (Small) Shinners ex Ahles – RAB; < *Chrysopsis graminifolia* (Michaux) Elliott var. *graminifolia* – C; < *Pityopsis microcephala* (Small) Small – S; < *Chrysopsis graminifolia* (Michaux) Elliott var. *microcephala* (Small) Cronquist – SE; < *Pityopsis graminifolia* – WH]

Pityopsis graminifolia (Michaux) Nuttall *var.* ***latifolia*** Fernald. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC, VA): sandhills, dry woodlands and forests (such as ridgetop pine/heath communities in the Mountains), roadbanks; common (rare in VA Piedmont and Mountains). June-October. Var. *latifolia* is the most widely distributed variety of *P. graminifolia*, ranging from DE, s. OH, and c. AR south to s. FL and e. TX; Bahamas; and in Mexico (Tamaulipas, Vera Cruz, Oaxaca, Chiapas) and Central America (Belize, Guatemala, Honduras). [= FNA, K, Z; > *Heterotheca nervosa* (Willdenow) Shinners var. *nervosa* – RAB; > *Heterotheca correllii* (Fernald) Ahles – RAB; = *Chrysopsis graminifolia* (Michaux) Elliott var. *latifolia* Fernald – C, W; > *Chrysopsis nervosa* (Willdenow) Fernald var. *nervosa* – F; < *Chrysopsis graminifolia* (Michaux) Elliott – G; > *Chrysopsis nervosa* var. *virgata* Fernald – F; > *Chrysopsis nervosa* var. *stenolepis* Fernald – F; = *Pityopsis graminifolia* – S, misapplied; = *Chrysopsis graminifolia* (Michaux) Elliott var. *graminifolia* – SE, misapplied; < *Pityopsis graminifolia* – WH]

Pityopsis graminifolia (Michaux) Nuttall *var.* ***tenuifolia*** (Torrey) Semple & Bowers. Cp (FL, GA, NC, SC, VA): sandhills, sandy woodlands, savannas, pine flatwoods; common. July-October. Var. *tenuifolia* ranges from se. NC south to s. FL and west to e. TX (north inland to c. AR and e. OK); apparently disjunct in se. VA. [= FNA, K, Z; < *Heterotheca nervosa* (Willdenow) Shinners var. *microcephala* (Small) Shinners ex Ahles – RAB (also see *P. graminifolia* var. *graminifolia*); < *Pityopsis microcephala* (Small) Small – S (also see *P. graminifolia* var. *graminifolia*); < *Chrysopsis graminifolia* (Michaux) Elliott var. *microcephala* (Small) Cronquist – SE (also see *P. graminifolia* var. *graminifolia*); < *Pityopsis graminifolia* – WH; ? *Pityopsis nervosa* var. *nervosa* – Y]

Pityopsis oligantha (Chapman ex Torrey & A. Gray) Small, Narrow-leaved Goldenaster. Cp (FL, GA): wet flatwoods and pitcherplant bogs; rare. Sw. GA and Panhandle FL west to s. AL (alleged reports from further west seem to be in error). [= FNA, K, S, WH, Z; = *Chrysopsis oligantha* Chapman ex Torrey & A. Gray – SE; = *Heterotheca oligantha* (Chapman ex Torrey & A. Gray) Harms]

Pityopsis pinifolia (Elliott) Nuttall, Sandhill Goldenaster. Cp (GA, NC, SC): sandhills, sandy roadsides; locally common (rare in GA). August-October. This species is locally abundant (and often weedy) but very local in distribution, limited to (apparently) scattered counties in the Sandhills (rarely middle Coastal Plain) of s. NC, SC, GA, and c. AL. [= FNA, K, S, Z; = *Heterotheca pinifolia* (Elliott) Ahles – RAB; = *Chrysopsis pinifolia* Elliott – SE]

Pityopsis ruthii (Small) Small. Mt (TN): flood-scoured rocks along rivers; rare. Restricted to rocks within the flood zone of the Hiwassee and Ocoee rivers, Polk County, TN; it should be sought in adjacent sw. NC. [= FNA, K, S, Z; = *Chrysopsis ruthii* Small – SE; = *Heterotheca ruthii* (Small) V.L. Harms]

Pityopsis falcata (Pursh) Nuttall. Cp (NJ): stable dunes (NJ), further north in sandplain grasslands, coastal heathlands, pitch pine-scrub oak barrens; rare. Se. MA south through RI, CT, and NY (Long Island) to s. NJ. [= FNA, K, Z; = *Chrysopsis falcata* (Pursh) Elliott – C, F, G]

Pityopsis graminifolia (Michaux) Nuttall var. *tracyi* (Small) Semple. Endemic to Panhandle FL; reports of it in n. AL are probably based on aberrant individuals of P. graminifolia. [= FNA, K, Z; = *P. tracyi* Small – S; < *Chrysopsis graminifolia* – SE; < *Pityopsis graminifolia* – WH; = *Pityopsis nervosa* (Willdenow) Dress var. *tracyi* (Small) D.B. Ward] {not keyed}

Plectocephalus D. Don in R. Sweet 1830 (Basketflower)

A genus of 4 species, annual herbs, of midwestern North America, Mexico, South America, and Africa. References: Keil in FNA (2006a).

* ***Plectocephalus americanus*** (Nuttall) D. Don in R. Sweet, American Basketflower. Cp (SC): waste ground around wool-combing mills; rare, introduced from further west (Nesom 2004d). [= FNA; = *Centaurea americana* Nuttall – C, F, G, K, SE]

Pluchea Cassini 1817 (Marsh-fleabane)

A genus of about 40 species, herbs and shrubs, of tropical, subtopical, and warm temperate regions. References: Nesom in FNA (2006a); Godfrey (1952)=Z, Nesom (1989, 2004a)=Y; Arriagada (1998)=X; Pruski (2005)=V; Cronquist (1980)=SE. Key based on FNA and other sources.

1 Stems winged by decurrent leaf bases ..... ***P. sagittalis***

1 Stems not winged by decurrent leaf bases.
2 Leaves petiolate or narrowly cuneate at the base; [section *Pluchea*].
3 Phyllaries glandular on the outer surface (the outer bracts also somewhat pubescent); inflorescence paniculiform, the lateral branches not reaching or exceeding the central branches; plants to 20 dm tall; [in freshwater habitats, widespread in the Coastal Plain and Piedmont] ..... ***P. camphorata***
3 Phyllaries short-pubescent with several-celled glandular-tipped hairs; inflorescence more-or-less cymiform and flat-topped, some of the lower lateral branches elongate and reaching or exceeding the central branches; plants to 10 (-15) dm tall; [mainly in salty or brackish habitats, restricted to the outer Coastal Plain] ..... ***P. odorata***
2 Leaves sessile, and either rounded, truncate, or clasping at the base; [section *Amplectifolium*].
4 Leaves mostly 8-20 cm long and 3-7 cm wide; involucre 9-12 mm high; middle phyllaries 2.5-3 mm wide ..... ***P. longifolia***
4 Leaves mostly 3-10 cm long and 1-3 cm wide; involucre 5-10 mm high; middle phyllaries 1-1.5 mm wide.
5 Stems and leaves glandular, otherwise nearly glabrous; involucre 4-5 mm wide ..... ***[P. yucatanensis]***
5 Stems and leaves puberulent or arachnose as well as glandular; involucre 5-12 mm wide.
6 Corollas pink or purple; heads 4-6 mm high, 5-9 mm wide; phyllaries usually arachnoid and commonly also with dense, thick, viscid hairs; outer phyllaries acuminate; nutlets black, 0.5-1 mm long, densely pubescent; [flowering June-July] ..... ***P. baccharis***
6 Corollas creamy white; heads 6-10 mm high, 6-12 mm wide; phyllaries thinly arachnoid, with sessile glands; outer phyllaries obtuse or obtuse-apiculate; nutlets pinkish, ca. 1 mm long, pubescent on the angles; [flowering late July-October].
7 Plants 3-11 dm tall; inner phyllaries 4-6 mm long; [widespread in our area] ..... ***P. foetida var. foetida***
7 Plants 9-25 dm tall; inner phyllaries 6-7 mm long; [of the Coastal Plain of SC southward] ..... ***P. foetida var. imbricata***

Pluchea baccharis (P. Miller) Pruski, Marsh Fleabane. Cp (FL, GA, NC, SC): wet savannas, natural ponds, marshes, ditches; common. June-July. E. NC south to s. FL, west to se. TX; Bahamas, Cuba, Mexico, and Central America. Pruski (2005) established that *P. baccharis* is the correct name for the taxon known in recent decades as *P. rosea*. Godfrey (1952) recognized two varieties of *P. rosea*, var. *rosea* of se. United States and var. *mexicana* R.K. Godfrey of gypsum plains in San Luis Potosí, Mexico; Nesom (1989) recognized the latter taxon at the species level, *P. mexicana* (R.K. Godfrey) Nesom. [= FNA, V. WH; = *P. rosea* R.K. Godfrey – RAB, K, WH, X, Y; = *P. rosea* var. *rosea* – GW, SE]

Pluchea camphorata (Linnaeus) A.P. de Candolle, Camphorweed, Camphor Pluchea. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): bottomland sloughs, clay flatwoods, other freshwater wetlands; common. August-October. DE and MD south to n. peninsular FL, west to TX and OK, north in the interior to s. OH and e. KS. [= RAB, C, F, FNA, G, GW, K, SE, WH, X, Y; = *P. petiolata* Cassini – S]

Pluchea foetida (Linnaeus) A.P. de Candolle *var. **foetida***, Stinking Fleabane. Cp (FL, GA, NC, SC, VA): seasonally wet areas, ditches, various other freshwater wetlands; common. Late July-October. S. NJ south to s. FL, west to e. TX; West Indies (?). [= K; < *P. foetida* – RAB, C, F, FNA, G, GW, SE, WH, X, Y; > *P. foetida* – S; > *P. tenuifolia* Small – S]

Pluchea foetida (Linnaeus) A.P. de Candolle *var. **imbricata*** Kearney. Cp (FL, GA, SC): freshwater wetlands; rare. Late July-October. SC south to FL Panhandle. The validity and distribution of this taxon need additional study. [= K; < *P. foetida* – RAB, C, FNA, GW, SE, WH, X, Y; = *P. imbricata* (Kearney) Nash – S]

Pluchea longifolia Nash. Cp (FL): brackish and freshwater marshes and swamps, ditches, canals; uncommon. Ne. FL and eastern FL Panhandle (Wakulla and Taylor counties) south to c. peninsular FL (Wunderlin & Hansen 2008). [= FNA, GW, S, WH]

Pluchea odorata (Linnaeus) Cassini, Saltmarsh Fleabane. Cp (GA, NC, SC, VA): salt and brackish marshes; common. August-October. VA south to s. FL, west to TX, also in w. United States, Central America, and South America. Two varieties are sometimes recognized, the widespread and more robust, but small headed var. *odorata* (involucre 4-6 (-7) mm across the disk, with 6-13 (19) functionally staminate flowers; plants 2-8 (-20) dm tall; of VA southward), and the northeastern North American and less robust but large-headed var. *succulenta* (involucre 7-8 (-10) mm across the disk, with (14-) 21-34 functionally staminate flowers; plants 2-6 dm tall; of NC northward). Additional study is needed to warrant recognition of the varieties. [= GW, WH, X, Y; = *P. purpurascens* (Swartz) A.P. de Candolle – RAB; > *P. odorata* var. *odorata* – C, FNA, K, SE; > *P. odorata* (Linnaeus) Cassini var. *succulenta* (Fernald) Cronquist – C, FNA, K, SE; > *P. purpurascens* (Swartz) A.P. de Candolle var. *purpurascens* – F, G; > *P. purpurascens* (Swartz) A.P. de Candolle var. *succulenta* Fernald – F, G; > *P. camphorata* – S, misapplied]

* ***Pluchea sagittalis*** (Lamarck) Cabrera, Wing-stem Camphorweed. Cp (FL): disturbed areas; rare, probably only a waif, known from old collections (1891-1901) from Pensacola, FL, and Mobile, AL, native of South America. July-August. [= FNA, WH; = *P. quitoc* de Candolle – S; = *P. suaveolens* (Vell.) Kuntze – SE] {synonymy incomplete}

* *Pluchea yucatanensis* Nesom, Yucatan Camphorweed. Cp (AL, MS): {habitat}; rare. Introduced in AL and MS from Mexico and Belize. [= FNA]

Polymnia Linnaeus 1753

A genus of 3 species, herbs, of e. North America. References: Wells (1965)=Z; Strother in FNA (2006c); Cronquist (1980)=SE. [also see *Smallanthus*]

1 Stem obviously and usually densely pubescent; cypselas 3-ribbed ..... ***P. canadensis***
1 Stem glabrous or nearly so (except sometimes in the inflorescence); cypselas 4-6-ribbed ..... ***P. laevigata***

Polymnia canadensis Linnaeus, White-flowered Leafcup. Mt (GA, NC, VA), Pd (VA): moist forests, particularly over calcareous rocks; common, rare in NC, uncommon in VA Piedmont (rare in NC). July-October. VT and Ontario west to MN, south to NC, nw. GA, AL, and AR. [= RAB, C, F, FNA, G, K, SE, W, Z; > *P. canadensis* – S; > *P. radiata* (A. Gray) Small – S]

Polymnia laevigata Beadle, Tennessee Leafcup. Mt (GA), Cp (FL): bouldery slopes, coquina outcrops and rubble (in FL); rare. W., c., and se. TN (Chester, Wofford, & Kral 1997), AL, Panhandle FL (Jackson County), nw. GA, and MO. [= FNA, K, S, SE, WH, Z]

Prenanthes Linnaeus 1753 (Rattlesnake-root)

A genus of about 30 species, herbs, of north temperate parts of the New and Old World. Preliminary molecular results suggest that *Prenanthes* includes disparate components, and North American taxa may be best treated in the segregate genus *Nabalus*. References: Bogler in FNA (2006a); Johnson (1980)=Z; Fusiak & Schilling (1984)=Y; Cronquist (1980)=SE. Key adapted from C and SE, in part.

Identification notes: The species cannot be reliably identified in sterile condition. "Principal phyllaries" are the inner, well-developed, excluding the few smaller and poorly-developed outer phyllaries.

1 Principal phyllaries 12-15; florets 15-38 per head; [of north and west of our area] ..... ***[P. crepidinea]***
1 Principal phyllaries 4-10; flowers mostly 4-19 per head; [collectively widespread in our area].
  2 Phyllaries glabrous or with few cilia or inconspicuous fine short pubescence at the tip.
    3 Principal phyllaries (4-) 5 (-6); flowers 4-6 per head ..... ***P. altissima***
    3 Principal phyllaries 7-10; flowers 8-15 per head.
      4 Inflorescences narrow and elongate (virgate); flowers pink to purple ..... ***P. autumnalis***
      4 Inflorescences open, corymbiform to paniculiform, with some elongate branches; flowers white, cream, yellowish, pink, or purple.
        5 Pappus cinnamon-brown; corolla whitish to pinkish ..... ***P. alba***
        5 Pappus straw-colored to light brown; corolla pale yellow ..... ***P. trifoliolata***
  2 Phyllaries evidently (though sometimes sparsely) pubescent with long coarse hairs (1.5-3 mm long).
    6 Inflorescence corymbiform to paniculiform, many of the branches well-developed.
      7 Phyllaries densely setose; leaves usually merely toothed, or shallowly lobed ..... ***P. barbata***
      7 Phyllaries sparsely setose; principal leaves usually evidently lobed ..... ***P. serpentaria***
    6 Inflorescence cylindric, thyrsoid, the branches very short.
      8 Heads nodding; principal phyllaries 4-7 (-9); flowers 5-8 (-13) per head; [of the Southern Appalachians] ..... ***P. roanensis***
      8 Heads ascending or nearly erect; principal phyllaries (6-) 8 (-10); flowers (8-) 11-14 (-19) per head; [west or north of our area].
        9 Stem and leaves rough-hairy; flowers creamy yellow ..... ***[P. aspera]***
        9 Stem and leaves glabrous; flowers usually purplish ..... ***[P. racemosa var. racemosa]***

Prenanthes alba Linnaeus, Northern Rattlesnake-root. Mt (NC, VA), Pd (VA), Cp? (VA?): forests; uncommon (rare south of VA). August-November. ME west to Manitoba, south to ne. NC, w. NC, WV, and MO. Reported for GA (GANHP). reports of *P. alba* from the Coastal Plain of NC and perhaps VA are based on *P. alba* ssp. *pallida*, which is invalidly published; additionally, specimens attributed to this taxon are appear to be attributable to *P. trifoliolata*. [= C, F, FNA, G, K, SE, W, Z; = *P. alba* ssp. *alba* – RAB; = ***Nabalus albus*** (Linnaeus) Hooker – S]

Prenanthes altissima Linnaeus, Tall Rattlesnake-root. Mt, Pd, Cp (GA, NC, SC, VA): forests; common (uncommon in Coastal Plain). August-November. Newfoundland west to MI, south to GA, LA, and AR. [= RAB, FNA, G, K, W, Y, Z; > *P. altissima* var. *altissima* – C, F, SE; = ***Nabalus altissimus*** (Linnaus) Hooker – S]

Prenanthes autumnalis Walter, Slender Rattlesnake-root. Cp (FL, GA, NC, SC, VA): pocosins, pine savannas, forest edges; common. September-November. NJ south to ne. FL, a Southeastern Coastal Plain endemic. [= RAB, C, F, FNA, G, K, SE, WH, Z; = *Nabalus virgatus* (Michaux) A.P. de Candolle – S; ***Nabalus***]

Prenanthes barbata (Torrey & A. Gray) Milstead, Barbed Rattlesnake-root, Flatwoods Rattlesnake-root. Mt (GA): limestone glades and barrens; rare. C. TN (Western Highland Rim) (Chester, Wofford, & Kral 1997), nw. GA, and n. AL west to se. AR, e. TX and w. LA. [= FNA, K, SE; < *Nabalus integrifolius* Cassini – S; = *P. serpentaria* Pursh var. *barbata* Torrey & A. Gray; ***Nabalus***]

Prenanthes roanensis (Chickering) Chickering, Roan Rattlesnake-root, Appalachian Rattlesnake-root. Mt (NC, VA): mountain forests, grassy balds, at high elevations; uncommon. August-October. Sw. VA south to w. NC and e. TN. Fusiak & Schilling (1984) studied *P. roanensis* and related species. Additional characters (other than those explicitly used in the key above) useful in separating *P. roanensis* from *P. altissima* are: phyllary tips usually black (vs. usually green), flowers 5-8 per head (vs. 4-6), and inflorescence usually narrow and thyrsoid (vs. usually conspicuously branched). [= RAB, C, FNA, K, SE, W, Y, Z; > *P. cylindrica* (Small) Braun – G; > ***Nabalus roanensis*** Chickering – S; > *Nabalus cylindricus* Small – S]

Prenanthes serpentaria Pursh, Lion's-foot, Gall-of-the-earth. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): forests; common (uncommon in Coastal Plain). August-October. MA south to GA, ne. FL, Panhandle FL, and MS. [= RAB, C, F, FNA, G, K, SE, W, WH, Y, Z; > ***Nabalus serpentarius*** (Pursh) Hooker – S; >< *Nabalus integrifolius* Cassini – S (also see *Prenanthes barbata*)]

Prenanthes trifoliolata (Cassini) Fernald, Gall-of-the-earth. Mt (GA, NC, VA), Cp (NC, SC, VA), Pd (VA): forests; common (rare in Coastal Plain). August-November. Newfoundland south to e. NC, n. GA, and TN. [= C, FNA, G, K, SE, W, Z; > *P. trifoliolata* – RAB; > *P. alba* ssp. *pallida* Milstead – RAB, not validly published; ? *P. trifoliolata* var. *trifoliolata* – F; = *Nabalus trifoliatus* – S, orthographic variant; = ***Nabalus trifoliolatus*** Cassini]

Prenanthes aspera Michaux, Rough Rattlesnake-root. A midwestern species, east to c. TN, KY, OH, and PA. [= C, F, G, K, SE; = ***Nabalus asper*** (Michaux) Torrey & A. Gray – S; = *Nabalus asperus*, orthographic variant]

Prenanthes crepidinea Michaux, Midwestern Rattlesnake-root. A midwestern species, ranging east to NY, sw. PA, e. WV, and c. TN (Western Highland Rim) (Chester, Wofford, & Kral 1997). [= C, F, FNA, G, K, SE; = ***Nabalus crepidineus*** (Michaux) A.P. de Candolle – S]

Prenanthes racemosa Michaux var. *racemosa*, Glaucous Rattlesnake-root. Calcareous siltstone/shale glades, other habitats. A northern species, ranging south to NJ, w. PA, and ne. KY (Clark et al. 2005). [= C, K; < *P. racemosa* – F, FNA; = *P. racemosa* ssp. *racemosa* – G; ? ***Nabalus racemosus*** (Michaux) Hooker]

Pseudognaphalium Kirpicznikov 1950 (Rabbit-tobacco)

A genus of about 100 species, herbs, nearly cosmopolitan, especially of American temperate regions. References: Nesom in FNA (2006a); Mahler (1975)=Z; Arriagada (1998)=Y; Cronquist (1980)=SE; Nesom (2001a)=X; Anderberg (1991). Key based, in part, on SE.

1 Involucre 2-3 mm high; plants to 2.5 dm tall; inflorescence of many, small, axillary and terminal clusters overtopped by subtending leaves..... ***[see Gnaphalium uliginosum]***

1 Involucre 4-7 mm high; plants generally well over 2.5 dm tall; inflorescence terminal, usually elongate.
- 2 Leaves distinctly (but shortly) decurrent and adnate-auriculate on the stem.
  - 3 Upper surface of the leaves coarsely glandular-hairy..... ***Ps. macounii***
  - 3 Upper surface of the leaves loosely tomentose, not glandular ..... ***Ps. stramineum***
- 2 Leaves sessile, not decurrent or adnate-auriculate.
  - 4 Stem white-woolly or arachnoid with matted white hairs, the stem surface generally obscured (sometimes glandular-pubescent at the base of the stem only)..... ***Ps. obtusifolium***
  - 4 Stem glandular-pubescent or glandular-puberulent, the hairs at right angles to the stem, the stem surface plainly visible.
    - 5 Stems glandular-villous, the stipitate glands (0.1-) 0.3-1.0 mm high, prominently variable in height on any portion of the stem, with a stalk broadened toward the base and about equal the gland width; pistillate florets 83–107, bisexual florets 9–15; leaves mostly oblong-lanceolate, 2.5–7 cm long, 4–20 mm wide, 4–8 times longer than wide; plant 4-10 dm tall ..... ***Ps. helleri***
    - 5 Stems glandular-puberulent, the stipitate glands 0.1–0.2 mm high, relatively even in height on any portion of the stem, with a filiform stalk of even width and narrower than the gland width; pistillate florets 47–78, bisexual florets (7–) 11–20; leaves linear to linear-lanceolate or linear-oblanceolate, 1.5–5.5 cm long, 1.5–10 mm wide, 6–10 times longer than wide; plant 3-7 dm tall..... ***Ps. micradenium***

Pseudognaphalium helleri (Britton) A. Anderberg, Heller's Rabbit Tobacco. Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): dry woodlands and openings (especially over over mafic rocks), sandhills; rare. September-October. Sc. VA south to Panhandle FL, s. AL, west to AR, LA, and ne. TX. [= FNA, X; = *Gnaphalium helleri* Britton var. *helleri* – Z; < *Gnaphalium helleri* – RAB, C, G, S, SE, W (also see *Ps. micradenium*); = *Gnaphalium obtusifolium* var. *helleri* (Britton) Blake – F, Y; = *Pseudognaphalium helleri* (Britton) A. Anderberg ssp. *helleri* – K; < *Pseudognaphalium helleri* – WH]

Pseudognaphalium macounii (Greene) Kartesz, Clammy Cudweed, Winged Cudweed. Mt (VA): dry fields, pastures, and woodland edges at high elevations; rare. July-September. Québec west to British Columbia, south to w. VA, WV, TN, and Mexico. [= FNA, K; = *Gnaphalium macounii* Greene – C, F, S; < *Gnaphalium viscosum* – SE, Y, misapplied; < *Pseudognaphalium viscosum* (Kunth) W.A. Weber, misapplied]

Pseudognaphalium micradenium (Weatherby) Nesom, Small Rabbit Tobacco. Pd, Cp, Mt (NC, SC, VA), {GA}: dry woodlands and openings; rare. September-October. Se. ME west to WI, south to e. SC, c. GA, se. TN, and s. MO. Nesom (2001a) discusses the distinctiveness of this taxon and its treatment as a species, rather than variety. [= FNA, X; = *Gnaphalium helleri* Britton var. *micradenium* (Weatherby) Mahler – Z; < *Gnaphalium helleri* – RAB, C, G, S, SE, W; = *Gnaphalium obtusifolium* var. *micradenium* Weatherby – F, Y; = *Pseudognaphalium helleri* (Britton) A. Anderberg ssp. *micradenium* (Weatherby) Kartesz – K]

Pseudognaphalium obtusifolium (Linnaeus) Hilliard & Burtt, Fragrant Rabbit Tobacco. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): openings, woodlands, coastal dunes, sandy pinelands. disturbed areas; common. August-October. Newfoundland west to Ontario, south to s. FL and TX. [= FNA, WH, X; = *Gnaphalium obtusifolium* Linnaeus – RAB, S, SE, W; > *G. obtusifolium* var. *obtusifolium* – F; > *Gnaphalium obtusifolium* Linnaeus *var. praecox* Fernald – F; = *Gnaphalium obtusifolium* var. *obtusifolium*– C, G, Y; > *Pseudognaphalium obtusifolium* ssp. *obtusifolium* – K; > *Pseudognaphalium obtusifolium* ssp. *praecox* (Fernald) Kartesz – K; *? Gnaphalium polycephalum* Michaux]

* ***Pseudognaphalium stramineum*** (Kunth) A. Anderberg. Cp (NC, SC, VA), Pd (NC, SC): sandy fields, roadsides, disturbed places; uncommon, native of TX south through Mexico and into South America. Late May-August. [= FNA, K; = *Gnaphalium stramineum* Kunth – C; *? G. chilense* Sprengel – RAB, SE, Y]

Pterocaulon Elliott 1823 (Blackroot)

A genus of about 18 species, herbs, of tropical, subtropical, and warm temperate America, and of Oceania and se. Asia. References: Nesom in FNA (2006a); Arriagada (1998)=Z; Cronquist (1980)=SE.

Identification notes: *Pterocaulon* is an unmistakable plant, the stems and leaf undersurfaces creamy-white floccose-tomentose, the leaf bases decurrent down the stem, the heads in oblong, terminal spikes, the tip nodding before anthesis.

Pterocaulon pycnostachyum (Michaux) Elliott, Blackroot, Wingstem. Cp (FL, GA, NC, SC): sandhills, dry pinelands, pine flatwoods; common. May-June. Se. NC south to s. FL and west to s. AL. [= RAB, FNA, GW, K, SE, WH, Z; = *P. undulatum* (Walter) C. Mohr – S]

Pulicaria Gaertner 1791 (False-fleabane)

A genus of 100 or more species, herbs (rarely shrubs), of Europe, Asia, and Africa. References: Preston in FNA (2006a).

* *Pulicaria arabica* (Linnaeus) Cassini. Cp (FL): disturbed areas (on ballast); rare (not recently collected), native of Africa. [= FNA, SE, WH; = *Vicoa auriculata* Cassine – S (misapplied)] {not keyed}

Pyrrhopappus A.P. de Candolle 1838 (False-dandelion)

A genus of 3-5 species, herbs, of sw. and se. North America. References: Strother in FNA (2006a); Cronquist (1980)=SE.

Pyrrhopappus carolinianus (Walter) A.P. de Candolle, False-dandelion. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry and moist forests, roadsides, meadows, fields; common (uncommon in NC and SC Mountains, rare in VA Mountains). March-June (and sometimes later). DE, se. PA, and MD south to c. peninsular FL, west to IL, MO, and TX. [= C, F, FNA, G, K, W, WH; > *P. carolinianus* var. *carolinianus* – RAB, SE; > *P. carolinianus* var. *georgianus* (Shinners) Ahles – RAB, SE; = *Sitilias caroliniana* (Walter) Rafinesque – S; > *Pyrrhopappus georgianus* Shinners]

Ratibida Rafinesque 1817 (Prairie Coneflower)

A genus of about 7 species, herbs, of North America. References: Urbatsch & Cox in FNA (2006c); Richards (1968)=Z; Cronquist (1980)=SE. Key adapted from SE.

1 Disks columnar, 2-4.5× as long as thick; plant a tap-rooted perennial; rays < 2 (-2.5) cm long; achenes ciliate and winged, crowned by a pappus consisting of 1 or more awn-teeth ..... ***R. columnifera***
1 Disks ellipsoid-globular, 1-1.6× as long as thick; plant a fibrous-rooted perennial from a woody rhizome or caudex; rays 2.5-3.5 (-4.5) cm long; achenes smooth, lacking a pappus ..... ***R. pinnata***

* ***Ratibida columnifera*** (Nuttall) Wooton & Standley, Columnar Prairie Coneflower. Cp (FL, NC, SC): dry disturbed areas, established around nurseries or plantings, waste areas near wool-combing mills; rare, introduced from further west. May-August. Ontario west to Alberta, south to TX, Mexico, and AZ; introduced at scattered sites eastward, including e. NC, e. SC, and c. TN (Chester, Wofford, & Kral 1997). [= C, F, FNA, G, K, SE, WH, Z; = *R. columnaris* (Sims) D. Don – S]

Ratibida pinnata (Ventenat) Barnhart, Globular Prairie Coneflower, Grey-headed Coneflower. Mt (GA), Pd (SC), Cp (FL): prairie-like glades and oak savannas over gabbro (usually in Iredell soils) or calcareous rocks; rare. June-August. S. Ontario west to MN and SD, south to w. PA, e. TN, nw. GA, Panhandle FL, MS, and OK; disjunct in nc. SC. A characteristic plant of midwestern prairies and limestone glades, remarkably disjunct to "Piedmont prairie" remnants in SC (Nelson 1993). [= C, F, FNA, G, K, S, SE, W, WH, Z]

Rudbeckia Linnaeus 1753 (Yellow Coneflower, Black-eyed Susan)

A genus of about 15 species, herbs, of North America. References: Urbatsch & Cox in FNA (2006c); Cronquist (1980)=SE; Perdue (1957)=Z. Key adapted in part from SE and FNA.

Identification notes: This treatment needs considerable additional work in the herbarium, and will likely be substantially modified.

1 Leaves grasslike, linear-lanceolate, > 10× as long as wide, the basal with blade 10-20 cm long and < 1 cm wide; [of Coastal Plain, of s. GA southward and westward].
  2 Plant with 1 head; rays red, orange, or maroon, 1.0-1.5 cm long; plant pubescent ..... ***R. graminifolia***
  2 Plant with several heads; rays yellow, 1.5-3.5 cm long; plant glabrous ..... ***R. mohrii***
1 Leaves broader, lanceolate, ovate, or pinnately-cleft, < 10× as long as wide; [collectively widespread].
  3 Leaves (at least some of the largest and generally more basal) 3-lobed or more divided.
    4 Disc flowers yellow or yellowish-green; achenes 3.5-6.0 mm long.
      5 Basal and lower stem leaves 1-5-lobed; plants 0.5-2 m tall.
        6 Heads small, the disc mostly 1.0-1.5 cm wide; rays usually 5 or 8; [of the Coastal Plain and Piedmont, VA south to FL, west to LA] ..... ***R. laciniata var. digitata***
        6 Heads larger, the disc mostly 1.5-2.0 cm wide; rays usually 8 or 13; [of high elevations of the Appalachians, VA and KY south to NC and TN] ..... ***R. laciniata var. humilis***
      5 Basal and lower stem leaves 1-2-pinnatifid, with 5-,many lobes; plants 1-3 m tall.
        7 Achenes 3.5-4.0 mm long; pappus > 0.7 mm long; [of DE, MD, and PA northward] ..... ***[R. laciniata var. bipinnata]***
        7 Achenes 4.2-6.0 mm long; pappus < 0.7 mm long; [widespread in our area] ..... ***R. laciniata var. laciniata***
    4 Disc flowers purple-brown; achenes 1.9-3.5 mm long.
      8 Pales acute, hairy near the tip; rays 20-40 mm long ..... ***R. subtomentosa***
      8 Pales cuspidate, with awn-like tips ca. 1.5 mm long, glabrous; rays 8-30 mm long.
        9 Cauline leaves 1-3-lobed (at least some on a plant 3-lobed).
          10 Ray blades 8-17 mm long; discs 10-15 mm across; [widespread in our area] ..... ***R. triloba var. triloba***
          10 Ray blades 18-30 mm long; discs 15-20 mm across; [at moderate to high elevations in the Appalachians] ..... ***R. triloba var. rupestris***

9 Cauline leaves 1-7-lobed (at least some on a plant 5-7-lobed).
11 Phyllaries > 9 mm long; [of the Blue Ridge of NC, VA, and TN] ..... ***R. triloba var. beadlei***
11 Phyllaries < 7 mm long; [of the Coastal Plain of s. AL and panhandle FL] ..... ***R. triloba var. pinnatiloba***
3 Leaves simple, unlobed, toothed (or not).
12 Pales (bracts of the receptacle) glabrous or nearly so (except sometimes for a minutely cilate margin).
13 Pales cuspidate, with awn-like tips ca. 1.5 mm long ..... [go to key lead 8b, above]
13 Pales obtuse to acute.
14 Larger leaves < 2 cm wide ..... ***[R. missouriensis]***
14 Larger leaves > 2 cm wide.
15 Plants 2-3 m tall; stem leaves strongly auriculate-clasping ..... ***R. auriculata***
15 Plants 0.5-1.3 m tall; stem leaves petiolate or sessile, but not auriculate-clasping.
16 Basal leaves with bases cuneate to broadly cuneate.
17 Basal leaves with blades 2.5-3.5× as long as wide; plants villous-hirsute ..... ***R. fulgida var. fulgida***
17 Basal leaves with blades < 2× as long as wide; plants glabrous to sparsely hairy.
18 Basal leaves attenuate-cuneate at the base; rays 15-25 mm long; upper stem leaves notably reduced in size from the lower stem leaves ..... ***R. fulgida var. spathulata***
18 Basal leaves broadly cuneate at the base; rays 20-40 mm long; upper stem leaves not typically reduced in size from the lower stem leaves ..... ***R. fulgida var. speciosa***
16 Basal leaves with bases rounded to cordate.
19 Upper stem leaves notably reduced in size from the lower stem leaves ..... ***[R. fulgida var. sullivantii]***
19 Upper stem leaves not typically reduced in size from the lower stem leaves.
20 Basal leaves with bases rounded; rays 20-40 mm long ..... ***R. fulgida var. speciosa***
20 Basal leaves with bases broadly rounded to cordate; rays 10-30 mm long ..... ***R. fulgida var. umbrosa***
12 Pales densely pubescent near the tip.
21 Plants glabrous or with scattered inconspicuous hairs.
22 Stem spreading-villous, sometimes very sparsely so; disc to 15 mm high ..... ***R. heliopsidis***
22 Stem glabrous; disc elongating in fruit, ultimately 12-60 mm high.
23 Leaves strongly blue-green and glaucous; flowering plants 1-2.5 m tall; largest leaves 7-16 cm wide; [cultivated in our area and rarely persisting or spreading] ..... ***R. maxima***
23 Leaves green; flowering plants 0.5-1.3 m tall; largest leaves < 6.5 cm wide; [native of pitcherplant bogs and wet flatwoods of e. GA and ne. FL west to s. AL] ..... ***R. nitida***
21 Plants conspicuously hirsute or pilose.
24 Plants perennials from a woody rhizome; pappus a low crown; style appendages short, blunt.
25 Disc 10-15 mm across; rays 6-12, mostly spreading, 15-25 mm long; leaves not folded longitudinally ..... ***R. heliopsidis***
25 Disc 15-25 mm across; rays 12-25, mostly reflexed, 30-50 mm long; leaves folded longitudinally.
26 Stem hairy only on the upper stem, the hairs ascending and < 0.5 mm long ..... ***[R. grandiflora var. alismaefolia]***
26 Stem hairy throughout, the hairs spreading on the lower stem, ascending on the upper stem and ca. 1.0 mm long ..... ***R. grandiflora var. grandiflora***
24 Plants annuals, biennials, or perennials from fibrous roots; pappus lacking or a low crown to 0.1 mm high; style appendages elongate, subulate (*R. hirta*) or short, acute to obtuse (*R. mollis*).
27 Stems and leaves softly pilose to woolly; style branches short, acute to obtuse; [plants of dry sands of the Coastal Plain of SC southward] ..... ***R. mollis***
27 Stems and leaves with coarse and stiffish hairs; style branches elongate, subulate; [plants collectively widespread in our area].
28 Stems leafy mainly towards the base, branched mainly near the middle; peduncles usually ½ the height of the plants; [of the Coastal Plain] ..... ***R. hirta var. angustifolia***
28 Stems leafy throughout, branched mainly well above the middle; peduncles < 1/3 the height of the plants; [collectively widespread].
29 Basal leaves broadly elliptic to ovate, 2.5-7 cm wide, mostly ca. 2× as long as wide, with coarsely serrate margins; [primarily Appalachian and westward, mostly of undisturbed habitats] ..... ***R. hirta var. hirta***
29 Basal leaves lanceolate to oblanceolate 1-2.5 (-5) cm wide, mostly 3-5× as long as wide, with entire to serrate margins; [widespread and weedy] ..... ***R. hirta var. pulcherrima***

Rudbeckia auriculata (Perdue) Kral, Swamp Black-eyed Susan. Cp (FL, GA): pitcherplant bogs, wet roadsides and powerline rights-of-way, seepages; rare (GA Special Concern). Sw. GA and Panhandle FL (Walton County) west to c. and s. AL. See Diamond & Boyd (2004) for detailed information. [= FNA, K, SE, WH; = *R. fulgida* Aiton var. *auriculata* Perdue]

Rudbeckia fulgida Aiton *var.* ***fulgida***, Common Eastern Coneflower. {FL?, GA, NC, VA} August-October. NY and IL south to FL and AL. [= C, FNA, G, K, SE; < *R. fulgida* – RAB, GW, W, WH; = *R. fulgida* Aiton – F; > *R. fulgida* – S; > *R. acuminata* C.L. Boynton & Beadle – S; > *R. foliosa* C.L. Boynton & Beadle – S; > *R. truncata* Small – S] {add to synonymy, esp. F, S, Z}

Rudbeckia fulgida Aiton *var.* ***spathulata*** (Michaux) Perdue. {FL?, GA, NC, SC, VA} August-October. VA, WV, and TN south to FL and AL. [= FNA; < *R. fulgida* – RAB, WH; = *R. spathulata* Michaux – F, S; < *R. fulgida* var. *fulgida* – K]

Rudbeckia fulgida Aiton *var.* ***speciosa*** (Wendroth) Perdue. {GA, VA} (GA Special Concern). August-October. Québec and WI south to GA, AL, and AR. [= C, FNA, K, Z; < *R. fulgida* – RAB, GW, W; = *R. speciosa* Wenderoth var. *speciosa* – F]

Rudbeckia fulgida Aiton *var.* ***umbrosa*** (C.L. Boynton & Beadle) Cronquist, Appalachian Coneflower. {GA, NC, SC, VA} August-October. VA, OH, IN, and MO south to GA, MS, and AR. [= FNA, G, K, SE, Z; < *R. fulgida* – RAB, GW, W; = *R. umbrosa* C.L. Boynton & Beadle – F; > *R. umbrosa* – S; > *R. chapmanii* C.L. Boynton & Beadle – S]

Rudbeckia graminifolia (Torrey & A. Gray) C.L. Boynton & Beadle. Cp (FL): wet savannas and "wet prairies;" rare. Endemic to the Apalachicola region, FL. [= FNA, K, S, SE, WH]

Rudbeckia grandiflora (Sweet) A.P. de Candolle *var.* ***grandiflora***, Largeflower Coneflower. Mt (GA): limestone glades and barrens; rare (GA Special Concern). MO and KS south to LA and TX; disjunct in nw. GA. [= FNA, K, SE, Z; = *R. grandiflora* – S]

Rudbeckia heliopsidis Torrey & A. Gray, Sunfacing Coneflower, Pineywoods Coneflower. Cp (NC, VA), Mt (GA), {SC}: limestone or sandstone streambanks and barrens, pinelands, roadsides; rare (US Species of Concern, GA Special Concern, NC Endangered, VA Rare). July-September. VA south to GA and AL. [= RAB, C, F, FNA, G, K, S, SE, W, Z]

Rudbeckia hirta Linnaeus *var.* ***angustifolia*** (T.V. Moore) Perdue, Coastal Plain Black-eyed Susan. Cp (FL?, GA, NC, SC): May-July. SC south to FL, west to TX. [= FNA, K, SE, Z; < *R. hirta* – RAB, WH; *? R. divergens* T.V Moore – S]

Rudbeckia hirta Linnaeus *var.* ***hirta***, Woodland Black-eyed Susan. {GA, NC, SC, VA} May-July. ME and MI south to GA and MS. [= C, FNA, K, SE, Z; < *R. hirta* – RAB, G, W; > *R. hirta* var. *hirta* – F; > *R. hirta* var. *brittonii* (Small) Fernald – F; > *R. hirta* – S; > *R. amplectens* T.V. Moore – S; > *R. brittonii* Small – S; > *R. monticola* Small – S]

Rudbeckia hirta Linnaeus *var.* ***pulcherrima*** Farwell, Weedy Black-eyed Susan. {FL, GA, NC, SC, VA} May-July. Newfoundland and British Columbia south to FL, TX, CA, and beyond. [= C, FNA, K, SE; < *R. hirta* – RAB, G, W, WH; > *R. serotina* Nuttall var. *serotina* – F; > *R. serotina* var. *corymbifera* (Fernald) Fernald & Schubert – F; > *R. serotina* var. *sericea* (T.V. Moore) Fernald & Schubert – F; > *R. bicolor* Nuttall – S; > *R. longipes* T.V. Moore – S; > *R. sericea* T.V. Moore – S; > *R. hirta* var. *corymbifera* Fernald – Z; > *R. hirta* var. *pulcherrima* – Z]

Rudbeckia laciniata Linnaeus *var.* ***digitata*** (Miller) Fiori, Coastal Plain Cutleaf Coneflower. Cp (FL, GA, NC, SC, VA): bottomlands, streamsides; common. July-October. VA south to FL, west to LA. [= C, F, K, SE; < *R. laciniata* – RAB, GW, S, W, WH; < *R. laciniata* var. *humilis* A. Gray – FNA; < *R. laciniata* var. *laciniata* – G]

Rudbeckia laciniata Linnaeus *var.* ***humilis*** A. Gray, Blue Ridge Cutleaf Coneflower. Mt (NC, SC?, VA): seeps, bog edges, brookbanks, moist forests; common (VA Watch List). July-October. VA and KY south to NC. [= C, F, G, K, SE; < *R. laciniata* – RAB, GW, S, W; < *R. laciniata* var. *humilis* A. Gray – FNA]

Rudbeckia laciniata Linnaeus *var.* ***laciniata***, Common Cutleaf Coneflower, Goldenglow. Cp (FL?, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): moist forests, bottomlands, streambanks; common. July-October. New Brunswick, Ontario, and Manitoba south to FL and TX. [= FNA, K, SE; < *R. laciniata* – RAB, GW, S, W, WH; < *R. laciniata* var. *laciniata* – C, F, G; > *R. laciniata* var. *hortensia* Bailey – F]

* ***Rudbeckia maxima*** Nuttall, Giant Coneflower. Cp (SC): disturbed ground; rare, cultivated and rarely persistent, native of sc. United States (AR and OK south to LA and TX). [= F, FNA, K, S, SE]

Rudbeckia mohrii A. Gray, Mohr's Coneflower. Cp (FL, GA): wet pine savannas; common. Ec. GA to Panhandle FL. [= FNA, K, S, SE, WH]

Rudbeckia mollis Elliott, Woolly Coneflower. Cp (FL, GA, SC): longleaf pine / turkey oak sandhills; uncommon (rare in SC). Late August-October. SC south to n. peninsular FL, FL Panhandle, west to s. AL. [= RAB, FNA, K, S, SE, WH, Z]

Rudbeckia nitida Nuttall, St. John's Black-eyed Susan. Cp (FL, GA): wet pine savannas; uncommon. E. GA and ne. FL south to c. peninsular FL, west to s. AL. [= FNA, K, WH; > *R. nitida* – S; > *R. glabra* A.P. de Candolle – S; = *R. nitida* var. *nitida* – SE]

Rudbeckia subtomentosa Pursh. Pd* (NC*): moist to dry woodlands, prairies, disturbed areas; rare. Nc. TN (Chester, Wofford, & Kral 1997). MI, IA, and OK south to TN, MS and TX; eastwards as introductions or possibly disjuncts. Known for NC only from a single 1897 specimen from Hollow Rock, Orange Co. NC; probably an introduction. [= F, FNA, K, S, SE, Z]

Rudbeckia triloba Linnaeus *var.* ***beadlei*** (Small) Fernald, Chauncey's Coneflower. Mt (NC, VA): seepy cliffs; rare (US Species of Concern, VA Rare). July-October. A sSouthern Appalachian endemic: VA and KY south to NC and TN. It is not at all clear that this taxon is distinct. [< *R. triloba* var. *beadlei* – F; < *R. triloba* var. *pinnatiloba* Torrey & A. Gray – C, FNA, G, K, SE, Z (defined broadly to include "*R. beadlei*"); < *R. triloba* – RAB, W; = *R. beadlei* Small – S]

Rudbeckia triloba Linnaeus *var.* ***pinnatiloba*** Torrey & A. Gray, Pinnate-leaf Coneflower. Cp (FL): calcareous soil, {additional habitat}; rare. S. AL and Panhandle FL. July-October. [< *R. triloba* var. *pinnatiloba* Torrey & A. Gray – C, FNA, G, K, SE, Z (defined broadly to include "*R. beadlei*"); = *R. pinnatiloba* (Torrey & A. Gray) Beadle – S; < *R. triloba* – WH] {synonymy incomplete, etc.}

Rudbeckia triloba Linnaeus *var.* ***rupestris*** (Chickering) A. Gray, Blue Ridge Three-lobed Coneflower. Mt (NC): July-October. A Southern Appalachian endemic: KY south to NC and TN. [= F, FNA, K, SE, Z; < *R. triloba* – RAB, W; = *R. rupestris* Chickering – S]

Rudbeckia triloba Linnaeus *var.* ***triloba***, Common Three-lobed Coneflower. Mt, Pd (GA), {NC, VA} July-October. VT, Ontario, MN, and NE south to GA and TX; westward in CO and UT (as introductions?). [= C, F, FNA, G, K, SE; < *R. triloba* – RAB, W; = *R. triloba* – S]

Rudbeckia fulgida Aiton var. *sullivantii* (C.L. Boynton & Beadle) Cronquist. August-October. NY, MI, and MO south to PA, WV, and AR. [= F, FNA, G, SE; = *R. speciosa* Wenderoth var. *sullivantii* (C.L. Boynton & Beadle) B.L. Robinson – F; < *R. fulgida* var. *speciosa* – K; = *R. sullivantii* C.L. Boynton & Beadle – S]

Rudbeckia grandiflora (Sweet) A.P. de Candolle var. *alismifolia* (Torrey & A. Gray) Cronquist. Cp: prairies, open woodlands. MS west to AR, LA, and TX; disjunct in KY. [= K; = *R. grandiflora* var. *alismaefolia* – FNA, SE, orthographic variant; = *R. alismaefolia* Torrey & A. Gray – S]

Rudbeckia laciniata Linnaeus var. *bipinnata* Perdue. NH and NY south to DE, MD, and PA. [= FNA, K; < *R. laciniata* var. *laciniata* – C, F, G]

Rudbeckia missouriensis Engelmann ex C.L. Boynton & Beadle, Missouri Coneflower. KY, IL, MO, and OK south to LA and TX. [= FNA, C, F, K, S, SE; = *R. fulgida* var. *missouriensis* (Engelmann) Cronquist – G]

Rugelia Shuttleworth ex Chapman 1860 (Rugelia, Rugel's Ragwort)

A monotypic genus, an herb, endemic to the Great Smoky Mountains of w. North Carolina and e. Tennessee. Treated variously as *Senecio* or *Cacalia* in most recent North American floras (see synonymy), this species is anomalous in both and is best treated

as a monotypic genus (Bremer 1994). References: Barkley in FNA (2006b); Bremer (1994)=Z; Barkley (1999)=Y; Pippen (1978)=X; Cronquist (1980)=SE.

Rugelia nudicaulis Shuttleworth ex Chapman, Rugelia, Rugel's Ragwort, Winter-well. Mt (NC, TN): high elevation forests and openings, primarily in spruce-fir forests, but extending in places downslope into northern hardwood forests; rare. June-August. The genus and species is endemic to the Great Smoky Mountains of w. NC and e. TN, all known populations within Great Smoky Mountains National Park. Where it occurs, it is usually locally abundant, often even the dominant herb. The basal rosettes are evergreen, and are conspicuous in all seasons. [= FNA, K, Y, Z; = *Senecio rugelia* Gray – RAB, S; = *Cacalia rugelia* (Gray) Barkley & Cronquist – SE, W, X]

Santolina Linnaeus 1753

A genus of about 8-18 species, shrubs, of the Mediterranean region. References: Watson in FNA (2006a).

* ***Santolina chamaecyparissus*** Linnaeus, Holy-flax, Lavender-cotton, Cypress Lavender-cotton. Cp, Mt (NC) {GA, SC}: disturbed areas; rare, native of Mediterranean Europe. March-October. This species is introduced in e. and w. NC (Fox, Godfrey, & Blomquist 1952). Graetz (1973) recommended it for planting in barrier island areas of the Carolinas. [= C, K]

Sclerolepis Cassini 1816 (Sclerolepis)

A monotypic genus, a perennial herb, of se. North America. References: Lamont in FNA (2006c); Cronquist (1980)=SE.

Sclerolepis uniflora (Walter) Britton, Sterns, & Poggenburg, Sclerolepis. Cp (FL, GA, NC, SC, VA): in shallow water (later sometimes stranded on shore by dropping water levels) of clay-based Carolina bays, natural lake shores, blackwater stream shores and swamps, in seepage wetlands including sea-level fens; uncommon (rare in VA). May-August; July-October. NH south to c. peninsular FL, west to sw. AL (very rare north of NC); disjunct in se. LA (L. Smith, pers. comm.). [= RAB, C, F, FNA, G, GW, K, SE, WH]

Scolymus Linnaeus 1753 (Golden Thistle)

A genus of 3 species, herbs, of the Mediterranean region. References: Strother in FNA (2006a).

* ***Scolymus maculatus*** Linnaeus, Golden Thistle. Cp (NC): on ballast at seaports (formerly); rare, native of Europe. Small states that *Scolymus* "has been found on ballast on the seacoast of N.C."; the site was likely the port of Wilmington. [= FNA, K, S]

Senecio Linnaeus 1753 (Ragwort, Groundsel)

A genus of very uncertain circumscription, if treated broadly with as many as 1500-2000 species, trees, shrubs, herbs, and vines. The trend is to divide *Senecio* into smaller, more natural genera. Most species traditionally treated as "*Senecio*" in our flora are not even part of a broadly defined core group, and have been transferred to *Packera* and *Rugelia*. References: Barkley in FNA (2006b); Pelser et al. (2007); Bremer (1994); Cronquist (1980)=SE; Barkley (1999)=Z; Barkley (1978)=Y. [also see *Ligularia, Packera, Rugelia*]

* ***Senecio vulgaris*** Linnaeus, Common Groundsel. Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA), Mt (NC, SC, VA): roadsides, fields, disturbed areas; uncommon (rare in FL), native of Eurasia. March-June. [= RAB, C, F, FNA, G, K, S, SE, W, WH, Y, Z]

* *Senecio brasiliensis* (Sprengel) Lessing *var. tripartitus* (A.P. de Candolle) Baker, Hempleaf Ragwort. Cp (FL): disturbed areas (on ballast); rare (not collected since 1894, Pensacola, Escambia County, FL), native of South America. [= FNA, WH; = *S. cannabinaefolius* Hooker & Arnott] {not keyed}

Sericocarpus Nees 1832 (White-topped Aster)

A genus of 5 species, herbs, of North America. This group of species, traditionally treated as *Sericocarpus*, was transferred to *Aster* by Cronquist, a treatment followed by most (but not all) recent floristic works. It now appears, based on morphological and molecular studies, that the traditional treatment as a separate genus is far superior. Nesom (1993a) argues that a variety of characters indicate that *Sericocarpus* is more closely allied to *Solidago*, *Euthamia*, *Bigelowia*, *Chrysoma*, and *Gutierrezia* than it is to *Aster*. Noyes & Rieseberg (1999) provide strong support for this contention, based on molecular evidence. See Nesom (1993a), Jones (1980), Semple & Brouillet (1980), and Noyes & Rieseberg (1999) for further discussion about the affinities of

this group. References: Semple & Leonard in FNA (2006b); Leonard, Cook, & Semple (2005)=Y; Nesom (1993a)=Z; Cronquist (1980)=SE.

1 Leaves basally disposed, leaves of the basal rosette much larger than the cauline leaves; leaves (at least the basal) toothed ..... ***S. asteroides***
1 Leaves cauline, basal rosette lacking, the mid-cauline leaves the largest; leaves entire (or with 1-2 teeth in *S. tortifolius*).
2 Leaves (2-) 4-8 cm long, 0.2-1.2 cm wide, linear to oblanceolate, 6-12× as long as wide, not twisted at the base (the leaf blade in a more-or-less horizontal plane); leaves glabrous (but with a ciliate margin), glandular-punctate; involucres glabrous ..... ***S. linifolius***
2 Leaves 1.5-4 cm long, 0.6-1.5 (-2.0) cm wide, obovate, 1.5-4× as long as wide, twisted at the base (bringing the leaf blade into a more-or-less vertical plane); leaves puberulent, glandular-punctate, and with prominent resin globules (at 10× magnification); involucres puberulent ..... ***S. tortifolius***

Sericocarpus asteroides (Linnaeus) Britton, Sterns, & Poggenburg, Toothed White-topped Aster. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry woodlands, thin soils around rock outcrops, sandhills, dry pinelands; common. June-July. S. ME and s. VT west to c. OH, south to e. SC, c. GA, w. Panhandle FL, s. AL, and s. MS. Coastal Plain populations are rhizomatous, while inland populations are not; some taxonomic distinction may be warranted (Nesom, pers. comm.). [= F, FNA, K, S, WH, Y, Z; = *Aster paternus* Cronquist – RAB, C, G, SE, W]

Sericocarpus linifolius (Linnaeus) Britton, Sterns, & Poggenburg, Narrow-leaf White-topped Aster. Cp, Pd, Mt (GA, NC, SC, VA): dry woodlands, sandhills; common, rare in VA Mountains. June-July. MA west to s. OH and s. IN, south to se. SC, c. GA, s. AL, s. MS, and e. LA (Florida parishes). [= F, FNA, K, S, Y, Z; = *Aster solidagineus* Michaux – RAB, C, G, SE, W]

Sericocarpus tortifolius (Michaux) Nees, Twisted-leaf White-topped Aster. Cp (FL, GA, NC, SC), Pd (GA): dry to mesic sandhills; common. August-October. E. NC south to s. FL, west to e. LA (Florida parishes), more or less restricted to the Coastal Plain, but inland onto hard-rock provinces in nc. GA and nc. AL. [= FNA, K, WH, Y, Z; = *Aster tortifolius* Michaux – RAB, SE, W; = *Sericocarpus bifoliatus* (Walter) Porter – S]

Silphium Linnaeus 1753 (Rosinweed)

A genus of 20-30 species, herbs, of e. North America. References: Sweeney (1970)=Z; Perry (1937)=Y; Clevinger in FNA (2006c); Clevinger (2004)=X; Cronquist (1980)=SE; Cruden (1962); Medley (1989); Steyermark (1951).

Identification notes: The number of ray flowers per head is a useful taxonomic character in *Silphium*; since only ray flowers are fertile, the number of ray flowers can also be determined by the number of achenes in freshly fruiting material. The key and taxonomic treatment is provisional.

1 Leaves basally disposed, the basal leaves large and persistent, the stem with very few to many leaves, but these definitely reduced upward in size; leaves entire to toothed, to deeply cut; plants with definite taproots (except *S. brachiatum, S. mohrii,* and *S. wasiotense*).
2 Stem relatively leafy, with 4-5 nodes or more, the stem leaves smaller than the basal, but not merely bracteal.
3 Leaves deeply pinnatifid to bipinnatifid ..... ***[S. laciniatum var. robinsonii]***
3 Leaves merely nearly entire to coarsely toothed (but not pinnatifid).
4 Leaves cuneate to rounded at the base; rays pale (sulphur) yellow; phyllaries acuminate, hispid ..... ***S. mohrii***
4 Leaves subcordate, cordate, to truncate-sagittate at the base; phyllaries glabrous, obtuse to acute.
5 Stem glabrous; pedicel glabrous; phyllaries acute; leaves truncate-sagittate at the base ..... ***[S. brachiatum]***
5 Stem hispid; pedicel hispidulous with hairs ca. 1 mm long; phyllaries obtuse; leaves cordate to subcordate at the base ..... ***[S. wasiotense]***
2 Stem nearly naked, bearing only a few bracteal (very reduced) leaves.
6 Heads relatively large (involucre 13-25 mm high, disk 15-25 mm wide), with 14-40 ray flowers; [of calcareous or mafic glades or woodlands].
7 Principal leaves deeply pinnatifid (or, if entire, definitely lanceolate and with the base tapering to the petiole) ..... ***[S. pinnatifidum]***
7 Principal leaves toothed (or subentire), cordate or truncate at the base (rarely abruptly narrowed) ..... ***S. terebinthinaceum***
6 Heads relatively small (involucre 6-11 mm high, disk 8-15 mm wide), with 6-12 ray flowers; [of a wide range of mostly dry, often acidic habitats].
8 Blades of basal leaves unlobed (or with a single obscure basal lobe on each side), reniform, usually wider than long, often > 25 cm wide; leaves usually puberulent beneath; achenes shorter than the phyllaries at maturity; [of the upper Piedmont and Mountains] ..... ***S. reniforme***
8 Blades of basal leaves divided or shallowly to deeply lobed, with several lobes on each side, about as wide as long, or longer than wide, < 25 cm wide; leaves usually glabrous (or sparsely scabrous) beneath; achenes longer than (or as long as) the phyllaries at maturity; [collectively widespread].
9 Involucre mostly 1.0-1.5 cm wide; achenes 6-9 mm long at maturity; achene wings < 1 mm wide, the wing tips long acute to acuminate, the sinus between the wing tips V-shaped; [of the Coastal Plain and lower Piedmont from se. VA south to extreme e. GA] ..... ***S. compositum var. compositum***
9 Involucre mostly 1.5-3.0 cm wide; achenes 8-14 mm long at maturity; achene wings 1-2 mm wide, the wing tips either acute to acuminate or obtuse, the sinus between the wing tips either V-shaped or narrowly U-shaped.
10 Achene wing tip obtuse, the sinus between the wing tips narrowly U-shaped; leaf blade usually longer than wide; petiole short, as long as or shorter than the leaf blade (midrib); [of se. SC south to c. peninsular FL and FL Panhandle] ..... ***S. compositum var. ovatifolium***
10 Achene wing tip acute to acuminate, the sinus between the wing tips V-shaped; leaf blade usually as long as wide; petiole long, as long as or longer than the leaf blade (midrib); [of se. NC south to se. GA and FL Panhandle] ..... ***S. compositum var. venosum***
1 Leaves primarily on the stem, basal leaves usually absent or soon withering, the stem with many leaves, these similar in size; leaves entire or toothed; plants fibrous-rooted from a crown, rhizome, or caudex.
11 Stem square; upper leaves connate, fused basally, the stem thus perfoliate.
12 Stem spreading-hispid (rarely nearly glabrous); heads with usually ca. 8 or ca. 13 rays; hairs on lower leaf surface or veins 1-2 mm long

.....***S. connatum***

12 Stem glabrous or glabrescent; heads with usually ca. 21 or ca. 34 rays; hairs on lower leaf surface absent or < 1 mm long ..... ***S. perfoliatum***

11 Stem terete; leaves not connate.

13 Basal and lower cauline leaf blades cordate, sagittate, or truncate at the base, **and** on well-developed petioles ..... ***[S. brachiatum]***

13 Basal and lower cauline leaf blades either rounded or cuneate at the base, **or** sessile.

14 Stems, leaves, and phyllaries densely stipitate-glandular (in addition to the eglandular pubescence).

15 Plants mostly 8-15 dm tall, with usually 6 or 7 nodes below the inflorescence; glandular hairs of the stems and leaves longer than the eglandular hairs; rays (8-) 12-14 (-16) per head; [of dolomite or limestone in c. AL] ..... ***[S. glutinosum]***

15 Plants mostly 15-20 dm tall, with usually 9-12 nodes below the inflorescence; stems and leaves ; glandular hairs of the stems and leaves about as long as the eglandular hairs; rays (17-) 19-23 (-33) per head; [of chalk in c. AL] ..... ***[S. perplexum]***

14 Stems, leaves, and phyllaries not stipitate-glandular, either smooth, scabrous, or hispid.

16 Leaves **both** strictly opposite throughout **and** clasping the stem.

17 Ray flowers 12-22 per head; phyllary surfaces scabrous, hirsute, or hispid ..... ***[S. integrifolium var. integrifolium]***

17 Ray flowers 20-36 (or more) per head; phyllary surfaces glabrous ..... ***[S. integrifolium var. laeve]***

16 Leaves alternate, opposite, whorled, or combinations of those states (if strictly opposite then not clasping the stem).

18 Ray flowers 20-30 per head (or more) ..... ***[S. radula]***

18 Ray flowers 12-20 per head.

19 Leaf surfaces glabrous.

20 Cauline leaves predominately in whorls of 3 ..... ***S. asteriscus var. trifoliatum***

20 Cauline leaves opposite ..... ***S. asteriscus var. latifolium***

19 Leaf surfaces scabrous to hispid.

21 Basal leaves persistent at flowering ..... ***S. asteriscus var. simpsonii***

21 Basal leaves caducous at flowering.

22 Pales stipitate-glandular ..... ***S. asteriscus var. dentatum***

22 Pales eglandular, scabrous to puberulent ..... ***S. asteriscus var. asteriscus***

Silphium asteriscus Linnaeus *var.* ***asteriscus***. Cp (FL), {Mt, Pd, Cp (GA, NC, SC, VA)} VA, KY, and MO south to FL and TX. [= C, FNA, K; > *S. asteriscus* – RAB; > *S. dentatum* var. *gatesii* (Mohr) Ahles – RAB; = *S. asteriscus* – F, G, W; > *S. asteriscus* – S, Y; > *S. asteriscus* var. *asteriscus* – SE; > *S. asteriscus* var. *scabrum* Nuttall – SE; > *S. scaberrimum* Elliott – S; < *S. asteriscus* – WH; > *S. gatesii* C. Mohr – Y]

Silphium asteriscus Linnaeus *var.* ***dentatum*** (Elliott) Chapman. Cp (FL, GA, SC), Pd (GA, SC), Mt (GA) {NC}: NC and TN south to FL and Al. [= FNA; = *S. dentatum* var. *dentatum* – RAB; = *S. dentatum* – F, W; > *Silphium asteriscus* Linnaeus var. *angustatum* A. Gray – K, SE; > *S. asteriscus* Linnaeus var. *laevicaule* DC – K; > *S. dentatum* Elliott – SE; > *S. elliottii* Small – S; > *S. incisum* Greene – S; > *S. nodum* Small – S; < *S. asteriscus* – WH; > *S. dentatum* var. *dentatum* – Y; > *S. dentatum* var. *angustatum* (A. Gray) L.M. Perry – Y]

Silphium asteriscus Linnaeus *var.* ***latifolium*** (A. Gray) J.A. Clevinger. {Cp, Pd, Mt (GA, NC, SC, VA)}: VA, WV, and KY south to GA and LA. [= FNA; = *Silphium trifoliatum* Linnaus var. *latifolium* A. Gray – C, F, G, K; > *Silphium trifoliatum* Linnaus var. *latifolium* A. Gray – SE, Y; = *S. laevigatum* Pursh – RAB; > *S. confertifolium* Small – S, SE, Y; > *S. glabrum* Eggert ex Small – S; < *S. trifoliatum* – W]

Silphium asteriscus Linnaeus *var.* ***simpsonii*** (Greene) J.A. Clevinger. Cp (FL, GA, SC): SC south to FL, west to MS. [= FNA, X; = *S. simpsonii* Greene – K; = *S. gracile* A. Gray – S, SE; < *S. asteriscus* – WH; = *S. simpsonii* var. *simpsonii* – Y]

Silphium asteriscus Linnaeus *var.* ***trifoliatum*** (Linnaeus) J.A. Clevinger. Pd (NC, SC, VA), Mt, Cp (NC, VA): NY, OH, and IL south to GA and AL. [= FNA; = *Silphium trifoliatum* Linnaeus var. *trifoliatum* – C, G, K, SE; = *S. trifoliatum* – RAB; > *S. atropurpureum* Retz. ex Willdenow – F, Y; > *S. trifoliatum* var. *trifoliatum* – F, Y; < *S. trifoliatum* – W]

Silphium compositum Michaux *var.* ***compositum***. Cp (GA, NC, SC, VA), Pd (NC, SC, VA), Mt (NC, SC): sandhills, other xeric forests; common. May-September. VA south to GA. Perhaps worth dividing further into two taxa: *S. compositum* sensu stricto, restricted to the Coastal Plain and extreme lower Piedmont, and distributed from se VA through the Carolina Coastal Plain to extreme e. GA, a distribution very similar to those of *Carphephorus bellidifolius, Cirsium repandum,* and *Vaccinium crassifolium*; and *S. collinum* Greene, with less deeply lobed leaves, and distributed from se. and sc. VA, nc. NC, sw. NC and ne. AL south to sc. SC, c. GA, and ec. AL. [= K, Y; = *C. compositum* – F; < *S. compositum* var. *compositum* – RAB; > *C. compositum* – S; > *S. orae* Small – S; < *S. compositum* – C, FNA, G, SE, W; = *S. compositum* ssp. *compositum* – Z; > *S. collinum* Greene]

Silphium compositum Michaux *var.* ***ovatifolium*** Torrey & A. Gray. Cp (FL, GA, SC): sandhills; rare. May-September. Se. SC south to c. peninsular FL and FL Panhandle. [= K; = *Silphium ovatifolium* (Torrey & A. Gray) Small – S, Y; < *S. compositum* – FNA, SE, WH; = *S. compositum* ssp. *ovatifolium* (Torrey & A. Gray) Sweeney & Fisher – Z]

Silphium compositum Michaux *var.* ***venosum*** (Small) Kartesz & Gandhi. Cp (FL, GA, NC, SC), Pd (SC): sandhills, xeric forests. May-September. Se. NC south to se. GA and FL Panhandle. [= K; = *Silphium venosum* Small – Y; < *S. compositum* var. *compositum* – RAB; > *S. lapsuum* Small – S; > *S. venosum* Small – S; < *S. compositum* – FNA, SE, WH; = *S. compositum* ssp. *venosum* (Small) Sweeney & Fisher – Z]

Silphium connatum Linnaeus, Virginia Cup-plant. Mt, Pd (NC, VA): floodplain forests and openings; uncommon. June-August. VA and WV south to nw. NC. [= RAB, F, Y; = *S. perfoliatum* var. *connatum* (Linnaeus) Cronquist – C, FNA, K, SE; < *S. perfoliatum* – G, W]

Silphium mohrii Small, Shaggy Rosinweed. Mt (GA): prairies; rare. Endemic to c., sc., and se. TN (Chester, Wofford, & Kral 1997) south to nw. GA (Jones & Coile 1988) and nc. AL. [= C, FNA, K, S, SE, Y]

Silphium perfoliatum Linnaeus, Common Cup-plant. Mt (NC, VA), Pd (NC): floodplain forets and openings; uncommon. June-August. VT, Ontario, and ND south to NC, AL, and TX. [= RAB, F, S, Y; = *S. perfoliatum* var. *perfoliatum* – C, FNA, K, SE; < *S. perfoliatum* – G, W]

Silphium pinnatifidum Elliott. Mt (GA): limestone glades and woodlands; rare. C. and se. TN south to nw. GA and AL. [= K, S, SE; = *S. terebinthinaceum* Jacquin var. *pinnatifidum* (Elliott) A. Gray – F, FNA, Y; < *S. terebinthinaceum* – G; > *S. chickamaugense* Canby]

Silphium reniforme Rafinesque ex Nuttall. Mt, Pd (NC, SC, VA): dry forests; uncommon. Sc. VA and e. TN, south to c. SC, c. GA, and e. AL. Plants with shallowly lobed leaves, with nearly the same distribution as typical *S. reniforme*, have been variously interpreted. [= S; = *S. compositum* Michaux var. *reniforme* (Rafinesque ex Nuttall) Torrey & A. Gray – RAB, F, K, Y; < *S. compositum* – C, FNA, G, SE, W; = *S. compositum* ssp. *reniforme* (Rafinesque ex Nuttall) Sweeney & Fisher – Z]

Silphium terebinthinaceum Jacquin, Prairie-dock. Mt (VA), Pd (NC, SC): mafic glades, barrens, woodlands, and roadsides (NC, SC), calcareous glades, barrens, and woodlands (VA); rare. NY, Ontario, WI, and NE south to GA, MS,and AR. *S. rumicifolium* Small refers to plants of limestone in the Ridge and Valley province of e. TN and extreme sw. VA, alleged to differ from *S. terebinthinaceum* in the leaf bases cuneate at the base (vs. cordate or truncate), smaller leaf blades (only to 15 cm long), smaller plants (to 8 dm tall vs. to 30 dm tall), and outer phyllaries broader than long (vs. longer than broad). The distinction of var. *luciae-brauniae* Steyermark, with leaf blades glabrous above vs. scabrous, is dubious and needs additional study. [= RAB, SE; = *S. terebinthinaceum* var. *terebinthinaceum* – F, FNA; < *S. terebinthinaceum* – G; > *S. terebinthinaceum* var. *terebinthinaceum* – K, Y; > *S. terebinthinaceum* var. *luciae-brauniae* Steyermark – K; > *S. terebinthinaceum* – S; > *S. rumicifolium* Small – S, Y]

Silphium brachiatum Gattinger, Cumberland Rosinweed. Endemic to sc. and se. TN (Chester, Wofford, & Kral 1997) and n. AL. And GA? [= F, FNA, G, K, S, SE, Y]

Silphium glutinosum J. Allison, Sticky Rosinweed. Mt (AL): dolomite glades; rare. Known only from calcareous Ketona glades in Bibb County, c. AL (Allison & Stevens 2001). [= FNA]

Silphium integrifolium Michaux var. *integrifolium*, Prairie Rosinweed. MI, WI, and SD south to c. TN, AL, LA, and OK. [= C, FNA, G, SE; > *S. integrifolium* var. *integrifolium* – F, K, Y; > *S. integrifolium* var. *deamii* L.M. Perry – F, K; > *S. integrifolium* var. *gattingeri* L.M. Perry – K, Y]

Silphium integrifolium Michaux var. *laeve* Torrey & A. Gray. MO west to NE, south to OK; disjunct in c. TN. [= C, FNA, G, K, SE; = *S. speciosum* Nuttall – F, Y]

Silphium laciniatum Linnaeus var. *robinsonii* L.M. Perry, Compass-plant. East to c. AL, wc. TN (Chester, Wofford, & Kral 1997), and c. KY. [= F, K, Y; < *S. laciniatum* – C, FNA, G, SE]

Silphium perplexum J. Allison, Old Cahaba Rosinweed. Mt (AL): dolomitic glades and woodlands; rare. Endemic to c. AL (Allison & Stevens 2001). [= FNA]

Silphium radula Nuttall. Mt (GA): rocky hardwood forests; rare (GA Rare). East to nw. GA (Jones & Coile 1988). Not given credence as in our area in FNA and other sources. [= K, SE; *? S. asperrimum* Hooker – Y, misapplied; *? S. gatesii* Mohr – Y?]

Silphium wasiotense M. Medley, Appalachian Rosinweed. E. KY and ne. TN (Risk & Wyrick 1996, Chester, Wofford, & Kral 1997). [= C, FNA, K; = *S. wasiotensis*, orthographic variant]

Silybum Adanson 1763 (Milk-thistle)

A genus of 2 species, herbs, of the Mediterranean region. References: Keil in FNA (2006a); Cronquist (1980)=SE.

* ***Silybum marianum*** (Linnaeus) Gaertner, Milk-thistle, Blessed-thistle. Pd (VA): disturbed areas; rare, native of s. Europe. May-July. Reported for NC by FNA; documentation unknown. [= C, F, FNA, G, K, SE; = *Mariana mariana* (Linnaeus) Hill – S]

Smallanthus Mackenzie ex Small 1933 (Bearsfoot)

A genus of about 20 species, of tropical, subtropical, and warm temperate America. Robinson (1978) describes the morphological and karyological differences warranting recognition of *Smallanthus* as a genus separate from *Polymnia*. References: Strother in FNA (2006c); Robinson (1978)=Z; Cronquist (1980)=SE.

Smallanthus uvedalius (Linnaeus) Mackenzie ex Small, Bearsfoot, Leafcup. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests, bottomland forests, and disturbed places; common. July-October. NY and IL south to c. peninsular FL and TX; possibly extending through e. Mexico and Central America to Panama, depending on circumscription. [= FNA, K, S, WH, Z; = *Polymnia uvedalia* Linnaeus – RAB, C, SE, W; > *Polymnia uvedalia* var. *uvedalia* – G; > *Polymnia uvedalia* var. *densipilis* Blake – F, G; > *Polymnia uvedalia* var. *floridana* Blake – F]

Solidago Linnaeus 1753 (Goldenrod)

A genus of 90-110 species, herbs, primarily North American, but with a few species in South America, Macaronesia, and Eurasia. The placement of the flat-topped goldenrods has been controversial; they are here included in *Solidago* rather than being treated as the separate genus *Oligoneuron*. References: Semple & Cook in FNA (2006b); Nesom (1990); Cronquist (1980)=SE; Morton (1973, 1974); Zhang (1996); Cook & Semple (2004); Nesom (1993b)=Z; Heard & Semple (1988)=Y; Brouillet & Semple (1981)=X; Cronquist (1980)=SE; Braun (1942). Portions of the key adapted (in part) from various sources, especially FNA and SE. [also see *Brintonia, Chrysoma*, and *Euthamia*]

Identification notes: Several related genera readily mistaken for (and/or sometimes included in) *Solidago* are included here as keying failsafes.

1 Inflorescence corymbiform, flat-topped or broadly rounded and about as broad as long, or broader; ["false goldenrods", section *Ptarmicoideae*, and section *Solidago*, subsection *Multiradiatae*] ..... **Key A**
1 Inflorescence a panicle, raceme, thyrse, or in axillary clusters, usually longer than broad, or with either the central branch well-developed and elongate, or with numerous branches elongate and more-or-less secund heads; [section *Solidago*].
2 Leaves basally disposed, the basal and lower cauline leaves larger, petiolate, and usually persistent, the middle and upper cauline leaves smaller and less petiolate.
3 Inflorescence cylindrical, of axillary clusters subtended by well-developed stem leaves, **or** a terminal thyrse or raceme, the branches not secund (unless the stem is arching and the heads become oriented to the side of the axis); [subsections *Glomeruliflorae*, *Humiles*, *Maritimae*, *Squarrosae*) ..... **Key B**
3 Inflorescence paniculiform, the major branches (at least) recurved with the heads borne secondly; [subsections *Argutae*, *Junceae*, *Maritimae*, *Nemorales*] ..... **Key C**
2 Leaves chiefly cauline, the basal and lower cauline leaves (when not early withering) the same size as or smaller than the middle and upper cauline leaves.
4 Inflorescence predominantly axillary, with well-developed leaves in at least the lower part of the inflorescence; [subsections *Argutae*, *Glomeruliflorae*, *Squarrosae*, *Thyrsiflorae*] ..... **Key D**
4 Inflorescence a well-developed panicle; [subsections *Triplinervae*, *Venosae*] ..... **Key E**

Key A – goldenrods with corymbiform inflorescences ("false goldenrods", section *Ptarmicoideae*, and section *Solidago*, subsection *Multiradiatae*)

1 Plant a woody shrub; leaves with a markedly pebbled surface ..... ***[Chrysoma]***
1 Plant an herb; leaves variously smooth or rugose, but not pebbled.
2 Inflorescence flat-topped; disk flowers 2-12, usually fewer than the ray flowers ..... ***[Bigelowia]***
2 Inflorescence corymbose (rounded); disk flowers 17-60, more than the ray flowers.
3 Rays white; leaves linear-lanceolate to linear-oblanceolate, the longer (10-) 15-20× as long as wide; pappus bristles slightly to strongly clavellate-thickened; [section *Ptarmicoideae*] ..... ***S. ptarmicoides***
3 Rays yellow; leaves oblong, elliptic, obovate, or spatulate, 2-8× as long as wide; pappus bristles not clavellate thickened.
4 Larger leaves obovate, 5-10 cm long, 1.5-4 cm wide, with prominent teeth; plants small, 0.5-4 dm tall; [of high elevation rock outcrops on Grandfather Mountain, Roan Mountain, and Hanging Rock Mountain (Avery, Watauga, and Mitchell counties), NC]; [section Solidago, subsection *Multiradiatae*] ..... ***S. spithamaea***
4 Larger leaves elliptic-oblong, 6-25 cm long, 2-10 cm wide, wiith small, obscure teeth; plants robust, 4-15 dm tall; [of dry, prairie-like sites at low elevations]; [section *Ptarmicoideae*]
5 Larger leaves 3-6 cm wide, ca. 2-8× as long as wide, acute to obtuse, serrate to crenate with numerous teeth (sometimes the teeth very obscure), with many pinnate-netted veins; leaves, stems, and peduncles moderately to densely pubescent.
6 Outer series of phyllaries glabrous on the back (glabrous to short-ciliate on the margin); leaf undersurface glabrous to somewhat hispid (0-20 hairs per mm^2) (the margins and midrib beneath often more densely pubescent); stems glabrous to somewhat hispid (0-25 hairs per mm^2) ..... ***S. rigida var. glabrata***
6 Outer series of phyllaries pubescent on the back (short-ciliate on the margin); leaf undersurface hispid (7-50 hairs per mm^2); stems glabrous to somewhat hispid (10-70 hairs per mm^2) ..... ***S. rigida var. rigida***
5 Larger leaves 0.4-1.6 cm wide, ca. 12-25× as long as wide, acuminate to acute, entire or serrate with a few salient teeth on either side, with 3+ parallel veins.
7 Rays 1-4 per head; cypselas 2-3 mm long; leaves acute to obtuse, rarely folded along the midvein; [of prairies and longleaf pine savannas from MS westward on the Coastal Plain] ..... ***[S. nitida]***
7 Rays 7-9 per head; cypselas 1.5-2.2 mm long; leaves acuminate, often folded along the midvein; [of wet prairies and fens of interior physiographic provinces] ..... ***S. riddellii***

Key B – goldenrods with basally disposed leaves and elongate, non-secund inflorescences (section *Solidago*, subsections *Glomeruliflorae*, *Humiles*, *Maritimae*, *Squarrosae*)

1 Heads very large, involucre 8-13 mm high; fresh leaves noticeably thick and rubbery in texture; [subsection *Glomeruliflorae*]; [plants of high elevations of NC and TN] ..... ***S. glomerata***
1 Heads smaller, involucre < 8 mm high; fresh leaves not thick or rubbery in texture; [plants collectively widespread].
2 Phyllaries and often also vegetative parts with minute sticky glands; stem leaves petiolate; [subsection *Humiles*].
3 Leaves, peduncles, and phyllaries copiously glandular; [plants of Coastal Plain sandhills] ..... ***S. kralii***
3 Leaves, peduncles, and phyllaries slightly glandular; [plants of rocky glades, cliffs, barrens, and river-scoured outcrops, primarily on mafic or calcareous rocks)].
4 Involucres 7-12 mm high; basal leaves 15-40 mm wide; [of n. AL and perhaps also e. TN and e. KY] ..... ***[S. arenicola]***
4 Involucres 3-7 mm high; basal leaves (2-) 3-22 (-31) mm wide; [of sc. NC, w. VA, and n. VA northward].
5 Achenes glabrous (even when young); flowering plants (3-) 4-10 (-13) dm tall; inflorescence broadly cylindrical, averaging 5-6 cm in diameter; [of rocky, flood-scoured riversides, known only from the Yadkin River in sc. NC] ..... ***S. plumosa***
5 Achenes pubescent (even when mature); flowering plants 1.5-6 (-8.5) dm tall; inflorescence narrowly cylindrical, averaging 2-4 cm in diameter.
6 Lower cauline leaves 7-15× as long as wide, (2.5-) 4.6-9.4 (-11.2) cm long, (2-) 3-9 (-17) mm wide, generally obscurely toothed; [of rocky, flood-scoured riversides, from e. KY, e. TN, and n. VA northward] ..... ***S. racemosa***
6 Lower cauline leaves 3-8× as long as wide, (4.2-) 6.2-11.3 (-15.9) cm long, (5-) 10-22 (-31) mm wide, generally sharply toothed; [of cliffs and barrens, primarily over mafic rocks, from w. VA northward] ..... ***S. randii***
2 Phyllaries and vegetative parts lacking minute sticky glands; stem leaves sessile.
7 Petioles of lower stem leaves sheathing the stems; [of bog and marsh habitats, growing in soils which are permanently or at least seasonally saturated]; [subsection *Maritimae*].
8 Basal leaves 0.7-8 cm wide; plants short, 4-10 (-15) dm tall, typically fairly stout; [of the Mountains and northward].

9 [of seepage over sloping rock on granitic domes, of sw. NC, nw. SC, and ne. GA] ..... ***S. simulans***
9 [of peaty bogs, of w. NC and e. TN northward]
10 Basal leaves 0.7-2.5 cm wide; [south to PA and WV] ..... ***[S. uliginosa var. linoides]***
10 Basal leaves 3-8 cm wide; [south to NC and TN] ..... ***S. uliginosa var. uliginosa***
8 Basal leaves 0.7-2.5 (-5) cm wide; plants short to tall, 3-20 dm tall, typically very slender; [of the Coastal Plain and lower Piedmont and southward].
11 Leaf margins smooth, entire; ray flowers 8-13 per head; disk flowers 14-25 per head; pappus (2.5-) 3.0-3.5 mm long ..... ***S. pulchra***
11 Leaf margins (of the basal leaves at least) scabrous-margined, also often toothed; ray flowers 2-7 per head; disk flowers 6-16 per head; pappus (3.0-) 3.5-4.5 (-5.0) mm long.
12 Leaf margins scabrous (or at least tuberculate) throughout; panicle branches often spreading-erect with recurved-secund tips; pappus 2.2-4.0 mm long ..... ***S. gracillima***
12 Leaf margins tending to become smooth on the upper stem; panicle branches usually stiffly erect; pappus 4.0-4.5 (-5.0) mm long ..... ***S. stricta***
7 Petioles of lower stem leaves not sheathing the stems; [of mesic or drier habitats]; [subsection *Squarrosae*].
13 Phyllaries spreading or with squarrose tips ..... ***S. squarrosa***
13 Phyllaries appressed.
14 Phyllaries sparsely to moderately finely stipitate-glandular; [of the Outer Coastal Plain of se. NC] ..... ***S. villosicarpa***
14 Phyllaries and peduncular bracts not glandular; [collectively widespread].
15 Phyllaries linear-lanceolate, attenuate, tapering to pointed or minutely rounded tip.
16 Proximal to mid stem glabrous; rays mostly 6-9; inner phyllaries usually striate with 2 prominent secondary veins ..... ***S. roanensis***
16 Stems and leaves finely hairy throughout with minute strigillose hairs; rays mostly 9-16; inner phyllaries not striate.
17 Leaves 20-50 (-60) per stem; midstem leaves usually 4-5 cm long; phyllaries attenuate; [of the Mountains and Piedmont (rarely Coastal Plain), of GA northward] ..... ***S. puberula var. puberula***
17 Leaves (20-) 50-120 per stem; midstem leaves usually 1-4 cm long; phyllaries acute to acuminate; [of the Coastal Plain from se. VA southward] ..... ***S. puberula var. pulverulenta***
15 Phyllaries ovate to lanceolate, acute to obtuse or rounded.
18 Rays white ..... ***S. bicolor***
18 Rays yellow (may turn pale yellow with age).
19 Leaves and stems sparsely to densely hairy with spreading to appressed hairs ..... ***S. hispida***
19 Leaves and upper stems glabrous.
20 Inflorescence either very narrowly thyrsiform and often interrupted or branches well spaced; mid cauline leaves 0.5-2.0 cm wide; [of MA to se. IN, south to GA and MI, mostly avoiding the Coastal Plain southward] ..... ***S. erecta***
20 Inflorescence usually denser, broader, and crowded, sometimes more open in robust plants, or narrow in plants outside range of *S. erecta*; mid cauline leaves often > 20 mm wide; [of MA to GA, west to SD and scattered south in CO to ne. NM].
21 Mid-stem leaves 0.4-1.5 (-2.0) cm wide; basal leaves 0.8-2.0 cm wide, entire or slightly serrate, present or absent at flowering ..... ***S. speciosa var. rigidiuscula***
21 Mid-stem leaves usually > 2 cm wide; basal leaves (2.0-) 3.0-5.5 cm wide, coarsely serrate, present at flowering ..... ***S. speciosa var. speciosa***

Key C – goldenrods with basally disposed leaves and elongate, secund inflorescences (section *Solidago*, subsections *Argutae*, *Junceae*, *Maritimae*, *Nemorales*)

1 Basal and lower cauline leaves petiolate with a cordate or subcordate blade and/or a cordate-clasping petiole; [subsection *Argutae*].
2 Pappus > ½× as long as the disc corollas; rays 1-3 ..... ***S. auriculata***
2 Pappus < ¼× as long as the disc corollas; rays 3-6 ..... ***S. sphacelata***
1 Basal and lower cauline leaves with cuneate leaf blades and petioles not cordate-clasping (though leaves may have petioles which sheath the stem).
3 Basal and cauline leaves lanceolate to linear-lanceolate.
4 Petiole bases of basal and lower cauline leaves not sheathing the stem; [of mesic, dry, or (less typically) seasonally saturated habitats].
5 Stems obviously short-canescent, scabrous, or loosely puberulent; [subsection *Nemorales*].
6 Leaves > 5× as long as wide, densely puberulent ..... ***S. nemoralis var. nemoralis***
6 Leaves 2-5× as long as wide, scabrous ..... ***S. radula***
5 Stems glabrous or nearly so; [subsection *Junceae*].
7 Rays 7-13; disc florets 8-12 ..... ***S. juncea***
7 Rays 3-7; disc florets 5-9 ..... ***S. pinetorum***
4 Petiole bases of basal and lower cauline leaves sheathing the stem; [of seasonally saturated habitats]; [subsection *Maritimae*].
8 Leaves somewhat fleshy, the stem leaves reduced but not very markedly so; inflorescence almost always with lower branches strongly recurved with second heads; [of coastal or otherwise saline habitats].
9 Involucres 3-4 mm high; rays 7-11; disc flowers ca. 10-16; [of MA south to FL, west to TX and beyond] ..... ***S. sempervirens var. mexicana***
9 Involucres 4-7 mm high; rays 12-17; disc flowers ca. 17-22; [of VA northward] ..... ***S. sempervirens var. sempervirens***
8 Leaves not fleshy (rarely so in *S. stricta* of near coastal situations), the stem leaves much reduced relative to the basal; inflorescence showing only relatively weak tendency to recurved branches with second heads; [of inland habitats, except rarely *S. stricta*].
10 Basal leaves 0.7-2.5 (-5) cm wide; plants short to tall, 3-20 dm tall, typically very slender; [of the Coastal Plain and lower Piedmont and southward].
11 Leaf margins smooth, entire; ray flowers 8-13 per head; disk flowers 14-25 per head; pappus (2.5-) 3.0-3.5 mm long; plants to 1 m tall ..... ***S. pulchra***
11 Leaf margins (of the basal leaves at least) scabrous-margined, also often toothed; ray flowers 2-7 per head; disk flowers 6-16 per head; pappus 2.2-4.5 (-5.0) mm long; plants to 2 m tall.

12 Leaf margins scabrous (or at least tuberculate) throughout; panicle branches often spreading-erect with recurved-secund tips; pappus 2.2-4.0 mm long ..... ***S. gracillima***
12 Leaf margins tending to become smooth on the upper stem; panicle branches usually stiffly erect; pappus 4.0-4.5 (-5.0) mm long ..... ***S. stricta***
10 Basal leaves 0.7-8 cm wide; plants short, 4-10 (-15) dm tall, typically fairly stout; [of the Mountains and northward].
13 [of seepage over sloping rock on granitic domes, of sw. NC, nw. SC, and ne. GA] ..... ***S. simulans***
13 [of peaty bogs, of w. NC and e. TN northward].
14 Basal leaves 0.7-2.5 cm wide; [south to PA and WV] ..... ***[S. uliginosa var. linoides]***
14 Basal leaves 3-8 cm wide; [south to NC and TN] ..... ***S. uliginosa var. uliginosa***
3 Basal and cauline leaves ovate to lanceolate; [subsection *Argutae*].
15 Leaves definitely scabrous or moderately to densely soft-villous or puberulent.
16 Leaves scabrous on the upper surface.
17 Basal and lower cauline leaves 8-30 cm long, 4-10 cm wide, mostly 2-3× as long as wide; upper stem leaves few, somewhat reduced, sharply toothed; [of the Mountains and rarely Piedmont] ..... ***S. patula var. patula***
17 Basal and lower cauline leaves 6-24 cm long, 2-6 cm wide, mostly 3-5× as long as wide; upper stem leaves many, strongly reduced, mostly entire; [of the Coastal Plain and lower Piedmont] ..... ***S. patula var. strictula***
16 Leaves moderately to densely soft-villous or puberulent.
18 Leaves puberulent; rays 0 (-2); flowering September-November; [of SC (NC?) south to FL and AL] ..... ***S. brachyphylla***
18 Leaves soft-villous; flowering May-June; rays 7-12; [of Coastal Plain of e. NC and e. SC] ..... ***S. verna***
15 Leaves glabrous (or nearly so) **or** strigose or strigillose.
19 Plants with slender, stoloniferous rhizomes (in addition to the main, more deeply-seated rhizomes) ..... ***S. tarda***
19 Plants lacking slender, stoloniferous rhizomes.
20 Phyllaries striate, with several nerves prominent; involucres 4.5-6 (-7) mm high ..... ***S. faucibus***
20 Phyllaries not striate, only the midvein prominent; involucres 2.5-5.6 mm high.
21 Basal leaves truncate at the base; leaves thick in texture ..... ***S. harrisii***
21 Basal leaves cuneate to rounded at the base; leaves of normal herbaceous texture.
22 Achenes glabrous ..... ***S. arguta var. arguta***
22 Achenes strigillose, at least towards the apex.
23 Leaves strigose or strigillose ..... ***S. arguta var. boottii***
23 Leaves glabrous ..... ***S. arguta var. caroliniana***

Key D – goldenrods with cauline leaves and axillary inflorescences (section *Solidago*, subsections *Argutae*, *Glomeruliflorae*, *Squarrosae*, *Thyrsiflorae*)

1 Leaves entire or obscurely few-toothed; achenes glabrous at maturity; outer phyllaries with squarrose tips (tips appressed in *S. speciosa* var. *rigidiuscula*).
2 Outer phyllaries appressed; [subsection *Squarrosae*] ..... ***S. speciosa var. rigidiuscula***
2 Outer phyllaries with squarrose tips.
3 Leaves oblanceolate-obovate, often short acuminate at the apex; mid-cauline leaves 8-14 cm long, 18-40 mm wide, the margins sharply serrate on at least the upper 2/3; [subsection *Argutae*] ..... ***[S. buckleyi]***
3 Leaves narrowly to broadly elliptic (or less commonly slightly oblanceolate), acute at the apex; mid-cauline leaves 3-8 (-10) cm long, 8-25 mm wide, margins entire to shallowly serrate on only the upper 1/2 to 2/3; [subsection *Thyrsiflorae*] ..... ***S. petiolaris var. petiolaris***
1 Leaves generally many- and sharp-toothed; achenes persistently pubescent; outer phyllaries with appressed tips; [subsection *Glomeruliflorae*].
4 Stem terete, glaucous.
5 Lower midstem leaves narrowly lanceolate, 5-15 cm long, 0.8-3 cm wide, 5-6× as long as wide; stems strongly arching; [plants widespread in our area] ..... ***S. caesia var. caesia***
5 Lower midstem leaves broadly lanceolate to rhombic, 5-9 cm long, 1.3-2.4 cm wide, 3-4× as long as wide; stems weakly arching; [plants of the Gulf Coastal Plain of GA westward] ..... ***S. caesia var. zedia***
4 Stem striate-angled, green.
6 Larger leaf blades on a plant 2-6 cm long; stems with spreading white hairs; [endemic to sandstone rockhouses in the Red River Gorge in Menifee, Powell, and Wolfe counties, KY] ..... ***[S. albopilosa]***
6 Larger leaf blades on a plant 8-20 cm long; stems glabrous or sparsely pubescent; [of various dry and mesic habitats, collectively widespread in our area].
7 Leaves 1-3 (-3.5)× as long as wide.
8 Leaves (2.2-) 2.5-3 (-3.5)× as long as wide, cuneate to a sessile base; teeth of the leaf margins not notably elongate and narrow, mostly 1-2 (-3) mm long (as measured on the upper side of the teeth) ..... ***S. flaccidifolia***
8 Leaves 1-2.2 (-2.5)× as long as wide, abruptly contracted to a winged petiole; teeth of the leaf margins elongate and narrow, acuminate, mostly (2-) 3-8 mm long (as measured on the upper side of the teeth) ..... ***S. flexicaulis***
7 Leaves 3-10× as long as wide.
9 Involucre (2.5-) 3-5 (-6) mm high; phyllaries 0.7-1 mm wide, 1-nerved; stems 4-9 (-10) dm tall; ray flowers 2-4 (-6); [broadly Appalachian] ..... ***S. curtisii***
9 Involucre 4.5-7 mm high; phyllaries 1-1.5 mm wide, 3-10-nerved; stems 6-16 dm tall; ray flowers 5-8; [apparently restricted to high elevations in the Blue Ridge of NC and TN] ..... ***S. lancifolia***

Key E – goldenrods with cauline leaves and well-developed paniculate inflorescences (section *Solidago*, subsections *Triplinervae* and *Venosae*)

1 Mid-stem leaves 3-nerved (obscurely so in *S. tortifolia*); leaves elliptic, lanceolate, oblanceolate, or linear; [subsection *Triplinervae*].
2 Rays 2-6; larger leaves linear to lance-linear, 2-7 (-10) mm wide, twisted at base; plants (3-) 7-1.3 dm tall ..... ***S. tortifolia***
2 Rays 7-17 (-24); larger leaves 5-30 mm wide, not twisted at base; plants 5-20 dm tall.

3 Rays 7-10 (-11); plants 5-15 dm tall; [of MD and PA south to VA, and IN, KY, and TN] ..... ***S. rupestris***
3 Rays (7-) 9-17 (-24); plants (5-) 10-20 dm tall; [collectively widespread].
4 Stems glabrous and usually also glaucous ..... ***S. gigantea***
4 Stems pubescent (at least the upper portion).
5 Leaves glabrous above and below, or pubescent only on the main veins beneath; midstem leaves serrulate, with 1-10 teeth per side, the largest < 0.5 mm long; [of the Coastal Plain, from NC south to FL and AL] ..... ***S. leavenworthii***
5 Leaves moderately to densely pubescent across the lower surface, and scabrous to puberulent above; midstem leaves entire, serrulate, or serrate; [collectively widespread].
6 Mid-stem leaves entire to serrulate; involucres (2.5-) 3-4.5 mm high ..... ***S. altissima*** *var.* ***altissima***
6 Mid-stem leaves serrate, the teeth 3-10 per side, the largest > 1.5 mm long; involucres 1.7-2.5 (-3.0) mm high.
7 Lower to mid-stem glabrous or sparsely pubescent ..... ***S. canadensis*** *var.* ***canadensis***
7 Lower to mid-stem moderately pubescent ..... ***S. canadensis*** *var.* ***hargeri***

1 Mid-stem leaves reticulate-nerved; leaves generally obovate, elliptic, lanceolate, or oblanceolate (if linear, then the fresh leaves anise-scented); [subsection *Venosa*].
8 Stems from branched caudices or short rhizomes, lacking elongated rhizomes.
9 Leaves serrate; leaves not translucent-punctate; fresh leaves not anise-scented
10 Stem spreading-hirsute; [of the Ozarks, disjunct in MS] ..... ***[S. ulmifolia*** *var.* ***palmeri]***
10 Stem glabrous or nearly so, except just below the inflorescence; [widespread] ..... ***S. ulmifolia*** *var.* ***ulmifolia***
9 Leaves entire; leaves translucent-punctate; fresh leaves anise-scented.
11 Main leaves ovate to lanceolate, 2-5 (-6)× as long as wide; stem pubescence general and circumferential; [of FL] ..... ***S. chapmanii***
11 Main leaves lanceolate to linear, (4-) 5-15× as long as wide; stem pubescence in lines decurrent down the stem from the margins of the leaf bases; [widespread] ..... ***S. odora***
8 Stems from elongated creeping rhizomes.
12 Mid-stem leaves sessile, somewhat clasping; leaf margins nearly entire to obscurely serrulate; leaves planar ..... ***S. fistulosa***
12 Mid-stem leaves subsessile, not clasping; leaf margins strongly serrate; leaves rugose.
13 Involucres 4-6 mm high; broader phyllaries 0.7-1.2 mm wide; stems glabrous below the inflorescence; mid-stem leaves elliptic (widest near the middle) ..... ***S. latissimifolia***
13 Involucres (2-) 2.5-3.5 (4.5) mm high; phyllaries mostly < 0.5 mm wide; stems hairy or glabrous below the inflorescence; mid-stem leaves lanceolate to ovate (widest below the middle).
14 Leaves relatively thin, not very rugose, usually sharply serrate, the apices acuminate, glabrous or soft-hairy on the surfaces.
15 Stems and leaves hairy ..... ***S. rugosa*** *var.* ***rugosa***
15 Stems and leaves glabrous ..... ***S. rugosa*** *var.* ***sphagnophila***
14 Leaves relatively thick and firm, strongly rugose, usually subentire to bluntly serrate, the apoices often only acute, scabrous or stiffly-hairy on the surfaces.
16 Inflorescences narrow, the lower lateral branches only slightly exceeding the subtending leaves; leaves sparsely pubescent; [of the Southern Appalachians] ..... ***S. rugosa*** *var.* ***cronquistiana***
16 Inflorescences broad, the lower lateral branches generally much longer than the subtending leaves; leaves moderatelty to densely pubescent; [collectively widespread].
17 Upper cauline leaves lanceolate to elliptic, not much reduced relative to leaves lower on the stem ..... ***S. rugosa*** *var.* ***aspera***
17 Upper cauline leaves ovate, much reduced relative to leaves lower on the stem ..... ***S. rugosa*** *var.* ***celtidifolia***

Solidago altissima Linnaeus *var.* ***altissima***, Tall Goldenrod. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): fields, roadsides, disturbed areas; common. August-October. Nova Scotia, Québec, and Saskatchewan south to c. peninsular FL, TX, and Mexico; introduced in w. North America. Var. *gilvocanescens* (Rydberg) Semple, with heads smaller (mainly 2-3 mm high vs. 3-4 mm high) is mainly distributed in the Great Plains. [= FNA; = *S. altissima* – F, K; = *S. canadensis* Linnaeus var. *scabra* Torrey & Gray – C, G, SE, WH; < *S. altissima* Linnaeus – RAB, GW (including *S. canadensis* vars. and *S. rupestris*); = *S. hirsutissima* P. Miller – S; < *S. canadensis* – W; = *S. altissima* ssp. *altissima* – FNA]

Solidago arguta Aiton *var.* ***arguta***, Forest Goldenrod. Cp, Pd, Mt (NC, VA): woodlands, woodland borders, road margins; uncommon (NC Watch List). August-October. ME and s. Ontario west to MO, south to NC and TN. [= *S. arguta* ssp. *arguta* – C, SE, W; < *S. arguta* – RAB (also see *S. tarda* and *S. vaseyi*); = *S. arguta* – F, G, S; = *S. arguta* ssp. *arguta* var. *arguta* – FNA; < *S. arguta* var. *arguta* – K]

Solidago arguta Aiton *var.* ***boottii*** (Hooker) Palmer & Steyermark, Boott's Goldenrod. Cp (GA, SC, VA?): dry open woodlands, dry slopes, often in sandy or rocky soils; rare. September-October. C. SC south to s. AL, west to LA, AR, and s. MO, most common in the Ozarks. [= K, SE; < *S. arguta* – RAB (also see *S. tarda* and *S. vaseyi*); > *S. boottii* – F, S; > *S. strigosa* – F, G, S; = *S. arguta* ssp. *caroliniana* (A. Gray) G.H. Morton var. *boottii* (Hooker) Palmer & Steyermark – FNA; > *S. boottii* var. *boottii* – G; = *S. arguta* Aiton ssp. *boottii* (Hooker) G.H. Morton]

Solidago arguta Aiton *var.* ***caroliniana*** A. Gray, Vasey's Goldenrod. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC, VA): forests, woodlands, grassy balds; common. September-October. WV west to c. TN and s. MO, south to ne. FL, Panhandle FL, s. MS, and c. AR. [= C, K, SE, W; < *S. arguta* – RAB; = *S. yadkinensis* (Porter) Small – F, S, misapplied; = *S. arguta* ssp. *caroliniana* (A. Gray) G.H. Morton var. *caroliniana* – FNA; > *S. boottii* Hooker var. *caroliniana* (A. Gray) Cronquist – G; < *S. arguta* var. *caroliniana* – WH; *?* *S. vaseyi* (A. Gray) Heller; = *S. arguta* ssp. *australis*, nomen nudum; = *S. arguta* Aiton ssp. *pseudoyadkinensis* G.H. Morton; = *S. pseudoyadkinensis*, nomen nudum; = *S. arguta* Aiton ssp. *caroliniana* (A. Gray) G.H. Morton]

Solidago auriculata Shuttleworth ex Blake, Eared Goldenrod. Pd (GA, SC), Cp (FL, GA), Mt (GA): rocky forests over circumneutral rocks, bottomland forests, calcareous hammocks; rare. August-September. Wc. SC, sc. TN (Chester, Wofford, & Kral 1997), AR, and OK south to GA, c. panhandle FL, AL, MS, LA, and TX. [= FNA, K, SE, WH; = *S. notabilis* Mackenzie – RAB, S]

Solidago bicolor Linnaeus, Silverrod, White Goldenrod. Mt (GA, NC, SC, VA), Pd, Cp (NC, VA): woodlands, roadbanks, pastures; common (rare in SC) (SC Rare). August-October. Nova Scotia and Manitoba south to GA and LA. [= RAB, C, FNA, G, K, S, SE, W; > *S. bicolor* var. *bicolor* – F; > *S. bicolor* var. *ovalis* – F]

Solidago brachyphylla Chapman, Dixie Goldenrod. Cp (FL, GA, NC?, SC), Pd (GA): open woodlands, bluff forests; rare. September-November. SC (NC?) south to ne. FL and Panhandle FL, west to s. AL (s. MS?). [= FNA, K, S, SE, WH]

Solidago caesia Linnaeus var. ***caesia***, Axillary Goldenrod. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (VA): moist forested slopes; common. August-October. ME and Ontario south to FL and LA. [= FNA; < *S. caesia* – RAB, C, F, G, K, S, SE, W, WH]

Solidago caesia Linnaeus *var. **zedia*** R.E. Cook & Semple, Gulf Coast Axillary Goldenrod. Cp (FL, GA): moist forests; uncommon. September-October. GA and panhandle FL west to LA and AR. [= FNA; < *S. caesia* – K, S, SE, WH]

Solidago canadensis Linnaeus *var. **canadensis***, Northern Common Goldenrod. {VA}: old fields, pastures, roadesides; uncommon? August-October. Newfoundland west to MN, south to VA, OH, and IL. See Fernald (1950), p. 1408. [= C, F, FNA, K, SE; < *S. canadensis* var. *canadensis* – G; < *S. canadensis* – S]

Solidago canadensis Linnaeus *var. **hargeri*** Fernald, Harger's Common Goldenrod. Mt (VA): {NC?}: old fields, pastures, roadsides; uncommon?. August-October. VT and NH west to MN, south to VA, NC?, KY, OH, IL, and IA. [= C, F, FNA, K, SE; < *S. canadensis* var. *canadensis* – G; < *S. canadensis* – S, W]

Solidago chapmanii A. Gray, Chapman's Goldenrod. Cp (FL, GA): sandhills and dry, open hammocks; uncommon (rare in GA). September-October. S. GA south to s. FL and Panhandle FL. [= S; = *Solidago odora* Aiton var. *chapmanii* (A. Gray) Chapman – K, WH; = *Solidago odora* Aiton var. *chapmannii* (A. Gray) Chapman – SE, orthographic error; = *S. odora* ssp. *chapmanii* (A. Gray) Semple – FNA]

Solidago curtisii Torrey & A. Gray, Curtis's Goldenrod. Mt (GA, NC, SC, VA), Pd (VA): moist forested slopes, and rarely in mafic woodlands in the Piedmont of VA; common. September-October. A Central and Southern Appalachian endemic: PA, WV, and MD south to n. GA and n. AL. Var. *curtisii*, with stem glabrous or slightly puberulent in the inflorescence, and var. *pubens* (M.A. Curtis) A. Gray, with stem densely puberulent, are sometimes distinguished. They do not appear to be worthy of taxonomic recognition. [= C, SE, W; < *S. curtisii* var. *curtisii* – RAB (also see *S. lancifolia*); > *S. curtisii* var. *curtisii* – F, G; > *S. curtisii* var. *pubens* (M.A. Curtis) A. Gray – RAB, F, G; = *S. curtisii* var. *curtisii* – FNA; < *S. curtisii* – K (also see *S. lancifolia*); = *S. caesia* Linnaeus var. *curtisii* (Torrey & A. Gray) Wood; > *S. curtisii* – S; > *S. pubens* M.A. Curtis – S]

Solidago erecta Pursh. Mt, Pd, Cp (GA, NC, SC, VA): woodlands, old fields, woodland borders, grassy balds; common (rare in Coastal Plain of NC, SC, and GA). August-October. NY and CT south to GA, AL, and MS. [= RAB, C, F, FNA, G, K, S, SE, W; < *S. erecta* – FNA (also see *S. porteri*); = *S. speciosa* Nuttall var. *erecta* (Pursh) MacMillan]

Solidago faucibus Wieboldt, Gorge Goldenrod. Mt (SC, VA): moist forests. Late August-October. S. WV south to sw. VA, and se. KY; disjunct in nw. SC. See Wieboldt & Semple (2003) for additional information. [= FNA]

Solidago fistulosa P. Miller, Hairy Pineywoods Goldenrod. Cp (FL, GA, NC, SC, VA): pocosins, swamp forests, wet savanhnas, wet pine flatwoods, maritime forests; common. August-November. Nova Scotia south to s. FL, west to LA. [= RAB, C, F, FNA, G, GW, K, S, SE]

Solidago flaccidifolia Small, Appalachian Goldenrod. Mt (GA, NC, SC, VA), Pd (GA), Cp? (GA): mountain slopes; uncommon. September-October. VA and KY south to GA and ne. AL; disjunct in nc. MS. [= C, G, K, SE, W; < *S. caesia* – RAB, F; = *S. latissimifolia* – S, misapplied; = *S. curtisii* Torrey & A. Gray var. *flaccidifolia* (Small) R.E. Cook & Semple – FNA; = *S. caesia* Linnaeus var. *paniculata* A. Gray]

Solidago flexicaulis Linnaeus, Zigzag Goldenrod. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): moist wooded slopes, especially over calcareous or mafic rocks; common (rare in VA Coastal Plain, uncommon south of VA). August-October. Nova Scotia, Ontario and ND south to GA, AL, MS, and KS. [= RAB, C, F, FNA, G, K, S, SE, W]

Solidago gigantea Aiton, Smooth Goldenrod. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): old fields, roadsides, streamside meadows, bottomlands; common (rare in FL). August-September (-October). Nova Scotia west to Saskatchewan and MT, south to panhandle FL (Liberty County), TX, and CO. [= RAB, C, GW, K, W, WH; > *S. gigantea* var. *gigantea* – F, G, SE; > *S. gigantea* Aiton var. *serotina* (Kuntze) Cronquist – G, SE; > *S. gigantea* var. *leiophylla* Fernald – F; = *S. serotina* – S]

Solidago glomerata Michaux, Skunk Goldenrod. Mt (NC): restricted to high elevation situations, including grassy balds, rock outcrops, heath balds, northern hardwood forests, and spruce-fir forests; common. September-October. A narrow Southern Appalachian endemic, restricted to w. NC and e. TN (perhaps reaching its northern limit on Elk Knob, Watauga County, NC). The basal rosettes are evergreen, and are a conspicuous component of the winter flora at high elevations. The plants have a distinctive skunky odor, easily smelled without touching or bruising the plant. [= RAB, FNA, K, S, SE, W]

Solidago gracillima Torrey & A. Gray, Southern Bog Goldenrod, Graceful Goldenrod. Cp (FL, GA, NC, SC, VA), Pd (GA): wet pine savannas, seepage bogs; rare. August-October. E. VA south to c. Panhandle FL, west to s. AL. Several distinct entities appear to have been referred to this taxon; the number of entities, and the appropriate names to apply to them, are presently obscure. The names *S. perlonga* Fernald, *S. austrina* Small, and *S. simulans* Fernald have been synonymized under *S. gracillima* (as by Cronquist 1980). Cronquist (1980) refers material from WV and high elevation granitic domes of sw. NC (*S. simulans*) to *S. gracillima*, a treatment which is not phytogeographically credible. The distinction between S. gracillima s.s and S. austrina may prove warranted. They are alleged to differ as follows: *S. austrina*: pappus 2.2-2.8 mm long, ray flowers 2-4, disc flowers 6-8; of the inner Coastal Plain and lower Piedmont; S. gracillima: pappus (3.0-) 3.5-4.0 mm long; ray flowers 3-7; disk flowers 9-13; of the Coastal Plain. [= RAB, K, W, WH; < *S. gracillima* – C, SE (also see *S. simulans*); > *S. austrina* Small – F, G, S; > *S. perlonga* Fernald – F; = *S. stricta* Aiton ssp. *gracillima* (Torrey & A. Gray) Semple – FNA; > *S. gracillima* – S]

Solidago harrisii Steele, Shale-barren Goldenrod. Mt, Pd (VA): limestone, dolostone, greenstone, shale, and calcareous siltstone woodlands, barrens, and cliffs; uncommon (rare in Piedmont). August-September. A Central Appalachian endemic: w. MD south to e. WV and w. VA. [= F, S, W; = *S. arguta* Aiton var. *harrisii* (Steele) Cronquist – C, K, SE; = *S. arguta* ssp. *arguta* var. *harrisii* – FNA; < *S. boottii* var. *boottii* – G]

Solidago hispida Muhlenberg ex Willdenow, Hairy Goldenrod. Mt (GA, VA), Pd (VA), {NC, SC}: dry rocky forests and woodland edges; rare (VA Watch List). August-October. Labrador west to Saskatchewan, south to nw. GA, AL, AR, IA, and SD. Widespread in e. and c. TN (Chester, Wofford, & Kral 1997) and in nw. GA (Jones & Coile 1988). Also reported for NC and SC by Kartesz (1999). [= C, FNA, S, SE, W; > *S. hispida* var. *hispida* – F, G, K]

Solidago juncea Aiton, Early Goldenrod. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): meadows, pastures, roadbanks, woodland borders; common. July-September. Nova Scotia west to MN, south to GA, AL, MS, and LA. [= RAB, C, FNA, S, SE, W; > *S. juncea* var. *juncea* – F, G, K; > *S. juncea* var. *neobohemica* Fernald – F, K; > *S. juncea* var. *ramosa* Porter & Britton – G]

Solidago kralii Semple, Kral's Goldenrod. Cp (GA, SC): longleaf pine sandhills; rare. August-September. SC south to GA. See Semple (2003) for additional information. [= FNA]

Solidago lancifolia (Torrey & A. Gray) Chapman, Lanceleaf Goldenrod. Mt (NC, VA): mountain slopes, mostly at high elevations; rare. Late August-September. W. VA and e. WV south to w. NC and e. TN. [= C, FNA, S, SE, W; < *S. curtisii* var. *curtisii* – RAB; < *S. curtisii* – K]

Solidago latissimifolia P. Miller, Coastal Swamp Goldenrod. Cp (FL, GA, NC, SC, VA): pocosins, swamp forests, sandhill seepages, sandhill-pocosin ecotones; uncommon (rare in VA). August-October. Nova Scotia south c. peninsular FL, west to s. AL. [= FNA, K, WH; = *S. elliottii* Torrey & A. Gray – RAB, C, G, GW, S, SE; > *S. elliottii* var. *ascendens* Fernald – F; > *S. elliottii* var. *pedicellata* Fernald – F]

Solidago leavenworthii Torrey & A. Gray, Leavenworth's Goldenrod. Cp (FL, GA, NC, SC): wet pine savannas, wet pine flatwoods, pond margins, marshes; common (uncommon in GA and SC, rare in NC). August-November. Se. NC south to s. FL, west to s. AL. [= RAB, FNA, GW, K, S, SE, WH]

Solidago nemoralis Aiton *var. **nemoralis***, Eastern Gray Goldenrod. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): woodlands, glades, barrens, roadbanks; common (rare in FL). Nova Scotia west to ND, south to Panhandle FL and TX. The more western var. *decemflora* (de Candolle) Fernald does not enter our area. [= K; > *S. nemoralis* var. *nemoralis* – C, F, G, SE; > *S. nemoralis* var. *haleana* Fernald – C, F, G, SE; < *S. nemoralis* – RAB, S, W, WH; = *S. nemoralis* ssp. *nemoralis* – FNA]

Solidago odora Aiton, Licorice Goldenrod. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry forests and woodlands, especially in dry pinelands, such as sandhills, of the Coastal Plain, inland in dry, fire-maintained sites, such as glades, barrens, and ridgetop pine-oak woodlands; common (uncommon in Mountains). July-October. NH, VT, NY, OH, and MO south to FL and TX. [= RAB, F, G, S, W; = *S. odora* var. *odora* – C, K, SE, WH; = *S. odora* ssp. *odora* – FNA]

Solidago patula Muhlenberg ex Willdenow *var. **patula***, Northern Roughleaf Goldenrod. Mt (GA, NC, SC, VA), Pd (GA, NC, VA): bogs, seepages over mafic rocks, grassy balds (as Whitetop Mountain); uncommon. August-September (-October). NH and VT west to WI, WI, MI, and IA, south to GA, AL, MS, and MO. Some or all of the coastal records may actually represent ambiguous specimens of *S. patula* var. *strictula*. [= RAB, C, F, G, K, SE; = *S. patula* ssp. *patula* – FNA; < *S. patula* – GW, W; = *S. rigida* – S, misapplied]

Solidago patula Muhlenberg ex Willdenow *var. **strictula*** Torrey & A. Gray, Southern Roughleaf Goldenrod. Cp (FL, GA, NC, SC), Pd (VA): streamhead pocosins, sandhill seepages, swamp edges; uncommon (rare in NC and VA). September-October. Se. VA south to Panhandle FL, west to MO, OK, and TX. Perhaps better treated as *S. salicina*. [= RAB, C, G, K, SE, WH; > *S. patula* var. *strictula* – F; > *S. salicina* – F; = *S. patula* ssp. *strictula* (Torrey & A. Gray) J.C. Semple – FNA; < *S. patula* – GW; = *S. salicina* Elliott – S]

Solidago petiolaris Aiton *var. **petiolaris***. Cp (FL, GA, NC, SC), Pd (GA, NC, SC), Mt (GA, NC): upland forests and woodlands; uncommon (rare in Mountains). Late August-November. The distribution of *S. petiolaris* (in the broad sense) is peculiar, with an eastern component (NC south to ne. FL and Panhandle FL, west to AL) and a western component (IL, MO, AR, and LA west to NE, CO, and NM). The eastern component is sometimes treated as *S. petiolaris* (sensu stricto) and the western as *S. angusta* Torrey & A. Gray. Alternatively these are recognized as the varietal rank (as here), or combined entirely. Var. *angusta* (Torrey & A. Gray) A. Gray and var. wardii (Britton) Fernald are Ozarkian and more western (Nesom 2008). [= C, F, K, SE; < *S. petiolaris* – RAB, W, WH (and also see *S. buckleyi*); *S. petiolaris* var. *petiolaris* – C, F, K, SE; = *S. petiolaris* – G, in a narrow sense; > *S. milleriana* Mackenzie – S; > *S. harperi* Mackenzie in Small – S]

Solidago pinetorum Small, Pineywoods Goldenrod. Cp, Pd (NC, SC, VA), Mt (NC, VA): dry woodlands, woodland borders, roadbanks, dry pinelands; common (rare in VA Mountains). July-September. N. and wc. VA south through e., c, and nw. NC to nc. SC. [= RAB, C, F, FNA, G, K, S, SE, W]

Solidago plumosa Small, Yadkin River Goldenrod. Pd (NC): in crevices of outcrops in rocky, flood-scoured riverbanks; rare. September. Known only from the type locality, the gorge of the Yadkin River in c. NC. Most of the population was probably lost by construction of two hydropower dams, one at each of the two ends of the gorge, and the flooding of the intervening area. This species is related to the more northern *S. racemosa* and the newly described *S. arenicola*. [= FNA, K, S, SE]

Solidago porteri Small, Porter's Goldenrod. Pd (GA): upland forests; rare. So far as known, this species is endemic to the Piedmont of GA; its taxonomic status is very uncertain. [= K, S, SE; < *S. erecta* – FNA] {not yet keyed}

Solidago ptarmicoides (Nees) Boivin, White Prairie-goldenrod, Upland White Aster. Mt (GA), Pd (NC, SC): prairie-like barrens over mafic, ultramafic, or calcareous rock, serpentine woodlands, prairies; rare (GA Watch List, NC Endangered). August-October. VT and NY west to Saskatchewan, south to e. TN (Rhea and Roane counties in the Ridge and Valley) (Chester, Wofford, & Kral 1997), nw. GA, AR, and CO; disjunct in nc. NC and nc. SC. [= C, FNA, SE, W, X= ***Oligoneuron album*** (Nuttall) Nesom – K, Z; = *Aster ptarmicoides* (Nees) Torrey & A. Gray – F, G, S; = *Unamia alba* (Nuttall) Rydberg; > *Aster ptarmicoides* var. *georgianus* A. Gray (referring to plants of se. US); = *Solidago asteroides* Semple, superfluous name]

Solidago puberula Nuttall *var. **puberula***. Mt (GA, NC, SC, VA), Pd (GA, NC, VA), Cp? (NC): bogs, wet meadows, and wet pastures, in dry acid soils in VA; uncommon (NC Watch List). August-October. Nova Scotia west to Ontario, south to GA and TN. [= RAB, C, F, G, K, SE; = *S. puberula* ssp. *puberula* – FNA; = *S. puberula* – S; < *S. puberula* – W]

Solidago puberula Nuttall *var. **pulverulenta*** (Nuttall) Chapman. Cp (FL, GA, NC, SC, VA): savannas, streamhead pocosins, flatwoods, swamps, seepages in pinelands, and disturbed areas; common. September-October. Se. VA south to Panhandle FL, west to LA. [= RAB, C, F, G, K, SE, WH; = *S. puberula* ssp. *pulverulenta* (Nuttall) Semple – FNA; = *S. pulverulenta* Nuttall – S]

Solidago pulchra Small, Carolina Goldenrod. Cp (NC): wet pine savannas, seepage bogs; rare. July-September. Endemic to a small part of the Coastal Plain of se. NC, where locally common in the few wet savannas remaining. Notable sites include Green Swamp (Brunswick County), Holly Shelter Game Land (Pender County), Camp Lejeune Marine Corps Base (Onslow County), and Croatan National Forest (Carteret County). There is no question of the distinctness of this species from *S. stricta* and *S. gracillima*. Once learned, the basal leaves are recognizable at a glance, the petiole very long (often twice as long as the leaf blade), the venation finely netted, the margins smooth and entire, the tip usually acute and prominently mucronate. Even following fire, sterile rosettes typically outnumber flowering plants 100 to 1. [= FNA, K, S, SE; < *S. stricta* – RAB, GW]

Solidago racemosa Greene, Sticky Goldenrod. Pd (VA): rocky, flood-scoured riversides; rare. ME and Québec south to n. VA and WV; plants in the Cumberland Plateau of KY and ne. TN (Churchill & Schell 1992; Chester, Wofford, & Kral 1997) placed here are problematic and may represent another taxon or taxa. This complex remains poorly understood. [= *S. simplex* Kunth ssp. *randii* (Porter) Ringius var. *racemosa* (Greene) Ringius – C, FNA, K; = *S. racemosa* Greene var. *racemosa* – F; = *S. spathulata* A.P. de Candolle ssp. *randii* (Porter) Cronquist var. *racemosa* (Greene) Cronquist – G, SE]

Solidago radula Nuttall, Rough Goldenrod. Pd (NC, SC), Mt (GA): dry woodlands over mafic rocks; rare. August-October. IL west to KS, south to LA and TX; disjunct eastward in KY, NC, SC, GA, and AL. [= RAB, C, FNA, G, S, SE, W; > *S. radula* var. *radula* – K]

Solidago randii (Porter) Britton, Rand's Goldenrod. Mt (VA): cliffs and barrens, primarily over mafic rocks (such as greenstone and hornblende); rare. Nova Scotia west to Ontario and MI, south to w. VA and WV. [= F; < *S. simplex* ssp. *randii* (Porter) Ringius var. *monticola* (Porter) Ringius – C, FNA; > *S. randii* – F; > *S. maxonii* Pollard – F; = *S. spathulata* A.P. de Candolle ssp. *randii* (Porter) Cronquist var. *randii* – G; = *S. simplex* Kunth ssp. *randii* (Porter) Ringius var. *randii* – K]

Solidago riddellii Frank ex Riddell, Riddell's Goldenrod. Mt (GA, VA?): wet, calcareous prairies; rare. Ontario and Manitoba south to OH, IN, IL, AR, and KS; disjunct in w. VA and nw. GA. The specimen from Fort Monroe ("Fortress Monroe, Va." – Fernald 1950) is accurately identified. [= C, F, FNA, G; = ***Oligoneuron riddellii*** (Frank ex Riddell) Rydberg – K, Z]

Solidago rigida Linnaeus *var.* ***glabrata*** E.L. Braun, Southeastern Bold Goldenrod. Pd (GA, NC, SC, VA), Mt (NC), Cp (GA): glades, barrens, and prairie-like areas, over mafic (such as diabase) or calcareous (such as calcareous shale) rocks, and in adjacent disturbed areas, such as roadbanks and powerline rights-of-way; rare (NC Rare, SC Rare, VA Rare). August-October. Sc. VA, se. TN, c. OH, and e. MO south to c. SC, sw. GA, and e. TX. This taxon (variously treated as a species, subspecies, or variety) is rare and scattered throughout its range, restricted to prairie-like situations. Var. *glabratum* is apparently strictly diploid. [= C, G, SE; = ***Oligoneuron rigidum*** (Linnaeus) Small *var.* ***glabratum*** (E.L. Braun) Nesom – K, Z; < *Solidago rigida* Linnaeus – RAB, W; = *Solidago jacksonii* (Kuntze) Fernald – F; = *Solidago rigida* ssp. *glabrata* (E.L. Braun) Heard & Semple – FNA, Y; = *Oligoneuron jacksonii* (Kuntze) Small – S]

Solidago rigida Linnaeus *var.* ***rigida***, Midwestern Bold Goldenrod. Mt, Pd (NC, VA): glades, barrens, and prairie-like areas, over mafic or calcareous rocks; rare (NC Rare, SC Rare, VA Rare). August-October. RI and MA west to NY, s. Ontario, MI, WI, s. MN and c. NE, south to c. VA, sc. NC, w. NC, sc. TN, c. AR, and se. TX. Var. *rigidum* is generally rare and restricted to relictual prairie-like situations east of MI, IN, IL, MO, and OK. Var. *rigidum* is tetraploid through most of its range, including (apparently) all of our area. A third variety, var. *humilis* (T.C. Porter) Nesom, is more northern and western, ranging from Ontario west to Alberta, south to MI, IN, IL, MO, OK, n. TX, and NM. [= C, G, SE; = ***Oligoneuron rigidum*** (Linnaeus) Small *var.* ***rigidum*** – K, Z; < *Solidago rigida* Linnaeus – RAB, W; = *Solidago rigida* – F; = *Solidago rigida* ssp. *rigida* – FNA, Y; = *Oligoneuron grandiflorus* (Rafinesque) Small – S]

Solidago roanensis Porter, Roan Mountain Goldenrod. Mt (GA, NC, SC, VA), Pd (NC, SC): forests, woodlands, roadbanks; common (rare in upper Piedmont). July-September. MD and WV south to AL and GA. [= RAB, C, FNA, G, K, S, SE, W; > *S. roanensis* var. *roanensis* – F; > *S. roanensis* var. *monticola* (Torrey & A. Gray) Fernald – F]

Solidago rugosa P. Miller *var.* ***aspera*** (Aiton) Fernald. Cp (FL), {GA, NC, SC, VA}: fields, forests, roadsides; common. August-November. ME west to MI, south to FL and TX. [= F; < *S. rugosa* var. *rugosa* – RAB; < *S. rugosa* ssp. *aspera* – C, G, K, SE, W, WH; = *S. rugosa* ssp. *aspera* (Aiton) Cronquist var. *aspera* – FNA; < *S. rugosa* – GW; < *S. altissima* – S, misapplied]

Solidago rugosa P. Miller *var.* ***celtidifolia*** (Small) Fernald, Hackberry-leaf Goldenrod. Cp (FL), {GA, NC, SC, VA}: fields, forests, wetlands; uncommon. September-November. VA south to FL, west to OK and TX. [= RAB, F; < *S. rugosa* ssp. *aspera* (Aiton) Cronquist – C, G, K, SE, W, WH; *S. rugosa* ssp. *aspera* (Aiton) Cronquist var. *celtidifolia* (Small) Fernald – FNA; < *S. rugosa* – GW; = *S. celtidifolia* Small – S]

Solidago rugosa P. Miller *var.* ***cronquistiana*** Semple, Cronquist's Goldenrod. Mt (GA, NC): high elevation balds and forests; uncommon. September-October. A Southern Appalachian endemic: w. NC and e. TN south to n. GA. See Semple (2003) for additional information. [= *S. rugosa* ssp. *aspera* (Aiton) Cronquist var. *cronquistiana* Semple – FNA; < *S. rugosa* var. *rugosa* – RAB; < *S. rugosa* ssp. *aspera* – K, SE, W; < *S. rugosa* – GW; < *S. altissima* – S]

Solidago rugosa P. Miller *var.* ***rugosa***, Wrinkle-leaf Goldenrod. {GA, NC, SC, VA}: fields, forests, wetlands; common. August-October. Nova Scotia west to Ontario, south to GA, AL, MS, LA, TX. [< *S. rugosa* var. *rugosa* – RAB; = *S. rugosa* ssp. *rugosa* var. *rugosa* – C, FNA, G, K, SE; > *S. rugosa* ssp. *rugosa* var. *villosa* – C, G, K, SE; > *S. rugosa* var. *rugosa* – F; > *S. rugosa* var. *villosa* – F; < *S. rugosa* – GW; < *S. rugosa* ssp. *rugosa* – W]

Solidago rugosa P. Miller *var.* ***sphagnophila*** Graves, Peat-loving Goldenrod. {NC, SC, VA}: boggy habitats; uncommon? August-October. Nova Scotia and ME south to SC. [= F; < *S. rugosa* var. *rugosa* – RAB; = *S. rugosa* ssp. *rugosa* var. *sphagnophila* Graves – C, FNA, G, K; < *S. rugosa* – GW; < *S. rugosa* ssp. *rugosa* – W; = *S. aestivalis* E. Bicknell]

Solidago rupestris Rafinesque, Riverbank Goldenrod, Rock Goldenrod. Pd, Mt (VA): crevices in rocky, flood-scoured riversides; rare. July-September. PA, OH, and IL south to VA and TN. [= C, F, FNA, K, SE; < *S. altissima* – RAB; = *S. canadensis* var. *rupestris* (Rafinesque) Porter – G; < *S. canadensis* – S]

Solidago sempervirens Linnaeus *var.* ***mexicana*** (Linnaeus) Fernald, Southern Seaside Goldenrod. Cp (FL, GA, NC, SC, VA): coastal dunes, dune slacks, maritime wet grasslands, tidal marshes; common (rare in VA). Late August-November (and sporadically until at least January in mild winters). VA (or allegedly MA) south to s. FL, west and south to TX and Mexico; west

Indies. [= C, F, G, GW, K, SE; < *S. sempervirens* – RAB, WH; = *S. mexicana* Linnaeus – S; = *S. sempervirens* ssp. *mexicana* (Linnaeus) Semple – FNA]

Solidago sempervirens Linnaeus *var.* ***sempervirens***, Northern Seaside Goldenrod. Cp (VA): coastal dunes, dune slacks, maritime wet grasslands, tidal marshes; common. Late August-November. Newfoundland south to VA along the coast (and introduced inland in saline situations such as along salted roadways. [= C, F, G, K, SE; = *S. sempervirens* Linnaeus – S; = *S. sempervirens* ssp. *sempervirens* – FNA]

Solidago simulans Fernald, Granite Dome Goldenrod, Cliffside Goldenrod. Mt (GA, NC, SC): in thin soil mats wetted by periodic seepage on granitic domes in the vicinity of Highlands, NC (Jackson and Macon counties, NC; Rabun County, GA) and in Hickory Nut Gorge (Rutherford County, NC); rare. August-September. Endemic to sw. NC, nw. SC, and ne. GA. [= K; < *S. uliginosa* – RAB, FNA; < *S. gracillima* – SE]

Solidago speciosa Nuttall *var.* ***rigidiuscula*** Torrey & A. Gray. Mt (GA): limestone barrens; rare. (August-) September-October. Ontario west to ND and WY, south to TN, LA, and TX; disjunct eastward in glade habitats to nw. GA (GANHP), TN (Chester, Wofford, & Kral 1997), and KY. [= C, G, K, SE; = *S. speciosa* var. *angustata* Torrey & A. Gray – F, misapplied; = *S. speciosa* ssp. *speciosa* var. *rigidiuscula* – FNA; *S. rigidiuscula* (Torrey & A. Gray) Porter – S] {synonymy incomplete}

Solidago speciosa Nuttall *var.* ***speciosa***, Showy Goldenrod. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): pastures, forests, woodlands, roadbanks; uncommon (rare in VA Coastal Plain). September-October. NH, VT, NY, and WI south to GA, MS, LA, and OK. [= C, F, G, K, SE; < *S. speciosa* – RAB, W; > *S. conferta* – S; > *S. harperi* Mackenzie – S; = *S. speciosa* ssp. *speciosa* var. *speciosa* – FNA]

Solidago sphacelata Rafinesque, Limestone Goldenrod, False Goldenrod. Mt (GA, NC, VA), Pd (NC, VA): rock outcrops and dry rocky forests, usually over calcareous or mafic rocks; uncommon (rare in Virginia Piedmont). (July-) August-September (-October). WV, OH, IN, and IL south to GA, AL, and MS. [= RAB, C, F, G, K, SE, W; = *Brachychaeta sphacelata* (Rafinesque) Britton – S]

Solidago spithamaea M.A. Curtis, Blue Ridge Goldenrod. Mt (NC): in crevices of sloping to nearly vertical outcrops of high elevation rocky summits on Grandfather Mountain, Hanging Rock Mountain, and Roan Mountain; rare. September-October. Endemic to the three mountains named, the first two in NC, the third on the NC-TN border. *S. spithamaea* is a very restricted endemic, apparently related most closely to *S. multiradiata* Aiton and *S. leiocarpa* de Candolle. *S. multiradiata* is an arctic-alpine species (with several recognized varieties) of n. Canada and AK, ranging south in w. North America to CA and CO. *S. cutleri* occurs in alpine situations on the higher peaks of Québec, ME, NH, VT, and NY. *S. spithamaea* is a part of the remarkable "pseudo-alpine" flora of high elevation rocky summits in nw. NC; it typically is found with *Liatris helleri, Huperzia appressa, Geum radiatum, Trichophorum cespitosum, Sibbaldiopsis tridentata, Polypodium appalachianum, Paronychia argyrocoma, Kalmia buxifolia, Stenanthium leimanthoides, Heuchera villosa* var. *villosa, Saxifraga michauxii, Solidago glomerata, Houstonia montana, Carex misera,* and *C. brunnescens.* [= RAB, FNA, K, S; = *S. spithamea* – SE, W, orthographic variant]

Solidago squarrosa Nuttall, Ragged Goldenrod, Stout Goldenrod, Squarrose Goldenrod. Mt (NC, VA), Pd (VA): upland forests; uncommon (rare in NC and in VA Piedmont). August-September. New Brunswick and Ontario south to DE, w. NC, and OH. [= RAB, C, F, FNA, G, K, S, SE, W]

Solidago stricta Aiton, Wand Goldenrod. Cp (FL, GA, NC, SC, VA?): pine savannas, Coastal Plain bogs, pocosins; common. Late August-October. NJ south to s. FL, west to TX; West Indies and s. Mexico. [= C, F, G, K, SE, WH; < *S. stricta* – RAB, GW (also see *S. pulchra*); = *S. petiolata* P. Miller – S, misapplied; = *S. stricta* Aiton ssp. *stricta* – FNA]

Solidago tarda Mackenzie. Cp (FL, GA, VA), Pd (GA): sandhills, other dry pinelands, and xeric fluvial sand ridges; rare (VA Watch List). September-October. NJ and e. PA south to e. VA, c. and s. GA, AL, and panhandle FL, in our area primarily in the Coastal Plain; disjunct in Marion County, TN (Chester, Wofford, & Kral 1997). [= C, FNA, S, SE; < *S. arguta* – RAB; < *S. ludoviciana* – F, misapplied as to our area; < *S. arguta* var. *arguta* – K; < *S. arguta* var. *caroliniana* – WH]

Solidago tortifolia Elliott, Leafy Pineywoods Goldenrod. Cp (FL, GA, NC, SC, VA): sandhills and dry pinelands; uncommon (rare in NC and VA). August-November. Se. VA south to s. FL, west to AR and TX. [= RAB, C, F, FNA, G, K, S, SE, WH]

Solidago uliginosa Nuttall *var.* ***uliginosa***, Northern Bog Goldenrod. Mt (GA?, NC, VA), Cp (VA): bogs; rare. Labrador west to Keewatin, south to w. NC, ne. TN, IL, and IA (reports from further south needs additional evaluation; some material formerly identified as *S. uliginosa* is actually *S. simulans* or *S. gracillima*). [= F, G, K; < *S. uliginosa* – RAB, C, FNA, SE, W; < *S. uniligulata* (A.P. de Candolle) Porter – S]

Solidago ulmifolia Muhlenberg ex Willdenow *var.* ***ulmifolia***, Elmleaf Goldenrod. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (FL, VA): rocky forests and woodlands, especially on mafic and calcareous substrates, moist hammocks (in FL); common (rare in FL, GA, NC, SC, rare in VA Coastal Plain, where usually confined to coquina limestone). August-October. Nova Scotia, ME, Ontario, and MN, south to FL and TX. [= C, FNA, G, K, SE; < *S. ulmifolia* – RAB, F, S, W, WH]

Solidago verna M.A. Curtis, Spring-flowering Goldenrod. Cp (NC, SC): moist pine savannas, lower slopes of sandhills, pineland roadbanks; rare. May-June. Se. NC south to e. SC. [= RAB, FNA, K, S, SE]

Solidago villosicarpa LeBlond, Carolina Maritime Goldenrod. Cp (NC): dry-mesic and mesic hardwood forests (and related disturbed areas), in the outer Coastal Plain; rare. September. Endemic to se. NC (Onslow, Pender, Brunswick, and Craven counties). See LeBlond (2000). [= FNA]

Solidago albopilosa E.L. Braun, Rockhouse Goldenrod, Cave Goldenrod. In sandstone rockhouses. In the Red River Gorge of e. KY (Menifee, Powell, and Wolfe counties). September. See Esselman & Crawford (1997). [= C, F, FNA, G, K, SE]

Solidago altissima Linnaeus var. *gilvocanescens* (Rydberg) Semple, Great Plains Common Goldenrod. Attributed to VA by Kartesz (1999). [= *S. canadensis* Linnaeus var. *gilvocanescens* Rydberg – C, F, K; = *S. pruinosa* Greene – G; < *S. canadensis* – S, W; = *S. altissima* L. ssp. *gilvocanescens* (Rydberg) Semple – FNA] {not keyed}

Solidago arenicola B.R. Keener & Kral, Black Warrior Goldenrod, is known from Blount County, AL (Black Warrior River) and perhaps on rivers in the Cumberland Plateau of TN and KY (notably Big South Fork of the Cumberland River). See Keener & Kral (2003) for additional information. [= FNA]

Solidago buckleyi Torrey & A. Gray, Buckley's Goldenrod. Forests, open ridgetop and bluff woodlands. September. W. KY, s. IN, s. IL, s. MO; perhaps eastwards in GA and AL (these occurrences controversial as to identification). [= F, FNA, G, K, S, SE; < *S. petiolaris* – RAB]

Solidago delicatula Small. Possibly east to AL, FL. August-October. [= FNA, SE; = *S. ulmifolia* Muhlenberg ex Willdenow var. *microphylla* A. Gray – K; < *S. ulmifolia* – S] {not keyed}

Solidago gattingeri Chapman, Gattinger's Goldenrod. Cedar glades. AR, MO, c. TN (Chester, Wofford, & Kral 1997). [= F, FNA, G, K, S, SE] {not keyed}

Solidago missouriensis Nuttall var. *fasciculata* Holzinger. C. TN (Chester, Wofford, & Kral 1997). [= C, F, G, K, SE; < *S. missouriensis* – FNA; = *S. glaberrima* Martens – S] {not keyed}

Solidago nitida Torrey & A. Gray, Shiny Goldenrod. Cp: pine savannas, prairies. (July-) August-October. MS west to s. AR, se. OK, and TX. [= FNA, SE; = *Oligoneuron nitidum* (Torrey & A. Gray) Small – K, S, Z; = *Solidago nitida* Torrey & A. Gray – FNA, SE]

Solidago shortii Torrey & A. Gray. Endemic to nc. KY (Fleming, Jefferson, Nicholas, Robertson counties) and s. IN. August-October. See Smith et al. (2004) for detailed information. [= C, F, FNA, G, K, SE] {not keyed}

Solidago uliginosa Nuttall var. *linoides* (Torrey & A. Gray) Fernald. South to s. PA and WV. [= K; < *S. uliginosa* – C, FNA; > *S. uliginosa* var. *linoides* – F; > *S. purshii* Porter – F; > *S. uliginosa* var. *peracuta* (Fernald) Friesner – G]

Solidago ulmifolia Muhlenberg ex Willdenow var. *palmeri* Cronquist. East to MS (and AL?). [= FNA, G, K, SE; < *S. ulmifolia* – S]

Soliva Ruiz & Pavón 1794 (Burweed)

A genus of about 8 species, herbs, of South America. References: Watson in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z. [also see *Gymnostyles*]

1 Achenes (1.5-) 2.5-3.0 mm long, usually winged, the wings not transversely ribbed ..... ***S. sessilis***
1 Achenes 1.5-2.2 mm long, winged, transversely ribbed.
  2 Leaves mostly basal; leaf blades 3-8 (-15) cm long, 2-3× pinnatifid ..... ***S. anthemifolia***
  2 Leaves cauline and basal; leaf blades 1-2 (-3) cm long, 1 (-2)× pinnatifid ..... ***S. stolonifera***

* ***Soliva anthemifolia*** (Antoine Laurent de Jussieu) Sweet. Cp (FL): lawns, disturbed areas; rare, native of South America. February-April. [= FNA, SE, Z = *Gymnostyles anthemifolia* Antoine Laurent de Jussieu – K, WH] {add synonymy}

* ***Soliva sessilis*** Ruiz & Pavón, Field Burweed. Cp (FL, GA, NC, SC, VA), Pd (GA, NC): lawns, roadsides; uncommon (rare in GA, NC, SC, VA), native of South America. April-May. [= FNA, K, S, WH, Z; = *S. pterosperma* (Antoine Laurent de Jussieu) Lessing – RAB, SE]

* ***Soliva stolonifera*** (Brotero) Loureiro, Carpet Burweed. Cp (FL, GA, SC): lawns, roadsides, moist open areas; uncommon, native of South America. March-April. [= FNA, SE, Z; = *Gymnostyles stolonifera* (Brotero) Tutin – K, WH; ? *Soliva nasturtiifolia* (Antoine Laurent de Jussieu) A.P. de Candolle – RAB, misapplied; ? *Gymnostyles nasturtiifolia* Antoine Laurent de Jussieu – S, misapplied]

Sonchus Linnaeus 1753 (Sow-thistle, Milk-thistle)

A genus of about 50-60 species, herbs and shrubs, of the Old World. References: Hyatt in FNA (2006a); Cronquist (1980)=SE.

1 Heads 30-50 mm across in flower, the involucre (10-) 15-20 mm high; perennials from creeping rhizomes.
  2 Phyllaries and peduncles densely pubescent with glandular hairs; longer phyllaries 14-17 mm long ..... ***[S. arvensis var. arvensis]***
  2 Phyllaries and peduncles glabrous (but with sessile glands); longer phyllaries 10-15 mm long ..... ***S. arvensis var. glabrescens***
1 Heads 15-25 mm across in flower, the involucre 9-13 mm high; annuals.
  3 Leaf base auricles rounded; mature achenes not transversely rugose ..... ***S. asper***
  3 Leaf base auricles sagittate, the two lobes on either side of the stem coming to a point; mature achenes transversely rugose ..... ***S. oleraceus***

* ***Sonchus arvensis*** Linnaeus *var.* ***glabrescens*** (Günther) Grabowski & Wimmer, Perennial Sow-thistle. Mt (NC, VA), Pd (VA): disturbed areas; uncommon (rare in NC), native of Europe. June-November. [= C, SE; < *S. arvensis* – RAB, W; = *Sonchus arvensis* ssp. *uliginosus* (Bieberstein) Nyman – FNA, K; > *S. arvensis* var. *glabrescens* – F; > *S. uliginosus* Bieberstein – F; = *S. uliginosus* – G]

* ***Sonchus asper*** (Linnaeus) Hill, Spinyleaf Sow-thistle, Prickly Sow-thistle. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): roadsides, fields, pastures, disturbed areas; common, native of Europe. Late March-July. [= RAB, C, F, FNA, G, K, S, SE, W, WH]

* ***Sonchus oleraceus*** Linnaeus, Common Sow-thistle. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, VA): roadsides, fields, pastures, disturbed areas; common, native of Europe. Late March-July. [= RAB, C, F, FNA, G, K, S, SE, W, WH]

* *Sonchus arvensis* Linnaeus var. *arvensis*, Perennial Sow-thistle. Disturbed areas. Native of Europe, south to MD, PA, TN, KY, and MS (Kartesz 1999). [= C, F, SE; = *S. arvensis* ssp. *arvensis* – FNA, K; = *S. arvensis* – G]

Sphagneticola O. Hoffmann 1900

A genus of about 4 species, perennial herbs, of tropical America and Asia. References: Strother in FNA (2006c).

* ***Sphagneticola trilobata*** (Linnaeus) Pruski. Cp (FL): disturbed areas; rare, native of tropical America. Naturalized in FL (including several counties in the panhandle adjacent to GA) (Wunderlin & Hansen 2003). [= FNA, K, WH; = *Wedelia trilobata* (Linnaeus) A.S. Hitchcock – S, SE]

Stokesia L'Héritier 1789 (Stokesia, Stokes Aster)

A monotypic genus, an herb, of se. North America. References: Strother in FNA (2006a); Jones (1982)=Z; Cronquist (1980)=SE.

Stokesia laevis (Hill) Greene, Stokesia, Stokes Aster, Blue Stokesia. Cp (FL, GA, SC), Pd* (NC*): native in pitcherplant bogs and moist pinelands of FL, GA, and SC, rather frequently grown as a garden plant and naturalized from cultivation at least in NC; rare. Late June-August. Native from e. SC south ne. FL, FL Panhandle, west to LA. There seems no reason to question the validity and native status of the early record from SC. A unique tetraploid population found by the Atlanta Botanical Garden in Omega, GA (near Tifton) in the 1990s was distinguished by having distinct upright and long scapes, up to 1 meter in length; the original population has been destroyed, but a selection derived from it was named 'Omega Skyrocket' and introduced into the commercial trade (D. Werner, pers. comm.. 2006). [= RAB, FNA, K, S, SE, WH, Z]

Stuartina Sonder 1853

A genus of 2 species, endemic to Australia.

* ***Stuartina hamata*** Philipson. Cp (SC): waste area near wool-combing mill; rare, native of Australia. See Nesom (2004d).

Symphyotrichum Nees 1833 (American Aster)

A genus of about 90 species, of the Americas and e. Asia. References: Brouillet et al. FNA (2006b); Brouillet & Semple (1981); Cronquist (1980)=SE; Jones (1980a, 1980b, 1984); Jones & Young (1983); R. Jones (1983)=Z; R. Jones (1992); Lamboy (1987, 1992)=Y; Nesom (1994)=X; Nesom (2005b)=V; Nesom (1993a, 1993b, 1994, 1997); Noyes & Rieseberg (1999); Semple & Brouillet (1980a, 1980b); Semple, Chmielewski, & Lane (1989); Semple, Heard, & Xiang (1996); Sundberg (2004)=Q; Reveal & Keener (1981); Warners & Laughlin (1999); Xiang & Semple (1996). Key to section *Oxytripolium* based on Nesom (2005b).

1 Basal and lower stem leaves petiolate with cordate blades; [subgenus *Symphyotrichum*] ..... **Key A**
1 Basal and lower stem leaves not **both** petiolate and cordate-bladed.
  2 Stem leaves clasping (or adnate-decurrent); rays blue, purple, or lavender.
    3 Upper stem leaves very numerous; blades of upper stem leaves 3-15 mm long; [subgenus *Virgulus*] ..... **Key B**
    3 Upper stem leaves sparse to moderately numerous; blades of at least the larger upper stem leaves > 15 mm long ..... **Key C**
  2 Stem leaves not clasping (the bases often somewhat sheathing in subgenus *Astropolium*); rays blue, purple, lavender, pink, or white.
    4 Leaves silky pubescent; upper stem leaves 8-30 mm long, oblanceolate; [subgenus *Virgulus*] ..... **Key D**
    4

?2Stem leaves small, 0.2-4.3 cm long; rays blue, purple, or lavender
?2Stem leaves larger ; rays blue, purple, lavender, pink, or white

Key A *Symphyotrichum* with petiolate, cordate-bladed lower leaves

S. undulatum, [S. oolentangiense var. oolentangiense], S. shortii, [S. drummondii var. drummondii], [S. drummondii var. texanum], S. lowrieanum, S. retroflexum, S. urophyllum

Key B

1S. adnatus
1S. walteri

Key C

S. georgianum, S. grandiflorum, S. novae-angliae, S. oblongifolium, S. patens var. gracile, S. patens var. patens, S. patens var. patentissimum, S. phlogifolium, S. firmum, S. fontinale, S. laeve var. concinnum, S. laeve var. leave, S. laeve var. purpuratum, S. novi-belgii var. elodes, S. novi-belgii var. novi-belgii, S. prenanthoides, S. puniceum var. puniceum, S. puniceum var. scabricaule, S. rhiannon, S. undulatum

Key D

S. concolor var. concolor, S. concolor var. devestitum, S. plumosum, S. pretense, =S. sericeum

Key to Section *Patentes*

1 Involucres 8-10 (-12) mm high; disk flowers 8-10 mm long, white with purplish lobes; heads 4-5 (-6) cm across (ray tip to ray tip); plants strongly rhizomatous, forming clonal colonies with the stems mostly scattered along the rhizome (new stems typically arising at least several cm from the old ones); achenes 2.5-4.0 mm long, pale gray-brown, the trichomes about 0.4 mm long and distributed on and between the ribs; anthers purplish; pollen white ..... ***S. georgianum***

1 Involucres 5.5-7.5 (-8.5) mm high; disk flowers 5.5-8 mm long, either white with purplish lobes or yellow; heads 3-4 (-4.5) cm across (ray tip to ray tip); plants cespitose, generally with 1 or more stems arising from caudices (the new stems arising near the old); achenes 2.0-4.0 mm long, tan, gray, brown, dark-brown, or black, the trichomes various (see below); anthers purplish or yellow; pollen white or yellow.

2 Disk corollas white {or perhaps also yellow??}; cauline leaves 7.5-12.5 (-14) cm long, thin in texture, soft-pubescent, the venation apparent, rugose-veiny and wrinkled; anthers purplish; pollen white; achenes 2.5-4.0 mm long, the trichomes concentrated on the ribs, < 0.4 mm long, appressed; [primarily of the Mountains, less commonly the Piedmont, mostly in moist, shady to semi-sunny situations] ..... ***S. phlogifolium***

2 Disk corollas yellow; cauline leaves (2-) 3-7 (-9) cm long, thick in texture, scabrous, the venation inconspicuous; anthers yellow; pollen yellow; achenes 2.0-3.5 mm long, the trichomes distributed on and between the ribs, mostly > 0.4 mm long, spreading; [widespread in our area, mostly in dry, semi-sunny to sunny situations] ..... ***S. patens var. patens***

[from Warners & Laughlin (1999)]

1 Stems glabrous, occasionally hispidulous in lines; stem leaves with glabrous midvein on the lower surface; rays white to pale lavender; inflorescence dense, leafy; shoots arising singly from elongate rhizome; stems 3-5 mm thick (at 20 cm above soil surface) ..... ***S. firmum***

1 Stems densely pubescent, usually purplish; stem leaves with pubescent midvein on the lower surface; rays lavender to purple; inflorescence widely spreading; shoots often in clumps of 2-6 stems from a persistent stout caudex; stems 5-9 mm thick (at 20 cm above soil surface)..... ***S. puniceum var. puniceum***

Key to section *Oxytripolium*

1 Plants perennial, from creeping rhizomes.

2 Midstem leaves (1.0-) 1.5-2.7 mm wide; involucres 4.1-5.3 mm high; ray florets 10-16; disc florets (10-) 13-23; achenes 1.5-2.0 (-2.5) mm long; pappus 3.0-4.4 mm long; [of FL southward] ..... ***S. bracei***

2 Midstem leaves (1.5-) 3-6 mm wide; involucres 6-9.5 (-11) mm high; ray florets (12-) 17-25; disc florets 25-45 (-54); achenes 2.8-4.0 (-4.5) mm long; pappus 5.0-6.1 mm long; [widespread in our area] ..... ***S. tenuifolium***

1 Plants annual, from a short taproot.

3 Heads usually dense in an elongate, pyramidal-paniculate arrangement; inner phyllaries 6-7 mm long, phyllary apices linear-acuminate, distal margins often inrolled/involute, green zone of phyllaries narrowly lanceolate, usually extending the entire length of the phyllary, chartaceous bases short or absent; pappus accrescent, 4-5.5 mm long at maturity and usually longer than coiled ray corollas; habitats wet, saline ..... ***S. subulatum***

3 Heads corymbiform to thyrsiform, diffusely paniculate, or secund to subsecund and paniculiform arrangements or at the tips of long, bracteate branches; inner phyllaries 4-6.5 mm long, phyllary apices acute to acuminate, distal margins inrolled/involute or not, green zone of phyllaries lanceolate to elliptic, chartaceous bases usually conspicuous; pappus not accrescent, 3.5-4 (-5) mm long at maturity, longer or shorter than ray corollas; habitats moist to wet, rarely saline.

4 Phyllary tips appressed, acute, flat, inner phyllaries with broadly lanceolate, distinctly demarcated, apical green zone, proximal ½ -1/3 white-chartaceous; ray floret laminae erect, often involute along the edges (curling inward lengthwise), rarely coiling back distally (if so, then only ca. 1/2 coil), usually shorter than mature pappus; disc florets (3-) 7-14 ..... ***S. squamatum***

4 Phyllary tips loose, linear-acuminate, distal margins often inrolled/involute, inner phyllaries with narrowly lanceolate, often weakly demarcated apical green zone, white-chartaceous bases short, ca. 1/3–1/2 the length of the phyllaries; ray floret laminae not involute along edges, usually coiling back distally in 1–4 or more coils, usually as long or longer than mature pappus; disc florets **either** (6-) 8-15 **or** 11-23 **or** (20-) 33-45 (-50).

5 Heads usually corymbiform to thyrsiform in arrangement (borne primarily on distal branches, distally clustered); inner phyllaries 4-5.5 (-6) mm long; phyllary apices acute to abruptly short-acuminate or long-acuminate, the distal margins inrolled/involute or not; ray florets in 1 (-2) series, corollas 2-3 mm long, the laminae 0.1-0.3 mm wide (dried), white to light pinkish or slightly blue, coiling back in 1-2 coils or less commonly remaining straight; disc florets (6-) 8-15; [of FL westward across the Gulf Coast] ..... ***S. expansum***

5 Heads diffusely paniculiform to pyramidal-paniculiform to corymbiform or second to subsecund and paniculiform; inner phyllaries 5-6.5 mm long; phyllary apices long-acuminate, the distal margins usually inrolled/involute; ray florets in 1-3 series, corollas 2-7 mm long, the laminae 0.2-0.8 mm wide (dried), white to blue or purple, coiling back in 2-5 coils; disc florets **either** 11-23 **or** (20-) 33-45 (-50).

6 Heads at first at ends of long, bracteate branches, then produced and maturing as axillary and nearly sessile or on very short lateral branches, commonly on one side of the main stem and appearing secund to subsecund, in paniculiform arrangements; ray florets in 2-3 series, corollas mostly 2–3.5 (-4) mm long, laminae 0.2-0.4 mm wide (dry), blue to purple, coiling back in 2-3 (-4) coils; disc florets 11-23; [e. GA southwards] ..... ***S. bahamense***

6 Heads often at ends of long, bracteate branches, axillary heads usually maturing on elongate lateral branches, the whole arrangement often diffusely paniculiform to pyramidal-paniculiform, or heads more distally disposed and the arrangement corymbiform to thyrsiform; ray florets in 1 series, corollas mostly 4-7 mm long, laminae 0.4-0.8 mm wide (dry), blue to white, coiling back in 3-5 coils; disc florets (20-) 33-45 (-50); [sc. United States east to AL and scattered eastward as an introduction] ..... ***S. divaricatum***

Symphyotrichum adnatum (Nuttall) Nesom. Cp (FL, GA): sandhills, pine flatwoods; common. S. GA south to s. FL, west to se. LA. [= FNA, K, WH, X; = *Aster adnatus* Nuttall – S, SE]

Symphyotrichum bahamense (Britton) Nesom, Bahama Salt-marsh Aster. Cp (FL, GA): salt, brackish, and fresh marshes, ditches, wet areas; uncommon. October-November. E. GA, peninsular FL, FL Panhandle; Bahamas. [= K, V; = *S. subulatum* (Michaux) Nesom var. *elongatum* (Bosserd) S.D. Sundberg – FNA, Q; < *Aster subulatus* – GW; < *A. subulatus* Michaux var. *cubensis* – SE; = *A. subulatus* Michaux var. *elongatus* Bosserd]

Symphyotrichum bracei (Britton ex Small) Nesom, Brace's Aster. Cp (FL): brackish marshes; rare. August-December (-February). Panhandle FL south to s. FL; Bahamas; Cuba. [= K, V, WH, X; = *Aster bracei* Britton ex Small – S, SE; = *S. tenuifolium* (Linnaeus) Nesom var. *aphyllum* (R.W. Long) S.D. Sundberg – FNA, Q]

Symphyotrichum chapmanii (Torrey & Gray) Semple & Brouillet, Chapman's Wood-aster. Cp (FL): flatwoods and seepage bogs; rare. Endemic to Panhandle FL and s. AL, with a few widely scattered records in the FL peninsula. [= FNA, WH; = *Eurybia chapmanii* (Torrey & Gray) Nesom – K, X; = *Aster chapmanii* Torrey & Gray – S, SE]

Symphyotrichum concolor (Linnaeus) Nesom *var.* ***concolor***, Eastern Silvery Aster. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): sandhills, Piedmont woodlands, forest edges, roadbanks; common, rare in Mountains. September-October. MA and NY south to s. FL, west to LA, inland less commonly to TN and KY. [= FNA; < *S. concolor* (Linnaeus) Nesom – K, WH, X; < *Aster concolor* Linnaeus – RAB, C, F, G, S, SE, W; < *Virgulus concolor* (Linnaeus) Reveal & Keener]

Symphyotrichum cordifolium (Linnaeus) Nesom. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): rich forests, shaded roadbanks; common, rare in Piedmont and Coastal Plain. September-October. [= K; < *Aster cordifolius* Linnaeus – RAB (also see *A. lowrieanus*); = *A. cordifolius* – C, G, S, SE, W; > *A. cordifolius* var. *cordifolius* – F; > *A. cordifolius* var. *polycephalus* Porter – F; > *A. cordifolius* var. *racemiflorus* Fernald – F; > *S. cordifolium* (Linnaeus) Nesom var. *cordifolium* – X; > *S. cordifolium* (Linnaeus) Nesom var. *polycephalum* (Porter) Nesom – X; > *S. cordifolium* (Linnaeus) Nesom var. *racemiflorum* (Fernald) Nesom – X]

Symphyotrichum depauperatum (Fernald) Nesom, Serpentine Aster. Pd (NC): glades and barrens over mafic rocks (diabase); rare. Early September-October. MD and se. PA; disjunct southward in nc. NC. [= FNA, K, X; = *Aster depauperatus* Fernald – C, F, G, SE]

* ***Symphyotrichum divaricatum*** (Nuttall) Nesom, Midwestern Salt-marsh Aster. Cp (SC, VA), Pd (VA): disturbed areas, including waste areas near wool-combing mill; rare, native of sc. United States and Mexico. October-November. See Nesom (2000). {distribution verified in part by specimens at NCU} [= K, V, X; = *Aster exilis* Elliott – RAB, F, apparently misapplied; = *Symphyotrichum subulatum* (Michaux) Nesom var. *parviflorum* (Nees) S.D. Sundberg – FNA, Q; < *Aster subulatus* – GW; = *Aster subulatus* Michaux var. *ligulatus* Shinners – SE]

Symphyotrichum dumosum (Linnaeus) Nesom var. ***dumosum***, Long-stalked Aster. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): old fields, disturbed areas, pastures; common. Late August-October. New Brunswick, WV, IN, IL, OK south to FL and TX. [= K, X; < *Aster dumosus* – RAB, C, G, GW, SE, W; > *Aster dumosus* Linnaeus var. *dumosus* – F; > *A. dumosus* var. *coridifolius* (Michaux) Torrey & A. Gray – F; < *S. dumosum* – FNA, WH; > *A. dumosus* – S; > *A. coridifolius* Michaux – S]

Symphyotrichum dumosum (Linnaeus) Nesom *var.* ***gracilipes*** (Wiegand) Nesom. Cp (FL), {GA, SC}. Late August-October. SC south to FL, west to LA. [= K; < *Aster dumosus* – RAB, GW, SE; < *S. dumosum* – FNA, WH; = *A. gracilipes* (Wiegand) Alexander – S; = *Aster dumosus* Linnaeus var. *gracilipes* Wiegand]

Symphyotrichum dumosum (Linnaeus) Nesom *var.* ***pergracile*** (Wiegand) Nesom. {NC, SC}. Late August-October. Endemic to NC and SC. [= K; < *Aster dumosus* – RAB, GW, SE; < *S. dumosum* – FNA; = *Aster dumosus* Linnaeus var. *pergracile* Wiegand]

Symphyotrichum dumosum (Linnaeus) Nesom var. ***strictior*** (Torrey & A. Gray) Nesom. Mt (VA), {NC}: woodlands and glades over mafic rock; rare. Late August-October. NH, Ontario, and WI south to NC and MO. [= K, X; < *Aster dumosus* – RAB, C, G, GW, SE, W; = *A. dumosus* Linnaeus var. *strictior* Torrey & A. Gray – F; < *S. dumosum* – FNA]

Symphyotrichum dumosum (Linnaeus) Nesom var. ***subulifolium*** (Torrey & A. Gray) Nesom. Cp (FL), {GA, NC, SC, VA} Late August-October. ME south to FL, west to TX. [= K, X; < *Aster dumosus* – RAB, C, G, GW, SE, W; = *Aster dumosus* Linnaeus var. *subulifolius* Torrey & A. Gray – F; < *S. dumosum* – FNA, WH]

Symphyotrichum elliottii (Torrey & A. Gray) Nesom, Southern Swamp Aster, Elliott's Aster. Cp (FL, GA, NC, SC, VA): bogs, swamps, and marshes, mainly in the outer Coastal Plain, on tree bases, hummocks, and stumps in tidal freshwater swamps, especially where salinities may occasionally exceed 5-10 ppt; uncommon (rare in VA). Late September-November. Se. VA south to s. FL, west to LA. Jones & Coile (1988) record for n. GA must be erroneous {check}. [= FNA, K, WH, X; = *Aster elliottii* Torrey & A. Gray – RAB, C, F, G, GW, S, SE; = *Aster puniceus* Linnaeus var. *elliottii* (Torrey & A. Gray) A. G. Jones]

Symphyotrichum ericoides (Linnaeus) Nesom *var.* ***ericoides***, Heath Aster, Squarrose White Aster. Mt (GA, VA): limestone glades; rare (GA Special Concern, VA Rare). [= K, X; = *Aster ericoides* Linnaeus var. *ericoides* – G; < *Aster ericoides* – C, F, SE, W; < *S. ericoides* ssp. *ericoides* – FNA; < *Virgulus ericoides* (Linnaeus) Reveal & Keener]

Symphyotrichum ericoides (Linnaeus) Nesom *var.* ***prostratum*** (Kuntze) Nesom, Squarrose White Aster. {VA}. [= K, X; = *Aster ericoides* Linnaeus var. *prostratus* (Kuntze) Blake – G; < *Aster ericoides* – C, F, SE, W; < *S. ericoides* ssp. *ericoides* – FNA; < *Virgulus ericoides* (Linnaeus) Reveal & Keener]

Symphyotrichum expansum (Poeppig ex Sprengel) Nesom. Cp (FL): pond margins, disturbed wet areas; rare. July-November (-January). FL, AL, OK, UT, NV, and CA south through Mexico and Central America to n. South America; West Indies. [= K, V, X; = *S. subulatum* (Michaux) Nesom var. *parviflorum* (Nees) S.D. Sundberg – FNA, Q] {add synonymy – S}

Symphyotrichum firmum (Nees) Nesom, Shining Aster. {GA, NC?, VA} (NC Watch List). Included by Nesom (1997) in *Symphyotrichum puniceum* (Linnaeus) Nesom var. *puniceum*, but see Warners & Laughlin (1999) for an analysis of differences between it and *S. puniceum*. [= FNA, X; = *Aster firmus* Nees – C; < *Aster puniceus* – RAB; = *Aster puniceus* Linnaeus var. *firmus* (Nees) Torrey & A. Gray – F; > *Aster puniceus* Linnaeus var. *firmus* (Nees) Torrey & A. Gray – G; > *Aster lucidulus* (A.

Gray) Wiegand – G, SE, W; = *Aster puniceus* Linnaeus ssp. *firmus* (Nees) A.G. Jones; < *S. puniceum* (Linnaeus) Löve & Löve var. *puniceum* – K]

Symphyotrichum fontinale (Alexander in Small) Nesom. Cp (FL): wet pinelands, marshes; rare. E. Panhandle FL south to s. FL. [= FNA, WH, X; = *Aster fontinalis* Alexander in Small – S, SE; = *A. patens* Aiton var. *floridanus* R.W. Long]

Symphyotrichum georgianum (Alexander) Nesom, Georgia Aster. Pd (GA, NC, SC), Cp (FL, GA): dry, rocky woodlands, woodland borders, roadbanks, powerline rights-of-way, primarily in places that formerly would have burned and likely been post oak or blackjack oak woodlands or savannas, also in thin soils around granitic flatrocks; rare. Early October-mid November; November-December. Sc. NC south to c. GA and west to c. AL; apparently disjunct on the Coastal Plain of sw. GA and e. panhandle FL. [= FNA, K, X; = *Aster georgianus* Alexander – S, Z; < *Aster patens* – RAB; = *Aster patens* Aiton var. *georgianus* (Alexander) Cronquist – SE; = *Virgulus georgianus* (Alexander) Semple; = *Virgulus patens* (Aiton) Reveal & Keener var. *georgianus* (Alexander) Reveal & Keener]

Symphyotrichum grandiflorum (Linnaeus) Nesom, Big-headed Aster. Cp, Pd (NC, SC, VA): dry woodlands, forest edges; roadbanks and powerline rights-of-way; common. Late September-November. E. and c. VA south to nc. SC. [= FNA, K, X; = *Aster grandiflorus* Linnaeus – RAB, C, F, G, S, SE, W; = *Virgulus grandiflorus* (Linnaeus) Reveal & Keener]

Symphyotrichum laeve (Linnaeus) Löve & Löve *var.* ***concinnum*** (Willdenow) Nesom, Narrow-leaved Smooth Aster. Pd (NC, SC, VA), Mt (VA), Cp (FL), {GA}: dry woodlands over mafic rocks; rare. September-October. NYand KY south to GA, Panhandle FL (Jackson County), and MS. [= FNA, K, WH, X; = *Aster concinnus* Willdenow – C, G, S, SE; < *A. laevis* – F; = *A. laevis* Linnaeus var. *concinnus* (Willdenow) House – RAB, W; = *S. laeve* ssp. *concinnum* (Willdenow) Semple & Brouillet]

Symphyotrichum laeve (Linnaeus) Löve & Löve *var.* ***laeve***, Smooth Blue Aster. Pd (NC, SC, VA), Mt (NC, VA), Cp (VA), {GA}: mesic hardwood forests; rare (GA Special Concern, SC Rare). September-October. Nova Scotia west to Manitoba, south to GA, LA, and OK. [= FNA, K, X; = *Aster laevis* Linnaeus var. *laevis* – RAB, C, G, SE, W; >< *A. laevis* – F; > *A. steeleorum* Shinners – F; > *A. laevis* – S; > *A. falcidens* Burgess – S]

Symphyotrichum laeve (Linnaeus) Löve & Löve *var.* ***purpuratum*** (Nees) Nesom, Gulf Coast Smooth Aster. Cp (GA, SC): open dry woodlands, prairies; rare (SC Rare). September-October. SC and GA west to AR and TX. [= FNA, K, X; > *Aster attenuatus* Lindley ex Hooker – G, S; > *Aster purpuratus* Nees – S; = *Aster laevis* Linnaeus var. *purpuratus* (Nees) A. G. Jones; = *S. attenuatum* (Lindley) Semple]

Symphyotrichum lanceolatum (Willdenow) Nesom var. ***interior*** (Wiegand) Nesom. {VA}: (Kartesz 1999). Hew Hampshire west to MN, south to VA, KY, AR, and OK. South at least to s. PA (Rhoads & Klein 1993). [= FNA, X; = *Aster lanceolatus* Willdenow var. *interior* (Wiegand) Semple & Chmielewski – C; = *Aster simplex* Willdenow var. *interior* (Wiegand) Cronquist – F, G; *S. lanceolatum* (Willdenow) Nesom ssp. *lanceolatum* var. *interior* (Wiegand) Nesom – K; < *Aster lanceolatus* – W; = *Aster lanceolatus* ssp. *lanceolatus* var. *interior* (Wiegand) Semple & Chmielewski; *Aster lanceolatus* ssp. *interior* (Wiegand) A.G. Jones]

Symphyotrichum lanceolatum (Willdenow) Nesom var. ***lanceolatum***. {VA}. Newfoundland west to Saskatchewan, south to PA (Rhoads & Klein 1993), VA (reported in FNA), NC (?), SC (?), TN, MS, LA, and TX. [= FNA, X; < *Aster simplex* Willdenow – RAB, GW; = *Aster lanceolatus* Willdenow var. *lanceolatus* – C; = *Aster simplex* var. *ramosissimus* (Torrey & A. Gray) Cronquist – F, G; < *Aster simplex* var. *simplex* – SE; < *Aster lanceolatus* – W; = *Aster lanceolatus* ssp. *lanceolatus* var. *lanceolatus*; = *Aster lanceolatus* ssp. *lanceolatus*]

Symphyotrichum lanceolatum (Willdenow) Nesom *var.* ***latifolium*** (Semple & Chmielewski) Nesom. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): bottomlands, other moist sites; common. September-October. ME west to Manitoba, south to e. Panhandle FL and TX. [= FNA, WH, X; < *Aster simplex* Willdenow – RAB, GW; = *A. lanceolatus* Willdenow var. *simplex* (Willdenow) A. G. Jones – C; = *A. simplex* var. *simplex* – F, G; = *S. lanceolatum* (Willdenow) Nesom ssp. *lanceolatum* var. *latifolium* (Semple & Chmielewski) Nesom – K; < *A. lanceolatus* – W; *A. lanceolatus* Willdenow var. *latifolius* Semple & Chmielewski]

Symphyotrichum lateriflorum (Linnaeus) Löve & Löve var. ***horizontale*** (Desfontaines) Nesom, Goblet Aster. {GA, NC, VA} September-November. ME and MN south to FL and AR. [= K, X; < *S. lateriflorum* – FNA; < *Aster lateriflorus* – C, G, GW, SE, W; = *A. lateriflorus* var. *pendulus* (Aiton) Burgess – F; *A. lateriflorus* (Linnaeus) Britton var. *horizontalis* (Desfontaines) Farwell]

Symphyotrichum lateriflorum (Linnaeus) Löve & Löve var. ***lateriflorum***, Starved Aster. {GA, NC, SC, VA} September-November. Nova Scotia, Québec, and Manitoba south to FL and TX. [= K; < *Aster lateriflorus* – RAB (also see *A. ontarionis*); < *A. lateriflorus* – C, G, GW, SE, W; = *A. lateriflorus* (Linnaeus) Britton var. *lateriflorus* – F; < *S. lateriflorum* – FNA; > *S. lateriflorum* var. *lateriflorum* – X; > *S. lateriflorum* var. *hirsuticaule* (Lindley ex A.P. de Candolle) Nesom – X; > *A. lateriflorus* var. *hirsuticaulis* (Lindley ex A.P. de Candolle) Porter]

Symphyotrichum lowrieanum (Porter) Nesom, Smooth Heart-leaved Aster. Mt (GA, NC, VA), Pd (VA): mesic to dry-mesic forests; common (rare south of VA). September-October. MA, NY, and Ontario, south to w. VA, w. NC, ne. GA, e. TN, and c. TN. Perhaps originating from hybridization of *S. cordifolium* and *S. laeve*. [= K, X; < *A. cordifolius* Linnaeus – RAB; = *A. lowrieanus* Porter – C, G, SE, W; > *A. lowrieanus* var. *lowrieanus* – F; > *A. lowrieanus* var. *lanceolatus* Porter – F; > *A. lowrieanus* – S; > *A. plumarius* Burgess – S; ? *A. cordifolius* ssp. *laevigatus* (Porter) A.G. Jones; ? *A. cordifolius* ssp. *laevigatus* Porter]

Symphyotrichum novae-angliae (Linnaeus) Nesom, New England Aster. Mt (GA, NC, VA), Pd (VA), Cp* (VA*): wet meadows, bogs, prairies; common, rare south of VA (GA Special Concern, SC Rare). September-October. Nova Scotia west to MT, south to GA, AL, MS, AR, OK, and NM. [= FNA, K, Z; = *Aster novae-angliae* Linnaeus – RAB, C, F, G, GW, S, SE, W; = *Virgulus novae-angliae* (Linnaeus) Reveal & Keener]

Symphyotrichum novi-belgii (Linnaeus) Nesom *var.* ***elodes*** (Torrey & A. Gray) Nesom, New York Aster. Cp (NC, SC, VA): wet pine savannas, marshes; common. Late September-November. New Brunswick south to NY, apparently disjunct southward from e. MD south to e. SC. [= FNA, K, X; < *Aster novi-belgii* – RAB, C, G, GW, SE; = *A. novi-belgii* Linnaeus var. *elodes* (Torrey & A. Gray) A. Gray – F; = *A. elodes* Torrey & A. Gray – S]

Symphyotrichum oblongifolium (Nuttall) Nesom, Eastern Aromatic Aster, Shale-barren Aster. Mt (NC, VA), Pd (VA): rock outcrops and dry woodlands over limestone, calcareous shale; common, rare in NC (NC Rare). Late September-October. NY, WI, MN, and MT, south to sc. VA, w. NC, AL, MS, TX, and NM. [= FNA, K, X; > *Aster oblongifolius* Nuttall var. *angustatus* Shinners – G, SE; = *A. oblongifolius* – RAB, C, F, S, W; = *Virgulus oblongifolius* (Nuttall) Reveal & Keener]

Symphyotrichum patens (Aiton) Nesom var. ***patens***, Common Clasping Aster. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry woodlands, roadsides, woodland edges, clearings, roadbanks; common (rare in FL). Late August-early November; October-November. Var. *patens* ranges from VT and NY west to PA, s. OH, s. IN, s. MO, and se. KS, south to e. GA, ne. FL, Panhandle FL, s. AL, s. MS, s. LA, and sc. TX. [= FNA, K, X; > *Aster patens* Aiton var. *patens* – C, F, G, SE; < *A. patens* – RAB, W; >< *A. patens* var. *gracilis* Hooker – C, F, G, SE, misapplied as to our area (now more narrowly defined and occurring only west of our area); = *A. patens* – S; = *A. patens* var. *patens* – Z; < *Virgulus patens* (Aiton) Reveal & Keener var. *patens*]

Symphyotrichum phlogifolium (Muhlenberg ex Willdenow) Nesom, Appalachian Clasping Aster. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): mesic, nutrient-rich mixed hardwood forests; uncommon (GA Special Concern, NC Watch List). Late August-mid October. NJ and Long Island, NY west to PA, n. OH, and e. IN south to c. VA, c. NC, w. SC, n. GA, and ne. AL, primarily in the Appalachian Mountains and adjacent provinces. [= FNA, K, X; < *Aster patens* – RAB; = *A. phlogifolius* Muhlenberg ex Willdenow – S, W, Z; = *A. patens* Aiton var. *phlogifolius* (Muhlenberg ex Willdenow) Nees – C, F, G, SE; = *Virgulus patens* (Aiton) Reveal & Keener var. *phlogifolius* (Muhlenberg ex Willdenow) Reveal & Keener]

Symphyotrichum pilosum (Willdenow) Nesom var. ***pilosum***. Mt, Pd, Cp (GA, NC, SC, VA): old fields, disturbed areas, woodland borders; common. September-November. New Brunswick west to MN, south to Panhandle FL and TX. [= FNA, K, X; < *Aster pilosus* – RAB, W; = *A. pilosus* Willdenow var. *pilosus* – C, F, G, SE; < *S. pilosum* – WH]

Symphyotrichum pilosum (Willdenow) Nesom var. ***pringlei*** (A. Gray) Nesom. Cp (NC), Pd (NC, VA), {GA, SC}: (VA Watch List). September-November. Nova Scotia west to MN, south to GA and TN. [= FNA, K, X; = *Aster pilosus* Willdenow var. *demotus* Blake – RAB, SE; = *Aster pilosus* var. *pringlei* A. Gray – C; > *A. pilosus* Willdenow var. *demotus* Blake – F, G; > *A. pilosus* var. *pringlei* – G; >< *A. pilosus* var. *pringlei* – F]

Symphyotrichum plumosum (Small) Semple. Cp (FL): dry flatwoods; rare. October-November. Endemic to c. Panhandle FL. [= FNA; < *Symphyotrichum concolor* (Linnaeus) Nesom – K; = *Aster plumosus* Small – S; = *S. concolor* (Linnaeus) G.L. Nesom var. *plumosum* (Small) Wunderlin & B.F. Hansen – WH]

Symphyotrichum praealtum (Poiret) Nesom var. ***angustior*** (Wiegand) Nesom, Willow Aster, Veiny Lined Aster. Mt (VA), {NC?}: fen-like calcareous wetlands; rare (VA Rare). ME south to NC and TN. Abrams Creek, Frederick County, VA. Also reported for NC by Kartesz (1999). [= K, X; < *Aster praealtus* – C, GW, W; = *A. praealtus* Poiret var. *angustior* Wiegand – F; < *S. praealtum* – FNA; < *A. praealtus* var. *praealtus* – G, SE]

Symphyotrichum praealtum (Poiret) Nesom var. ***praealtum***. Mt (GA, VA): moist forests over limestone, wooded fen (with *Acer rubrum* and *Fraxinus nigra*); rare. NY, MN, and SD south to Panhandle FL and TX. Reported for Giles County, VA. [= K, X; < *Aster praealtus* – C, GW, W; = *A. praealtus* Poiret *var. praealtus* – F; < *A. praealtus* var. *praealtus* – G, SE; < *S. praealtum* – WH]

Symphyotrichum pratense (Rafinesque) Nesom, Barrens Silky Aster. Mt (GA, VA?), Cp (FL): calcareous glades and barrens; rare. September-October. Sw. VA (?), KY, AR, and TX, south to e. TN (Chester, Wofford, & Kral 1997), nw. GA, Panhandle FL (Gadsden County), AL, MS, and LA. See Ludwig (1999); Nesom believes that all VA material is likely actually *S. sericeum*. [= FNA, K, X; < *Aster sericeus* – C, F, G, SE; = *S. sericeum* (Ventenat) Nesom var. *microphyllum* (A.P. de Candolle) Wunderlin & B.F. Hansen – WH; = *A. pratensis* Rafinesque; = *A. sericeus* Ventenat var. *microphyllus* A.P. de Candolle]

Symphyotrichum prenanthoides (Muhlenberg ex Willdenow) Nesom, Zigzag Aster. Mt (NC, VA), Pd (VA): forests, roadbanks; common. Late August-October. MA, NY, s. Ontario, and MN, south to w. NC, TN, IL, and IA. [= FNA, K, X; = *Aster prenanthoides* Muhlenberg ex Willdenow – RAB, C, F, G, S, SE, W]

Symphyotrichum priceae (Britton) Nesom, Miss Price's Aster. Mt (GA): limestone glades; rare. KY south through c. TN to nw. GA and n. AL. [= FNA, K, X; = *Aster pilosus* Willdenow var. *priceae* (Britton) Cronquist – C, G, SE; < *A. pilosus* var. *pringlei* – F; < *A. pilosus* – W; = *A. priceae* Britton]

Symphyotrichum puniceum (Linnaeus) Löve & Löve var. ***puniceum***, Purple-stem Aster, Swamp Aster. Mt, Pd (GA, NC, SC, VA), Cp (NC, VA): bogs, seeps, ditches, wet meadows; common, rare in Coastal Plain south of VA. September-October. Newfoundland and Labrador west to British Columbia, south to GA, AL, MO, and SD. Unresolved material from Grayson County mafic seeps. [= K, X; < *Aster puniceus* Linnaeus – RAB, C, GW, S, SE, W; > *A. puniceus* var. *puniceus* – F; > *A. puniceus* var. *compactus* Fernald – F; = *A. puniceus* var. *puniceus* – G; ? *A. conduplicatus* Burgess – S]

Symphyotrichum racemosum (Elliott) Nesom *var.* ***racemosum***, Small White Aster. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): bottomlands, marshes; common. ME south to n. FL, west to TX, and inland to OH, IN, IL, MO, and OK. [= K, X; = *Aster vimineus* Lamarck – RAB, G, GW, SE, W, misapplied; < *A. racemosus* – C; > *A. vimineus* var. *vimineus* – F, misapplied; > *A. racemosus* – F; < *S. racemosum* – FNA; > *A. brachypholis* Small – S]

Symphyotrichum racemosum (Elliott) Nesom *var.* ***subdumosum*** (Wiegand) Nesom. {} {in e. WV and apparently through our area judging from F} [= X; < *Aster racemosus* Elliott – C; = *A. vimineus* Lamarck var. *subdumosus* Wiegand – F; < *S. racemosum* – FNA; = *A. fragilis* Willdenow var. *subdumosus* (Wiegand) A.G. Jones, misapplied]

Symphyotrichum retroflexum (A.P. de Candolle) Nesom. Mt (GA, NC, SC): forests; common. Late August-October. W. NC and e. TN south to nw. SC and n. GA. [= FNA, K, X; = *Aster curtisii* Torrey & A. Gray – RAB, S, SE, W; = *A. retroflexus* Lindley ex A.P. de Candolle – C]

Symphyotrichum rhiannon Weakley & Govus, Buck Creek Aster, Rhiannon's Aster. Mt (NC): ultramafic outcrop barren; rare. October-November. Endemic (as far as is known) to the Buck Creek Serpentine Barren, Clay County, NC. Showing some similarities to *S. puniceum* and *S. prenanthoides*, but unique in many characters and not seemingly intermediate. See Kauffman et al. (2004) for additional information. [= FNA]

Symphyotrichum* ×*schistosum (Steele) Nesom, Millboro Aster. Mt (VA): {VA} (US Species of Concern, VA Rare). [= K, X; = *Aster* ×*schistosus* Steele (pro sp.); = *A. schistosus* Steele]

Symphyotrichum sericeum (Ventenat) Nesom, Western Silvery Aster. Mt (GA): limestone glades; rare (GA Rare). Nw. GA (Jones & Coile 1988). [= FNA, K, X; = *Aster sericeus* Ventenat – G, S; < *A. sericeus* Ventenat – C, F, SE; = *Virgulus sericeus* (Ventenat) Reveal & Keener; ? *Aster phyllolepis* Torrey & A. Gray]

Symphyotrichum shortii (Lindley) Nesom, Midwestern Blue Heart-leaved Aster, Short's Aster. Pd (GA, VA), Mt (GA, NC), Cp (FL): dry, rocky slopes, calcareous hammocks (in FL); rare. PA, s. Ontario, and MN, south to w. NC, c. GA, Panhandle FL (Gadsden and Jackson counties), MS, and AR. The lower stem leaves are indeed reminiscent of the leaves of *Asplenium rhizophyllum* (formerly known as *Camptosorus*), explaining one of Small's names for this species. [= FNA, K, X; = *Aster shortii* Lindley – C, F, G, SE; > *A. shortii* – S; > *A. camptosorus* Small – S]

Symphyotrichum simmondsii (Small) Nesom. Pd, Cp (SC), {NC?}: Also reported for NC by Kartesz (1999). [= K, X; < *S. simmondsii* – FNA, WH (also see *S. kralii*); = *Aster simmondsii* Small; ? *A. pinifolius* Small]

* ***Symphyotrichum squamatum*** (Sprengel) Nesom, South American Salt-marsh Aster. Cp (FL): disturbed areas (on ballast), escaped to coastal marshes and dunes; rare, native of South America. AL (Mobile County), FL (Escambia County), LA, TX. [= K, V, WH, X; = *S. subulatum* (Linnaeus) Nesom var. *squamatum* (Sprengel) S.D. Sundberg – FNA, Q; < *Aster subulatus* Michaux var. *cubensis* – SE; ? *Aster subulatus* Michaux var. *australis* (A. Gray) Shinners]

Symphyotrichum subulatum (Michaux) Nesom, Eastern Salt-marsh Aster. Cp (FL, GA, NC, SC, VA): tidal marshes; common. September-November. S. ME south to ne. FL, Panhandle FL, west to LA. See Sundberg (2004). [= K, V, WH, X; = *Aster subulatus* Michaux var. *subulatus* – C, SE; < *A. subulatus* – RAB, GW; = *S. subulatum* var. *subulatum* – FNA, Q; > *A. subulatus* var. *subulatus* – F, G; > *A. subulatus* var. *obtusifolius* Fernald – F, G; > *A. subulatus* Michaux var. *euroauster* Fernald & Griscom – F]

Symphyotrichum tenuifolium (Linnaeus) Nesom, Perennial Salt-marsh Aster. Cp (FL, GA, NC, SC, VA): brackish marshes; common. July-November. ME south to c. peninsular FL, west to TX. See Sundberg (2004). [= K, V, WH, X; = *Aster tenuifolius* Linnaeus – RAB, C, G, GW, SE; = *Symphyotrichum tenuifolium* var. *tenuifolium* – FNA, Q]

Symphyotrichum undulatum (Linnaeus) Nesom. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry forests, woodlands, roadbanks; common. August-November. Nova Scotia west to s. Ontario, south to c. peninsular FL and LA. [= FNA, K, WH, X; = *Aster undulatus* Linnaeus – RAB, C, G, SE, W; > *A. undulatus* var. *undulatus* – F; > *A. undulatus* var. *loriformis* Burgess – F; > *A. undulatus* var. *diversifolius* (Michaux) A. Gray – F; > *A. asperifolius* Burgess – S; > *A. linguiformis* Burgess – S; > *A. loriformis* (Burgess) Burgess – S; > *A. mohrii* Burgess – S; > *A. claviger* Burgess – S; > *A. corrigiatus* Burgess – S; > *A. gracilescens* Burgess – S; > *A. proteus* Burgess – S; > *A. sylvestris* Burgess – S; > *A. triangularis* (Burgess) Burgess – S; > *A. truellius* Burgess – S; > *A. undulatus* – S; > *A. undulatus* Linnaeus *var. asperulus* (Torrey & A. Gray) Wood; > *A. undulatus* Linnaeus *var. loriformis* Burgess]

Symphyotrichum urophyllum (Lindley in A.P. de Candolle) Nesom, White Arrowleaf Aster. {confused} Mt (VA), Pd (NC, SC), Cp (FL, NC, SC), {GA, VA} Late August-October. ME west to MN and NE, south to e. Panhandle FL, MS, and OK. [= FNA, K, WH, X; = *Aster sagittifolius* Wedemeyer ex Willdenow – RAB, C, G, S, SE, W; = *A. sagittifolius var. sagittifolius* – F; = *A. urophyllus* Lindley in A.P. de Candolle]

Symphyotrichum walteri (Alexander) Nesom. Cp (FL, GA, NC, SC): sandhills, pine flatwoods; common. E. NC south to c. peninsular FL. [= FNA, K, WH, X; = *Aster walteri* Alexander – S, SE; = *A. squarrosus* Walter – RAB (the name preoccupied); = *Virgulus walteri* (Alexander) Reveal & Keener]

Symphyotrichum boreale (Torrey & A. Gray) Löve & Löve, Rushlike Aster, Northern Bog Aster. Reported for WV (Barbour and Fayette counties), PA, and NJ. [= FNA, K, X; = *Aster borealis* (Torrey & A. Gray) Provancher – C; =? *Aster junciformis* Rydberg – F, G]

Symphyotrichum concolor (Linnaeus) Nesom *var. **devestitum*** (S.F. Blake) Semple. Cp (FL, GA?, SC?): Panhandle FL, maybe extending to GA, AL, and SC. See Semple (2004). [= FNA; < *Symphyotrichum concolor* (Linnaeus) Nesom – K, WH, X; < *Aster concolor* Linnaeus – RAB, S, SE; < *Virgulus concolor* (Linnaeus) Reveal & Keener; = *Aster concolor* Linnaeus var. *devestitus* S.F. Blake]

Symphyotrichum drummondii (Lindley) Nesom *var. drummondii*, Hairy Heart-leaved Aster. In WV (Nesom 2000), MD, KY, TN, AL, MS. [= FNA, K, X; < *Aster drummondii* Lindley – C, G, SE; = *Aster sagittifolius* var. *drummondii* (Lindley) Shinners – F; = *Aster drummondii* var. *drummondii*]

Symphyotrichum drummondii (Lindley) Nesom var. *texanum* (Burgess) Nesom. East to MS, AL, and KY. [= FNA, K; = *Aster texanus* Burgess – C, G, SE; = *Aster drummondii* Lindley var. *texanus* (Burgess) A.G. Jones] {synonymy incomplete}

Symphyotrichum kralii Nesom. Cp (FL): East Gulf Coastal Plain of AL and FL. See Nesom (1997); the name *A. pinifolius* is illegitimate. [= K; = *Aster pinifolius* Alexander in Small – S, name illegitimate; < *S. simmondsii* (Small) Nesom – FNA, WH; < *Aster dumosus* – SE]

Symphyotrichum lateriflorum (Linnaeus) Löve & Löve var. *angustifolium* (Wiegand) Nesom. South to KY and NJ (Kartesz (1999). [= K, X; < *S. lateriflorum* – FNA] {add to synonymy}

Symphyotrichum lateriflorum (Linnaeus) Löve & Löve *var. **spatelliforme*** (Burgess) Nesom. Cp (FL): [= X; < *S. lateriflorum* – FNA, WH; = *Aster spatelliformis* Burgess]

Symphyotrichum longifolium (Lamarck) Nesom. Cp (SC): [= X; = *A. longifolius* Lamarck]

Symphyotrichum novi-belgii (Linnaeus) Nesom var. *novi-belgii*, New York Aster. Newfoundland and Labrador south to MD and WV. [= FNA, K, X; < *Aster novi-belgii* – RAB, C, G, GW, SE; = *A. novi-belgii* Linnaeus *var. novi-belgii* – F; *A. novi-belgii* – S]

Symphyotrichum ontarionis (Wiegand) Nesom *var. **ontarionis***, Bottomland Aster. {GA} In GA, west. See Nesom (1997) and Brouillet & Labrecque (1997). [= FNA; < *Aster lateriflorus* – RAB; < *Aster ontarionis* Wiegand – C, F, G, SE, W; = *S. ontarione* var. *ontarione* – K, X, orthographic variant]

Symphyotrichum oolentangiense (Riddell) Nesom var. ***oolentangiense***. {GA} Reported for GA (Kartesz 1999) on the basis of Fernald (1950), and also reported for GA in FNA. East to sw. TN (Chester, Wofford, & Kral 1997) and AL. [= K, X; < *Aster oolentangiensis* – C; = *A. azureus* Lindley var. *azureus* – F; < *A. azureus* – G, SE; < *S. oolentangiense* – FNA]

Symphyotrichum patens (Aiton) Nesom var. *gracile* (Hooker) Nesom. Var. *gracile*, as defined more narrowly by Z, ranges east to s. AL from a core range in LA, e. and c. TX, and OK. [= FNA, K; < *A. patens* Aiton var. *gracilis* Hooker – C, F, G, SE; = *A. patens* var. *gracilis* – Z]

Symphyotrichum patens (Aiton) Nesom var. *patentissimum* (Lindley ex de Candolle) Nesom. Var. *patentissimus* (Lindley ex de Candolle) Nesom is largely Ozarkian, east to KY and MS. [= FNA, K; = *Aster patens* Aiton var. *patentissimus* (Lindley) Torrey & A. Gray – C, F, G, SE, Z]

Symphyotrichum praealtum (Poiret) Nesom var. *subasperum* (Lindley) Nesom. KY, IN, IL, MO, and OK south to AL and TX. [= K; < *S. praealtum* – FNA]

Symphyotrichum puniceum (Linnaeus) Löve & Löve var. *scabricaule* (Shinners) Nesom. Pineland seepage bogs. AL, MS, LA, TX. [= FNA, K; < *Aster puniceus* Linnaeus – C, GW, S, SE, W]

Synedrella Gaertner 1791 (Nodeweed)

A monotypic genus, an annual herb, native of tropical America. References: Strother in FNA (2006c).

* ***Synedrella nodiflora*** (Linnaeus) Gaertner, Nodeweed. Cp (FL): moist to wet disturbed areas (on ballast); rare (not collected since the late 1800s), native of tropical America. January-December. [= FNA, SE, WH] {add synonymy – S}

Tagetes Linnaeus 1753 (Marigold)

A genus of about 40-50 species, of tropical and warm temperate America. References: Strother in FNA (2006c); Cronquist (1980)=SE.

1 Rays inconspicuous, ca. 1-2 mm long; [plant a well-established weed, primarily in the Coastal Plain]..... ***T. minuta***
1 Rays showy, mostly > 10 mm long; [plant cultivated, rarely occurring as a waif].
2 Peduncles conspicuously swollen and hollow below the flower; involucre 15-20 mm high; achenes 7-10 mm long..... ***T. erecta***
2 Peduncles not conspicuously swollen and hollow below the flower; involucre 10-15 mm high; achenes 4-7 mm long..... ***T. patula***

* ***Tagetes erecta*** Linnaeus, Common Marigold, African Marigold, Aztec Marigold, Big Marigold. Cp (FL, GA, NC, SC, VA), Pd, Mt (NC, SC, VA): commonly cultivated, rarely persistent or as a waif, native of Mexico. July-November. [= RAB, C, F, G, K, S, SE, WH; < *T. erecta* – FNA]

* ***Tagetes minuta*** Linnaeus, Muster John Henry. Cp (FL, GA, NC, SC, VA), Pd (GA, SC): sandy fields, pecan orchards, sandy roadsides; common (rare in FL), native of South America. Late September-November. [= RAB, C, F, FNA, G, K, S, SE, WH]

* ***Tagetes patula*** Linnaeus, French Marigold. Mt (VA), Pd, Cp (NC, SC): commonly cultivated, rarely persistent or as a waif, native of Mexico. July-November. [= RAB, C, G, K, SE; < *T. erecta* – FNA]

Tanacetum Linnaeus 1753 (Tansy)

A genus of about 150 species, herbs, of north temperate regions, especially the Old World. References: Watson in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z.

1 Leaves simple, crenate (sometimes with a few basal lobes)..... ***[T. balsamita]***
1 Leaves 1-3-pinnatifid.
2 Rays present, white; leaf blades 4-10 cm long, 1-2-pinnate (with 3-5 pairs of primary lobes) ..... ***T. parthenium***
2 Rays absent; leaf blades 8-20 cm long, 2-3-pinnate (with 4-20+ pairs of primary lobes)..... ***T. vulgare***

* ***Tanacetum parthenium*** (Linnaeus) Schultz 'Bipontinus', Feverfew. Cp (SC), Pd (NC): disturbed areas; rare, native of Europe. June-September. [= FNA, K, Z; = *Chrysanthemum parthenium* (Linnaeus) Bernhardi – RAB, C, F, G, SE; = *Matricaria parthenium* Linnaeus – S]

* ***Tanacetum vulgare*** Linnaeus, Common Tansy, Golden-buttons. Mt (NC, VA), Pd, Cp (VA), {GA}: uncommon, native of Eurasia. August-October. [= RAB, C, F, FNA, G, K, S, SE, W, Z]

* *Tanacetum balsamita* Linnaeus, Costmary. Disturbed areas. Introduced south to PA (Rhoads & Klein 1993), MD (Kartesz 1999), and DE (Kartesz 1999). August-September. [= FNA; = *Chrysanthemum balsamita* (Linnaeus) Baillon – C; = *Balsamita major* Desfontaines – K]

Taraxacum G.H. Weber ex Wiggers 1780 (Dandelion)

A genus of about 60 species (or as many as 2000 if apomictic microspecies are recognized), herbs, of boreal and temperate regions. There seems little utility in trying to reconcile the numerous European microspecies against our introduced material. References: Brouillet in FNA (2006a); Cronquist (1980)=SE.

1 Cypselas reddish or purplish at maturity; leaves usually deeply cut throughout their length, the lobes narrow..... ***T. erythrospermum***
1 Cypselas brown or tan at maturity; leaves less deeply cut, particularly toward the base ..... ***T. officinale***

* ***Taraxacum erythrospermum*** Andrzejowski ex Besser, Redseeded Dandelion. Mt, Pd (GA, NC, VA), Cp (NC, SC) {VA}: roadsides, lawns, pastures, other disturbed sites; uncommon, native of Eurasia. January-December. Brouillet in FNA explains

the nomenclatural and taxonomic complexities involved with the various names applied, and the reason for retaining *T. erythrospermum* at this time. [= RAB, F, FNA; >< *T. laevigatum* (Willdenow) de Candolle – C, G, K, SE, W; >< *Leontodon erythrospermum* (Andrzejowski) von Eichwald – S]

* ***Taraxacum officinale*** G.H. Weber ex Wiggers, Common Dandelion. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): lawns, roadsides, urban areas, pastures, disturbed areas, trailsides, less commonly in a variety of less disturbed habitats; common, native of Eurasia. January-December. [= RAB, C, FNA, G, SE, W, WH; > *T. officinale* var. *officinale* – F; > *T. officinale* ssp. *officinale* – K; = *Leontodon taraxacum* Linnaeus – S]

Tetragonotheca Linnaeus 1753 (Squarehead)

A genus of 4 species, herbs, endemic to se. North America. The other three species in the genus occur in LA, TX, and adjacent Mexico. References: Strother in FNA (2006c); Turner & Dawson (1980)=Z; Cronquist (1980)=SE.

Tetragonotheca helianthoides Linnaeus, Squarehead, Pineland-ginseng. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): sandhills, sandy woodlands, open hammocks, roadsides; common (uncommon in NC, rare in VA). April-July. Se. VA and e. TN south to c. peninsular FL and s. MS. [= RAB, C, F, FNA, G, K, S, SE, W, WH, Z]

Tetraneuris E.L. Greene 1898 (Bitterweed)

A genus of about 9 species, herbs, of North America. References: Bierner & Turner in FNA (2006c).

* ***Tetraneuris linearifolia*** (Hooker) Greene *var.* ***linearifolia***. Cp (SC): waste area near wool-combing mill; rare, perhaps merely a waif, native of sc. United States. See Nesom (2004d). [= FNA, K; *? Hymenoxys linearifolia* Hooker]

Thymophylla Lagasca y Segura 1816

A genus of about 13 species, herbs and shrubs, of sw. and sc. United States and Mexico. References: Strother in FNA (2006c).

* ***Thymophylla tenuiloba*** (A.P. de Candolle) Small *var.* ***tenuiloba***, Dahlberg Daisy, Golden-fleece Cp (FL, SC): dry, disturbed areas, waste areas near wool-combing mills; rare, native of sc. United States. Also known as a naturalized introduction in AL and MS (Nesom 2004d, FNA). [= FNA, K; < *Th. tenuiloba* – S, WH; = *Dyssodia tenuiloba* (A.P. de Candolle) B.L. Robinson var. *tenuiloba* – SE]

Tithonia Desfontaines ex Jussieu 1789 (Sunflowerweed)

A genus of about 11 species, herbs, shrubs, and rarely trees, of sw. United States, Mexico, and Central America. References: La Duke in FNA (2006c).

* ***Tithonia rotundifolia*** (Miller) S.F. Blake. Cp (FL): disturbed areas; rare, native of Mexico. November-January. [= FNA, WH] {add to synonymy - S}

Tragopogon Linnaeus 1753 (Goat's-beard)

A genus of about 110 species, herbs, of temperate Eurasia and the Mediterranean region. References: P. Soltis in FNA (2006a); Voss (1996); Cronquist (1980)=SE.

1 Flowers purple; pappus brownish ..... ***T. porrifolius***
1 Flowers yellow; pappus dingy white.
  2 Peduncle obviously swollen below the flower and fruit; margins of the phyllaries green (or pale); leaf tips straight; rays pale yellow, obviously shorter than the longest phyllaries ..... ***T. dubius***
  2 Peduncle only slightly swollen below the flower and fruit; margins of the phyllaries reddish purple (rarely green); leaf tips more or less curled or curved; rays bright yellow, as long as or longer than the phyllaries ..... ***T. pratensis***

* ***Tragopogon dubius*** Scopoli, Goat's-beard, Yellow Salsify. Mt, Pd (NC, VA), Cp (VA): roadsides, fields, other disturbed places; common (rare in NC), native of Europe. April-July. [= RAB, C, FNA, G, K, SE, W; *? T. major* Jacquin – F]

* ***Tragopogon porrifolius*** Linnaeus, Salsify, Vegetable-oyster. Mt (NC, VA), Pd (GA, NC, VA): roadsides, fields; rare, native of Europe. Late April-July. [= RAB, C, F, FNA, G, K, S, SE, W]

* ***Tragopogon pratensis*** Linnaeus, Showy Goat's-beard, Yellow Goat's-beard, Meadow Salsify, Jack-go-to-bed-at-noon. Mt, Pd (VA) {GA?, NC?}: roadsides, fields; rare, native of Europe. April-August. Also reported for NC and GA in FNA. [= C, F, FNA, G, K, S, SE, W]

Tridax Linnaeus 1753

A genus of about 26 species, herbs, mainly of the New World tropics. References: Strother in FNA (2006c); Powell (1965)=Z.

* ***Tridax procumbens*** Linnaeus. Cp (FL): disturbed areas; rare, native of Mexico, Central America, and n. South America. January-December. [= FNA, SE, WH, Z] {add synonymy – S}

Tripleurospermum Schultz 'Bipontinus' 1844 (Mayweed)

A genus of about 40 species, herbs, of the northern hemisphere. References: Brouillet in FNA (2006a); Arriagada & Miller (1997)=Z.

1 Stem ascending or erect; achenes with resin glands > 2× as long as wide; annual ..... ***[T. inodorum]***
1 Stem procumbent (rarely ascending); achenes with resin glands 1.0-1.5× as long as wide; perennial or biennial ..... ***[T. maritimum ssp. maritimum]***

* *Tripleurospermum inodorum* (Linnaeus) Schultz 'Bipontinus', Scentless Chamomille. Introduced at scattered locations in North America, such as AL, FL, KY, MD, and PA. [= FNA; = *T. perforata* (Mérat) M. Lainz – K, Z; = *Matricaria perforata* Mérat]
* *Tripleurospermum maritimum* (Linnaeus) W.D.J. Koch ssp. *maritimum*, Scentless Chamomille. Introduced at scattered locations in eastern North America, such as AL, PA, NJ. [= FNA; = *T. maritima* ssp. *maritima* – K, orthographic variant]

Tussilago Linnaeus 1753 (Coltsfoot)

A monotypic genus, an herb, of Eurasia and n. Africa. References: Barkley in FNA (2006b); Cronquist (1980)=SE.

* ***Tussilago farfara*** Linnaeus, Coltsfoot. Mt, Pd (NC, VA), Cp (VA): roadsides, especially gravelly or shaly roadbanks or ditches, streamside gravel bars, disturbed ground; common (uncommon in VA Piedmont and Coastal Plain, rare in NC Piedmont), native of Eurasia. This species has spread rapidly southward from the Northeast, where it was introduced in North America. Fernald (1950) considered its southern limit to be "New Jersey, Pennsylvania, and Ohio". Gleason (1952) extended it to WV. Strausbaugh and Core (1978) reported that the first collection in WV was actually in 1933, "migrating southward year by year, now abundant and often conspicuous along highways, on strip-mined areas and other denuded areas, in every county of the state." First reported in NC in 1971, it is now rather common in most of the mountain counties, and is beginning to appear at scattered sites in the Piedmont. Though preferring a cool and moist climate, *Tussilago* seems likely to continue to increase in abundance and to spread into the Piedmont. [= C, F, FNA, G, K, SE, W]

Uropappus Nuttall 1841 (Silver-puffs)

A monotypic genus, an annual herb, of w. North America and nw. Mexico. References: Chambers in FNA (2006a).

* ***Uropappus lindleyi*** (A.P. de Candolle) Nuttall, Lindley's Silver-puff. Cp (SC): waste area near wool-combing mill; rare, perhaps merely a waif, native of sw. United States. See Nesom (2004d). [= FNA, K]

Verbesina Linnaeus 1753 (Crownbeard, Wingstem, Frostweed)

A genus of about 200-300 species, trees, shrubs, and herbs, of tropical, subtropical, and warm temperate America. References: Strother in FNA (2006c); Olsen (1979)=Z; Coleman (1966)=Y; Cronquist (1980)=SE.

1 Stem and lower leaf-surfaces grey strigose-canescent; alien annuals, 2-10 dm tall, with taproots; [section *Ximenesia*] ..... ***V. encelioides var. encelioides***
1 Stem and lower leaf surfaces glabrous or pubescent, but not grey strigose-canescent; native perennials, 5-40 dm tall, with fibrous or fleshy-fibrous roots.
  2 Leaves primarily opposite (the uppermost sometimes alternate).
    3 Internodes winged; [collectively widespread].
      4 Plants 4-5 (-10) dm tall, perennating from short horizontal rhizomes; ray florets (5-) 8; disc florets 20-60+; [endemic to ne. FL]; [section *Pterophyton*] ..... ***V. heterophylla***
      4 Plants 10-30 dm tall, perennating from a crown with fleshy roots; ray florets (0-) 1-3 (-5); disc florets 8-15+; [widespread]; [section *Phaethusa*] ..... ***V. occidentalis***
    3 Internodes not winged; [collectively of sw. GA, s. AL, and FL Panhandle]; [section *Pterophyton*].
      5 Ray florets (5-) 11-13, yellow; heads 3-20 ..... ***V. aristata***
      5 Ray florets 0; heads 1 (-3) ..... ***V. chapmanii***
  2 Leaves primarily alternate (the lowermost sometimes opposite).
    6 Heads few, 1-15 (-20), in a compact inflorescence; disc 7-16 mm wide at anthesis; ray florets (5-) 7-15, yellow; plants 5-12 dm tall; [section *Pterophyton*] ..... ***V. helianthoides***

6 Heads numerous, 10-200 or more, in a dense to open inflorescence; disc 3-15 mm wide at anthesis; ray florets either absent, or 1-5 and white, or 2-10 and yellow; plants 10-40 dm tall.
7 Ray florets 1-5, white; [section *Ochractinia*].
8 Lower and middle leaves pinnately lobed or dissected; achenes of ray florets glabrous; [of the outer Coastal Plain from SC southward] ..... ***V. virginica var. laciniata***
8 Lower and middle leaves entire, serrate, or slightly undulate; achenes of ray florets papillose or short-pubescent; [more widespread in our area] ..... ***V. virginica var. virginica***
7 Ray florets absent, **or** 2-10 and yellow; [section *Actinomeris*].
9 Ray florets present, 2-10, yellow; disc florets yellow ..... ***V. alternifolia***
9 Ray florets absent; disc florets white ..... ***V. walteri***

Verbesina alternifolia (Linnaeus) Britton ex Kearney, Common Wingstem. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, VA): alluvial forests, marshes, floodplain pastures; common (rare in FL). August-September. NY and s. Ontario west to IA, south to panhandle FL and LA. [= RAB, C, FNA, G, GW, K, SE, WH; = *Ridan alternifolia* (Linnaeus) Britton – S]

Verbesina aristata (Elliott) Heller, Coastal Plain Crownbeard. Cp (FL, GA): longleaf pine sandhills, swamp margins, dry woodlands; rare. Sw. GA and ne. FL west to FL Panhandle and s. AL. June-August. [= FNA, K, SE, WH; = *Pterophyton aristatum* (Elliott) Alexander – S]

Verbesina chapmanii J.R. Coleman. Cp (FL): bogs and wet pine flatwoods; rare. June-August. Florida Panhandle (6 county endemic). [= FNA, GW, K, SE, WH; *Pterophyton pauciflorum* (Nuttall) Alexander – S; *V. warei* A. Gray, misapplied]

* ***Verbesina encelioides*** (Cavanilles) Bentham & Hooker f. ex A. Gray *var.* ***encelioides***, Skunk-daisy. Cp (FL, GA, NC, SC): fields, pastures, and disturbed areas; uncommon (rare in FL), native of w. United States. May-October. [= C, SE; < *V. encelioides* – RAB, F, FNA, G, WH; = *V. encelioides* ssp. *encelioides* – K, Y; < *Ximenesia encelioides* Cavanilles – S]

Verbesina helianthoides Michaux, Ozark Crownbeard. Mt (NC), Cp? (GA?): dry woodlands over mafic rocks; rare. May-October. OH west to IA and KS, south to c. TN, nw. GA, n. AL, and nc. TX; disjunct in w. NC and e. GA. [= C, F, FNA, G, K, SE; = *Pterophyton helianthoides* (Michaux) Alexander – S]

Verbesina heterophylla (Chapman) A. Gray. Cp (FL): pine flatwoods; rare. (April-) June. Ne. FL (8 county endemic). [= FNA, GW, K, SE, WH; = *Pterophyton heterophyllum* (Chapman) Alexander – S]

Verbesina occidentalis (Linnaeus) Walter, Southern Crownbeard. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): forests, woodlands, pastures, and roadsides, especially abundant in alluvial areas or upslope over mafic or calcareous rocks; common (uncommon in FL). MD west to OH and MO, south to FL panhandle and MS. [= RAB, C, F, FNA, G, GW, K, SE, WH; = *Phaethusa occidentalis* (Linnaeus) Britton – S]

Verbesina virginica Linnaeus *var.* ***laciniata*** (Poiret) A. Gray, Southern Frostweed. Cp (FL, GA, NC?, SC): moist forests and thickets; rare. September-October. E. SC (or e. NC?) south to s. FL. Olsen (1979) maps this variety as occurring in e. NC; I know of no documentation. The two varieties need additional study; specific status may be warranted. [= RAB, GW, K, SE, Z, WH; < *V. virginica* – FNA; = *Phaethusa laciniata* (Poiret) Small – S; ≒ *V. laciniata* (Poiret) Nuttall]

Verbesina virginica Linnaeus *var.* ***virginica***, Common Frostweed. Mt, Pd (GA, NC, SC), Cp (FL, GA, SC, VA): moist to dryish forests, especially over mafic or calcareous rocks, in Coastal Plain ravines in VA over coquina limestone; uncommon (rare in VA). July-October. Sc. NC (e. VA?) west to e. KS, south to s. FL and c. TX. Populations of *V. virginica* from e. VA appear to be substantially disjunct from other populations of either variety. [= RAB, C, GW, K, SE, Z; < *V. virginica* – F, FNA, G, WH; = *Phaethusa virginica* (Linnaeus) Britton – S]

Verbesina walteri Shinners, Walter's Wingstem. Cp (GA, SC), Pd (NC): floodplains, low moist forests; rare (NC Watch List). Late August-September. Coastal Plain of SC south to GA, west to LA; disjunct in Piedmont of NC and Ouachita Mountains of AR. [= RAB, FNA, GW, K, SE; = *Ridan paniculata* (Walter) Small – S]

Vernonia Schreber 1791 (Ironweed)

A genus of about 20 species, perennial herbs, of e. and c. North America and n. Mexico; a few species in South America. Tradititionally very broadly circumscribed to include about 500 species, trees, shrubs, and herbs, of tropical, subtropical, and warm temperate regions, especially America and Africa; this broader circumscription appears increasinglyt indefensible. References: Strother in FNA (2006a); Jones (1982)=Z; Urbatsch (1972)=Y; Jones in Cronquist (1980)=SE. Key based on FNA and SE.

Identification notes: Hybrids are frequent between co-occurring species. Only *V.* ×*georgiana* is keyed separately below (because of its distinctive appearance). Others may be recognized by intermediate morphology and ecological / geographic context.

1 Basal rosette present, its leaves larger than those of the stem; [of xeric habitats of the Coastal Plain and (in NC southward) xeric rocky habitats of the Piedmont].
2 Phyllary tips acute to rounded (sometimes minutely apiculate), the narrowest short acuminate; [from s. MS westward] ..... ***[V. texana]***
2 Phyllary tips subulate to filiform, the broadest long-acuminate.
3 Basal leaves 2-10 cm wide; stem leaves few, abruptly reduced upward in size relative to the basal ..... ***V. acaulis***
3 Basal leaves 0.5-2.5 cm wide; stem leaves relatively many, gradually reduced upward ..... ***V.* ×*georgiana***
1 Basal rosette absent; [collectively of a wide variety of habitats].
4 Phyllary tips subulate to filiform, the broadest long-acuminate.
5 Involucres 11-15 mm in diameter; phyllaries (50-) 60-70+; florets 50-100+ ..... ***V. arkansana***
5 Involucres 4-8 (-10) mm in diameter; phyllaries 22-46 (-60+); florets 12-45 (-65).
6 Middle cauline leaves 1.2-7.5 cm wide; plants 4-35 dm tall; [of various habitats, but not typically in Coastal Plain pinelands].
7 Pappus whitish to yellowish, 30 outer bristles intergrading with 30+ inner bristles; leaf blades 2.5-3.5 (-4)× as long as wide .....

..... ***V. glauca***

7 Pappus brown to purple, 20 outer scales contrasting with 30-40+ inner bristles; leaf blades (3.3-) 4-6× as long as wide.....
..... ***V. noveboracensis***

6 Middle cauline leaves 0.1-1.8 cm wide; plants 3-11 dm tall; [of Coastal Plain pinelands].
8 Leaves 3-7 cm long, (5-) 10-20+ mm wide, 2.5-6× as long as wide, somewhat auriculate at the base ..... ***V. pulchella***
8 Leaves 5-12 cm long, 2-4 (-8+) mm wide, (8-) 12-50× as long as wide, attenuate at the base.
9 Tips of the inner phyllaries long-acuminate, 1.4-4.8 mm long..... ***V. angustifolia* var. *scaberrima***
9 Tips of the inner phyllaries acuminate, 0.1-1.0 mm long ..... ***V. angustifolia* var. *angustifolia***

4 Phyllary tips acute to rounded (sometimes minutely apiculate), the narrowest short acuminate.
10 Leaves 2-4 (-8+) mm wide, (8-) 12-50× as long as wide.
11 Heads 16-19-flowered; phyllary tips acuminate ..... ***V. angustifolia* var. *angustifolia***
11 Heads 8-15-flowered; phyllary tips acute..... ***V. angustifolia* var. *mohrii***
10 Leaves 5-70 mm wide, 2-9 (-17)× as long as wide.
12 Undersurface of leaf glabrous or nearly so, with pits (best seen at > 10× magnification) containing awl-shaped hairs or glands.....
..... ***[V. fasciculata* var. *fasciculata]***
12 Undersurface of leaves conspicuously scabrous or pubescent, lacking pits.
13 Stems glabrous ..... ***V. flaccidifolia***
13 Stems hairy.
14 Leaf undersurfaces scabrous with appressed awl-shaped hairs, with few or no resin glands.
15 Heads with 13-30 flowers; leaf blades linear-lanceolate, 10-30 cm long, 1.2-7.5 cm wide, 4-10× as long as wide .....
..... ***V. gigantea***
15 Heads with 9-20 flowers; leaf blades elliptic to oblanceolate, 6-20 cm long, 1.2-5 cm wide, 3-5× as long as wide.....
..... ***V. ovalifolia***
14 Leaf undersurfaces with curled, erect hairs, and with conspicuous resin glands.
16 Heads with (15-) 20-25 (-35) florets; involucres 4-6.7 mm high, 4-7 mm across ..... ***[V. baldwinii* var. *baldwinii]***
16 Heads with 30-55 florets; involucres (6-) 7-10 mm high, 5-9 mm across ..... ***V. missurica***

Vernonia acaulis (Walter) Gleason. Cp, Pd (GA, NC, SC): sandhills, dry rocky woodlands, bluffs, and barrens; common. Late June-August; August-October. Coastal Plain and lower Piedmont of ne. and nc. NC south to sc. GA. [= RAB, FNA, K, S, SE]

Vernonia angustifolia Michaux *var.* ***angustifolia***. Cp (GA, NC, SC), Mt? (NC): sandhills; common. Late June-early September; September-October. Se. NC south to GA. [= RAB; < *V. angustifolia* – FNA, S; = *V. angustifolia* ssp. *angustifolia* – K, SE]

Vernonia angustifolia Michaux *var.* ***mohrii*** S.B. Jones. Cp (FL, GA): sandhills; uncommon? Sw. GA and Panhandle FL west to s. AL and s. MS. [< *V. angustifolia* Michaux – FNA, S, WH; = *V. angustifolia* ssp. *mohrii* (S.B. Jones) S.B. Jones & Faust – K, SE]

Vernonia angustifolia Michaux *var.* ***scaberrima*** (Nuttall) A. Gray. Cp (GA, SC): sandhills; uncommon. Late June-August; August-October. Se. SC south to se. GA. [= RAB; < *V. angustifolia* – FNA, WH; = *V. angustifolia* ssp. *scaberrima* (Nuttall) S.B. Jones & Faust – K, SE; > *V. scaberrima* Nuttall – S; > *V. recurva* Gleason – S]

* ***Vernonia arkansana*** A.P. de Candolle, Arkansas Ironweed. Cp (NC): roadsides; rare, apparently introduced in se. NC from native range in the Ozarkian Midwest. [= C, K, SE; = *V. crinita* Rafinesque] {not yet keyed}

Vernonia flaccidifolia Small. Pd, Mt (GA): upland deciduous forests and woodlands, woodland borders; common. June-September. C. and nw. GA, se. TN, and ne. and c. AL (Urbatsch 1972). [= FNA, K, S, SE, W, Y] {not yet keyed}

Vernonia* ×*georgiana Bartlett (pro sp.). Cp (GA, NC, SC): sandhills; uncommon. Late June-early August; August-October. [= RAB, K, SE; = *V. georgiana* – S]

Vernonia gigantea (Walter) Trelease. Mt, Pd (GA, NC?, SC?, VA), Cp (GA, NC): {habitat}; common. Late August-October; August-November. W. NY, s. MI and e. NE south to SC, FL, and TX. [= W; = *V. gigantea* (Walter) Trelease ssp. *gigantea* – K, SE, Y; = *V. altissima* Nuttall – RAB, G; = *V. gigantea* var. *gigantea* – C; > *V. altissima* var. *altissima* – F; < *V. gigantea* – FNA, WH; > *V. altissima* var. *taeniotricha* Blake – F; > *V. altissima* – S; > *V. gigantea* – S]

Vernonia glauca (Linnaeus) Willdenow. Cp, Pd, Mt (GA, NC, SC, VA): Late June-September; August-October. NJ and PA south to GA, AL, and MS. [= RAB, C, F, FNA, G, K, S, SE, W]

Vernonia missurica Rafinesque, Missouri Ironweed. Cp (FL), {GA}: wet hammocks, prairies, glades; rare. IN, C. TN (Chester, Wofford, & Kral 1997), GA (FNA), and Panhandle FL, west to IA, KS, OK, and TX. [= C, F, K, S, SE, WH]

Vernonia noveboracensis (Linnaeus) Michaux. Mt, Pd, Cp (GA, NC, SC, VA): {habitat}; common. July-September; August-October. MA and NY south to ne. and e. Panhandle FL and AL. [= RAB, C, FNA, G, K, SE, W, WH; > *V. noveboracensis* var. *noveboracensis* – F; > *V. noveboracensis* var. *tomentosa* (Walter) Britton – F; > *V. noveboracensis* – S; > *V. harperi* Gleason – S]

Vernonia ovalifolia Torrey & A. Gray, Oval-leaf Ironweed. Cp (FL, GA): rich woods, stream banks; common. Sw. GA south to Panhandle FL and c. peninsular FL. [= S; < *V. gigantea* – FNA, WH; = *Vernonia gigantea* (Walter) Trelease ssp. *ovalifolia* (Torrey & A. Gray) Urbatsch – K, SE, Y] {not yet keyed}

Vernonia pulchella Small. Cp (GA, SC): sandhills; uncommon. Se. SC (Beaufort and Jasper counties) south to se. GA. [= FNA, K, S, SE]

Vernonia baldwinii Torrey var. *baldwinii*, Western Ironweed. MI, KY, and LA west to NE, CO, and TX. [= C, F; < *V. baldwinii* – FNA; = *V. baldwinii* ssp. *baldwinii* – K, SE]

Vernonia fasciculata Michaux var. *fasciculata*, Smooth Ironweed. KY and OH west to Manitoba and Colorado. [= C, F; < *V. fasciculata* – FNA; = *V. fasciculata* ssp. *fasciculata* – K]

Vernonia texana (A. Gray) Small, Texas Ironweed. S. MS west to OK and TX. [= FNA, K, S, SE]

Vittadinia A. Richard 1832

* ***Vittadinia sulcata*** N. Burbidge. Cp (SC): waste area near wool-combing mill; rare, perhaps merely a waif, native of sw. Australia. See Nesom (2004d).

Xanthium Linnaeus 1753 (Cocklebur)

A genus of about 3 species, herbs, cosmopolitan (of somewhat uncertain original distribution). References: Strother in FNA (2006c); Cronquist (1980)=SE.

1 Leaves lanceolate, 2-5× as long as wide, cuneate at the base; leaf axil with a 1-3 cm long yellow 3-forked spine ..... ***X. spinosum***
1 Leaves ovate or orbicular, 0.8-1.5× as long as wide, cordate at the base; leaf axil lacking spines ..... ***X. strumarium***

* ***Xanthium spinosum*** Linnaeus, Spiny Cocklebur. Mt (VA), Cp (NC, SC), Pd (GA, VA): fields, disturbed ground; rare, introduced, but the native distribution unknown. July-November. [= RAB, C, FNA, K, SE; > *X. spinosum* var. *spinosum* – F; > *X. spinosum* var. *inerme* Bel – F; > *X. ambrosioides* Hooker & Arnott – F; = *Acanthoxanthium spinosum* (Linnaeus) Fourreau – S]

Xanthium strumarium Linnaeus, Cocklebur. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): disturbed ground, roadsides, pastures, barnyards, beaches; common. July-November. Nearly cosmopolitan, its original distribution unclear, but probably native to the New World. Various taxa have been recognized (see synonymy); it is unclear that any are usefully distinguished. The most commonly followed recent treatment is that by Cronquist, recognizing two varieties in eastern North America: var. *canadense*, with burs 2-3.5 cm long, the prickles of the bur with spreading hairs and stipitate glands toward the prickle bases, and var. *glabratum* (A.P. de Candolle) Cronquist, with burs 1.5-2 cm long, the prickles of the bur nearly glabrous or with short glandular or nonglandular puberulence toward the prickle bases. [= FNA, GW; > *X. strumarium* var. *glabratum* (A.P. de Candolle) Cronquist – RAB, C, G, K, SE, W, WH; > *X. strumarium* var. *strumarium* – RAB, misapplied; > *X. strumarium* var. *canadense* (P. Miller) Torrey & A. Gray – C, G, K, SE, W, WH; > *X. chinense* P. Miller – F; > *X. echinatum* Murray – F; > *X. italicum* Moretti – F; > *X. oviforme* Wallroth – F; > *X. pensylvanicum* Wallroth – F; > *X. strumarium* – F]

Youngia Cassini 1831(Youngia)

A genus of about 30-40 species, herbs, of Asia. References: Spurr in FNA (2006a); Cronquist (1980)=SE.

* ***Youngia japonica*** (Linnaeus) A.P. de Candolle, Asiatic Hawk's-beard, Youngia. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): roadsides, disturbed areas; uncommon, native of se. Asia. Spreading rapidly in our area. [= C, FNA, K, SE, WH; = *Crepis japonica* (Linnaeus) Bentham – RAB, F, G, S; > *Y. japonica* ssp. *japonica*]

Zinnia Linnaeus 1759 (Zinnia)

A genus of about 17 species, herbs, of sw. North America south to South America. References: Smith in FNA (2006c); Cronquist (1980)=SE.

1 Achenes wingless; receptacular bracts (chaff) toothed or erose on the lip ..... ***Z. peruviana***
1 Achenes winged; receptacular bracts (chaff) with a differentiated fimbriate lip ..... ***Z. violacea***

* ***Zinnia peruviana*** (Linnaeus) Linnaeus, Peruvian Zinnia. Cp (FL, GA, NC, SC): disturbed areas; rare (commonly cultivated), native of the New World tropics. May-November. [= FNA, K, SE, WH; ? *Z. pauciflora* Linnaeus – S]

* ***Zinnia violacea*** Cavanilles, Garden Zinnia, Elegant Zinnia. Cp (FL, GA, NC, SC): disturbed areas; rare (commonly cultivated), native of the New World tropics. May-November. [= FNA, K, WH; = *Z. elegans* Jacquin – S, SE]

BALSAMINACEAE A. Richard 1822 (Touch-me-not Family)

A family of 2 genera and 850-1000 species, primarily of the Old World tropics. References: Fischer in Kubitzki (2004).

Impatiens Linnaeus (Jewelweed, Touch-me-not, Snapweed, Balsam)

A genus of 850-1000 species, herbs and subshrubs, primarily tropical and north temperate Old World. References: Fischer in Kubitzki (2004).

1 Corolla purple, pink, or white; plants 3-6 (-8) dm tall; stems puberulent or glabrous; [cultivated alien, rarely escaped].
  2 Sepal spur strongly recurved; stems puberulent ..... ***I. balsamina***

2 Sepal spur slightly curved; stems glabrous or with widely scattered hairs..... ***I. walleriana***
1 Corolla yellow or orange (rarely cream or white); plant mostly 5-25 dm tall; stems glabrous; [native].
3 Flowers orange (rarely orange-yellow or white); calyx spur (colored) 7-10 mm long, curved forward parallel to the calyx sac ....***I. capensis***
3 Flowers yellow (rarely cream or white); calyx spur (colored) 4-6 mm long, at a right angle to the calyx sac..... ***I. pallida***

* ***Impatiens balsamina*** Linnaeus, Garden Balsam. Cp (NC, SC, VA), Mt (VA): frequently cultivated, sometimes escaped as a waif or "throw-out"; rare, native of s. Asia. June-November. [= RAB, C, F, G, K, S]

Impatiens capensis Meerburg, Orange Jewelweed, Orange Touch-me-not, Spotted Touch-me-not. Mt, Pd, Cp (GA, NC, SC, VA): moist forests, bottomlands, cove forests, streambanks, bogs; common (rare in Coastal Plain of GA). May-November. Newfoundland west to Saskatchewan and AK, south to SC, panhandle FL, AL, and TX. Within the portion of our area where *I. capensis* and *I. pallida* overlap, the two species often occur in mixed populations. *I. capensis* tends to have the leaf apices and crenulations more rounded than *I. pallida*, but the character is overlapping and variable. [= RAB, C, F, GW, K, W; = *I. biflora* Walter – G, S]

Impatiens pallida Nuttall, Yellow Jewelweed, Yellow Touch-me-not, Pale Touch-me-not. Mt (GA, NC, VA), Pd (NC, VA), Cp (VA): cove forests, streambanks, seepages, moist forests, bogs, roadsides; common (rare in Piedmont of NC and Coastal Plain of VA). July-September. Nova Scotia and Québec west to Saskatchewan, south to e. VA, wc. NC, TN, WV, MO, and OK. [= RAB, C, F, G, GW, K, S, W]

* ***Impatiens walleriana*** Hooker f., Garden Impatiens. Pd (NC): suburban woodlands, weakly spreading from horticultural plantings; rare, native of Africa. [= K]

BASELLACEAE Moquin-Tandon 1840 (Madeira-vine Family)

A family of 4 genera and about 20 species, vines. References: Vincent in FNA (2003b).

Anredera Jussieu (Madeira-vine)

A genus of about 12 species, vines, of tropical and subtropical Americas. References: Vincent in FNA (1993b).

* ***Anredra cordifolia*** (Tenore) Steenis, Madeira-vine. Cp (FL): disturbed areas; rare, native of South America. In Panhandle FL (Leon County) and n. peninsular FL (Alachua County) (Wunderlin & Hansen 2004). [=FNA, K, WH] {add synonymy}

BATACEAE von Martius ex Meisner 1842 (Batis Family)

A monogeneric family, low shrubs, of tropical and subtropical shores of the Americas, New Guinea, the Pacific, and Australia. References: Rogers (1982b); Bayer & Appel in Kubitzki & Bayer (2003).

Batis P. Browne 1756 (Saltwort, Beachwort, Batis)

A genus of 2 species, low shrubs, of tropical and subtropical shores of the Americas, New Guinea, the Pacific, and Australia. The only other member of the family and genus is *B. argillicola*, of New Guinea and Australia. References: Rogers (1982b)=Z; Goldblatt (1976); Bayer & Appel in Kubitzki & Bayer (2003).

Batis maritima Linnaeus, Saltwort, Beachwort, Batis, Turtleweed. Cp (AL, FL, GA, LA, MS, NC?, SC): brackish marshes; rare north of GA (but locally common). June-July; October. Se. SC south to s. FL, west to TX, and in Central and South America; HI (where apparently introduced). *B. maritima* is alleged (as by S) to occur as far north as NC, but the documentation is unknown; there is no twentieth century evidence to place *Batis* in NC. [= RAB, GW, K, S, WH, Z]

BEGONIACEAE C. Agardh 1824 (Begonia Family)

A family of 2 genera and about 900 species, herbs and shrubs, of tropical and subtropical regions.

Begonia Linnaeus (Begonia)

A genus of about 900 species, herbs and shrubs, of tropical and subtropoical regions.

* ***Begonia cucullata*** Willdenow, Wax Begonia, Club Begonia. Cp (FL, GA): disturbed places; rare, native of South America. Escaped or persistent in e. GA (Jones and Coile 1988) south to Panhandle FL and ne. FL (Wunderlin & Hansen 2004). [= K, WH]

BERBERIDACEAE A.L. de Jussieu 1789 (Barberry Family)

As broadly defined here, a family of about 15 genera and 650 species, herbs and shrubs, of the temperate Northern Hemisphere and Andean South America. There has been much debate and study of whether the Berberidaceae shold be recognized as a broadly defined unit, or split into a variety of segregate families (such as Podophyllaceae, Epimediaceae, Nandinaceae, Leonticaceae). Based on molecular studies, Kim & Jansen (1996, 1998) conclude that division of the Berberidaceae into segregate families is not warranted. References: Whetstone, Atkinson, & Spaulding in FNA (1997); Stearn (2002); Kim & Jansen (1996, 1998); Ahrendt (1961); Loconte & Estes (1989b); Meacham (1980); Loconte in Kubitzki, Rohwer, & Bittrich (1993).

1 Plant a shrub.
  2 Leaves ternately compound; [subfamily *Nandinoideae*] ..... ***Nandina***
  2 Leaves simple or 1-pinnately compound; [subfamily *Berberideae*, tribe *Berberidinae*].
    3 Leaves simple, < 6 cm long, fascicled on short spur shoots; stems spiny ..... ***Berberis***
    3 Leaves 1-pinnately compound, > 10 cm long, not fascicled on short spur shoots; stems not spiny ..... ***Mahonia***
1 Plant an herb.
  4 Leaves compound; flowers greenish or maroon; [subfamily *Berberidoideae*, tribe *Leonticeae*] ..... ***Caulophyllum***
  4 Leaves simple (though parted); flowers white; [subfamily *Berberideae*, tribe *Epimediinae*].
    5 Plant acaulescent; flower solitary and scapose; leaf segments 2; fruit a capsule ..... ***Jeffersonia***
    5 Plant caulescent; flower solitary, or cymose to umbellate, borne on a stem with leaves; leaf segments several; fruit a berry.
      6 Flowers cymose or umbellate; stamens 6; berry globose, 8-12 mm long, 2-4 seeded; larger leaves with only 2 clefts that extend > halfway to the peltate center of the leaf (thus the leaf divided into 2 halves, the other sinuses shallow) ..... ***Diphylleia***
      6 Flower solitary; stamens 12-18; berry ovoid, 25-70 mm long, many-seeded; larger leaves with 5 or more clefts that extend > halfway to the peltate center of the leaf (thus the leaf fairly evenly divided into multiple lobes) ..... ***Podophyllum***

Berberis Linnaeus 1753 (Barberry)

A genus of 300-500 species, shrubs, of North America, South America, Asia, Europe, and n. Africa. References: Whittemore in FNA (1997); Kim, Kim, & Landrum (2004); Loconte in Kubitzki, Rohwer, & Bittrich (1993). [also see *Mahonia*]

1 Leaves entire; flowers solitary or 2-4 in umbels; spines mostly simple; [section *Tschonoskyanae*] ..... ***B. thunbergii***
1 Leaves bristly-serrate; flowers 5-many in racemes (sometimes the racemes umbelliform); spines mostly trifurcate (some simple or bifurcate).
  2 Leaves evergreen, coriaceous; leaf teeth tipped with firm prickles; fruits blue-black, pruinose; [section *Wallichianae*] ..... ***B. julianiae***
  2 Leaves deciduous, herbaceous; leaf teeth tipped with weak bristles; fruits red, not pruinose.
    3 Leaves with 1-9 (20) bristles on each margin, the bristles 3-6 mm apart; berries ovoid (6-9 mm long, 6-7 mm broad), 5-10 (rarely more) in an often umbellate raceme; petals notched at apex; [section *Canadenses*] ..... ***B. canadensis***
    3 Leaves with 18-36 bristles on each margin, ca. 2 mm apart; berries ellipsoid (8-10 mm long, 4-5 mm broad), 10-20 in a raceme; petals obtuse at apex; [section *Vulgares*] ..... ***B. vulgaris***

Berberis canadensis P. Miller, American Barberry, Allegheny Barberry. Pd, Mt (GA, NC, SC, VA): rocky woods, forest openings, glades, usually over mafic rocks (such as diabase) or calcareous rocks (such as limestone), sometimes along fence-rows in sw. VA (presumably spread by birds); uncommon, rare south of VA and in VA Piedmont (GA Special Concern, NC Rare). April-May; September-October. A broad Southern Appalachian-Ozarkian endemic, not occurring in Canada (the epithet a misnomer): scattered and local in VA, WV, KY, TN, NC, SC, AL, GA, MO, IL, IN, and sc. PA (where apparently now extirpated). Along with *B. vulgaris*, *B. canadensis* has been subjected to organized eradication programs because of its serving as an alternate host for wheat rust (*Puccinia graminis*). [= RAB, C, F, FNA, G, K, S, W]

* ***Berberis julianiae*** Schneider, Evergreen Barberry. Mt (NC): seeding down and escaping locally near horticultural plantings; rare, native of China. First reported for NC by Pittillo & Brown (1988). [= K; = *B. julianae*, orthographic variant]

* ***Berberis thunbergii*** A.P. de Candolle, Japanese Barberry. Mt (NC, SC, VA), Pd (GA, NC, VA), Cp (NC, VA): rich forests, old fields; uncommon, native of Japan. March-April; May-September. This species is immune to wheat rust; it is probably now the most commonly encountered barberry in our area. [= RAB, C, F, FNA, G, K, S, W]

* ***Berberis vulgaris*** Linnaeus, European Barberry, Common Barberry. Mt (NC, VA): disturbed areas; rare, native of Europe. April; September. This species, once widely cultivated and established in North America, serves as an alternate host to wheat rust and has been subjected to eradication programs for over half a century. It may no longer occur in our area. [= C, F, FNA, G, K]

Other species of *Berberis* are used horticulturally in our area. Though none appear to be established at this time, the possibility of encountering species other than the three treated above should be kept in mind. *B. julianiae* Schneider is especially commonly planted in hedges and landscaping.

Caulophyllum Michaux 1803 (Blue Cohosh)

A genus of 3 species, herbs, with a relictual north temperate distribution (e. North America, e. Asia). The only other species of the genus is *C. robustum* Maximowicz, of e. Asia. References: Loconte in FNA (1997); Stearn (2002)=Y; Loconte & Blackwell (1981, 1984, 1985)=Z; Uttal (1985); Brett (1981); Loconte in Kubitzki, Rohwer, & Bittrich (1993).

1 Carpels (in flower) 3.5-5 mm long, averaging 4 mm; style 0.8-1.5 mm long; sepals 6-9 mm long, usually purple; terminal leaflets (5-) 7-9 (-10) cm long, (4-) 5-7.5 (-8) cm wide; main inflorescence with 4-18 flowers; first leaf 2-ternate or 3-ternate ..... ***C. giganteum***

1 Carpels (in flower) 1.3-2.8 mm long, averaging 2 mm; style 0.3-1.0 mm long; sepals 3-6.5 mm long, yellow, yellow-purple, or green; terminal leaflets (3-) 5-7 (-8) cm long, (2-) 3.5-6.5 (-10) cm wide; main inflorescence with 5-70 flowers; first leaf 3-ternate or 4-ternate..... ***C. thalictroides***

Caulophyllum giganteum (Farwell) Loconte & Blackwell, Northern Blue Cohosh. Mt (NC, VA): rich forests; rare (NC Rare). April-May; July-August. *C. giganteum* is more northern in distribution than C. *thalictroides*, ranging south to VA, nw. NC, ne. and nc. TN (Chester, Wofford, & Kral 1997), and c. KY. This species blooms about 2 weeks earlier than *C. thalictroides* where they grow together. The combination of sympatry, morphologic distinctness, and phenologic separation of the two taxa argues for recognition at the species level. [= FNA, K, W, Y, Z; < *C. thalictroides* – RAB, F, G, S; = *C. thalictroides* var. *giganteum* Farwell – C]

Caulophyllum thalictroides (Linnaeus) Michaux, Common Blue Cohosh, Green Vivian. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): rich forests; common (rare in Piedmont and Coastal Plain) (SC Rare). April-May; July-August. The species is widespread in e. North America, south to GA, AL, and AR. [= FNA, K, W, Y, Z; < *C. thalictroides* – RAB, F, G, S (also see *C. giganteum*); = *C. thalictroides* var. *thalictroides* – C]

Diphylleia Michaux 1803 (Umbrella-leaf)

A genus of 3 species, herbs, with a relictual north temperate distribution. The other two species in the genus are east Asian – *D. grayi* F. Schmidt of Japan and Sakhalin, and *D. sinensis* H.L. Li of the Hubei, Shaanxi, Gansu, Sichuan, and Yunnan provinces of China. References: George in FNA (1997); Ying, Terabayashi, & Boufford (1984)=Z; Stearn (2002)=Y; Loconte in Kubitzki, Rohwer, & Bittrich (1993).

Diphylleia cymosa Michaux, Umbrella-leaf, Pixie-parasol. Mt (GA, NC, SC, VA): seepages and brook-banks, sometimes away from brooks or seeps in northern hardwood or cove hardwood forests (but then usually in subterranean seepage), primarily at moderate to high elevations; uncommon (SC Rare, VA Watch List). May-June; July-August. A narrow Southern Appalachian endemic: high mountains of w. NC and e. TN, extending a short distance into ne. GA, nw. SC, and sw. VA. [= RAB, C, F, FNA, G, K, S, W, Y, Z]

Jeffersonia W. Barton 1793 (Twinleaf)

A genus of 2 species, the only other species of the genus is native to e. Asia (eastern Russia, Korea, Manchuria). The closest North American relatives of *Jeffersonia* are *Achlys* and *Vancouveria* of the Pacific Northwest. References: George in FNA (1997); Stearn (2002)=Y; Loconte & Estes (1989b); Loconte in Kubitzki, Rohwer, & Bittrich (1993).

Jeffersonia diphylla (Linnaeus) Persoon, Twinleaf. Mt (GA, NC, VA), Pd (VA): moist and extremely nutrient-rich forests, generally over calcareous or mafic rocks (including limestone, dolostone, amphibolite, greenstone, etc.) or very rich alluvium; uncommon (rare in GA and NC). March-April; May. The species is widepread in ne. United States, south to MD, NC, and AL. It is somewhat suggestive of *Sanguinaria* in both foliage and flower. [= RAB, C, F, FNA, G, K, S, W, Y]

Mahonia Nuttall 1818 (Mahonia, Holly-grape, Oregon Grape)

A genus of over 100 species, shrubs, of w. North America and e. Asia. Many authors favor the inclusion of *Mahonia* in *Berberis*. It appears that *Mahonia* is a paraphyletic grade basal to *Berberis* (in the narrow sense) (Kim, Kim, & 2004). References: Whittemore in FNA (1997); Loconte in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaflet blades with 2-7 teeth per side, each tooth 3-8 mm long; leaflets very thick and stiff ..... ***M. bealei***
1 Leaflet blades with 6-13 teeth per side, each tooth 1-2 (-3) mm long; leaflets thickish, but flexible when fresh..... ***M. nervosa***

* ***Mahonia bealei*** (Fortune) Carrière, Leatherleaf Mahonia, Chinese Mahonia, Holly-grape. Pd (GA, NC, VA), Cp (FL, NC, VA): in deciduous forests in suburban areas, spread from plantings; rare, native of China. December-March; May-July. Naturalizing widely in the southeastern United States, including (at least) AL, DE, GA, FL, NC, and SC. [= RAB, K; = *Berberis bealei* Fortune – FNA, WH]

* ***Mahonia nervosa*** (Pursh) Nuttall. Pd (SC): disturbed areas; rare, native of w. North America. Introduced in SC (Hill & Horn 1997). [= K; = *Berberis nervosa* – FNA]

Nandina Thunberg 1781 (Nandina, Sacred-bamboo)

A monotypic genus, a shrub, native of Japan, China, and India. Here treated as a monotypic genus in the Berberidaceae, *Nandina* seems to have only a general kinship to the Berberidaceae (see Ehdaie & Russell 1984, Loconte & Estes 1989b, Meacham 1980) and should likely be placed in its own monotypic family. References: Whetstone, Atkinson, & Spaulding in FNA (1997); Ehdaie & Russell (1984); Loconte in Kubitzki, Rohwer, & Bittrich (1993).

BERBERIDACEAE

* ***Nandina domestica*** Thunberg, Nandina, Sacred-bamboo. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): forests and woodlands in suburban areas, commonly planted, increasingly escaping and naturalizing; uncommon (rare in GA, NC, SC, VA), native of China. May-June; October-November. *Nandina* has numerous cultivated forms, and is widely planted in the Piedmont and Coastal Plain of our area, especially southward. Leaflet shape varies in cultivated forms from broadly ovate to linear. [= RAB, FNA, K]

Podophyllum Linnaeus 1753 (May-apple)

A genus of 2 species (or ca. 14 if *Dysosma* is included), herbs, one in e. North America, the other in e. Asia. The obvious morphological kinship of *Podophyllum*, *Diphylleia*, and *Hydrastis* is corroborated by alkaloid chemistry. References: George in FNA (1997); Shaw (2000, 2002)=Z; Loconte in Kubitzki, Rohwer, & Bittrich (1993).

Podophyllum peltatum Linnaeus, May-apple, American Mandrake. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): rich forests, bottomlands, slopes, pastures; common (rare in FL). March-April; May-June. *P. peltatum* is widespread through most of e. United States. The ripe fruits are edible; the rest of the plant contains a variety of alkaloids, and is poisonous-medicinal. Compounds from *Podophyllum* are used in wart removal, and show anti-viral and anti-cancer promise. [= RAB, C, F, FNA, G, K, S, W; > *P. peltatum* var. *peltatum* – Z; > *P. peltatum* var. *annulare* J.M.H. Shaw – Z]

BETULACEAE S.F. Gray 1821 (Birch Family)

A family of 6 genera and about 150 species, primarily of subarctic to cold temperate regions of the Northern Hemisphere, but extending through Central America to n. South America. The two subfamilies recognized here are sometimes elevated to family status, as by Govaerts & Frodin (1998). References: Furlow in FNA (1997); Furlow (1990)=Z; Hardin (1971)=Y; Govaerts & Frodin (1998); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

1 Scales of the pistillate catkins persistent; leafy involucre absent; fruit a small winged nut; [subfamily *Betuloideae*].
  2 Pistillate scales woody, forming a persistent conelike catkin; plant a shrub, < 4 m tall (except *A. glutinosa*) ..... ***Alnus***
  2 Pistillate scales deciduous with or soon after the fruits; plant a tree, > 10 m tall at maturity ..... ***Betula***
1 Scales of the pistillate catkins caducous; leafy involucre present, conspicuous; fruit an unwinged nut; [subfamily *Coryloideae*].
  3 Nut spherical, 1-1.5 cm in diameter, closely enveloped by the involucre ..... ***Corylus***
  3 Nut ovoid, 0.4-0.6 cm long, loosely or not at all enveloped by the involucre.
    4 Infructescence bracts flat, 1-3 lobed, not enclosing the nut; bark gray, smooth; trunk moderately to strongly fluted; buds 4-angled ..... ***Carpinus***
    4 Infructescence bracts inflated, loosely enclosing the nut; bark brown, shreddy; trunk not fluted; buds not 4-angled ..... ***Ostrya***

Alnus P. Miller 1754 (Alder)

A genus of about 25-35 species, shrubs and trees, of subarctic to warm temperate regions of the Northern Hemisphere, and in montane situations south to n. South America. References: Furlow in FNA (1997); Furlow (1990)=Z; Hardin (1971)=Y; Schrader & Graves (2002)=X; Kubitzki in Kubitzki, Rohwer, & Bittrich (1993). Key based in part on Schrader & Graves (2002).

1 Fruit broadly winged; winter buds sessile, covered by multiple, imbricate, unequal scales; [subgenus *Alnobetula*] ..... ***A. viridis*** *var.* ***crispa***
1 Fruit narrowly winged; winter buds stalked, covered by 2-3 equal scales.
  2 Pistillate catkins mostly 1-1.5 (-2) cm long, subsessile and often clustered together closely; typical leaves with 8-14 principal veins on each side of the midrib; [subgenus *Alnus*].
    3 Fruiting catkins drooping; leaves broadest at or below the middle, pale green to glaucous beneath, doubly serrate, the teeth of various sizes, usually some of them coarse; bark dark reddish-brown, shiny, with prominent light-colored lenticels ..... ***A. incana*** *ssp.* ***rugosa***
    3 Fruiting catkins erect; leaves broadest at or above the middle, green beneath, finely serrate, the teeth approximately equal in size; bark light gray or brown, with inconspicuous lenticels ..... ***A. serrulata***
  2 Pistillate catkins mostly 1.5-3 cm long, evidently pedunculate and therefore spaced; typical leaves with 5-8 principal veins on each side of the midrib.
    4 Flowering spring; plant a tree; leaves broadly rounded to slightly notched at the tip; [alien, rarely planted and possibly persistent in our area]; [subgenus *Alnus*] ..... ***[A. glutinosa]***
    4 Flowering late summer or autumn; plant a shrub; leaves obtuse to short-acuminate at the tip; [native of e. MD, DE, and GA]; [subgenus *Clethropsis*].
      5 Strobili (14-) 14.5-19 (-24) mm long, <1.3× as long as wide; large shrub or tree 5.5-9.5 m tall, with a narrow crown; [of nw. GA] ..... ***A. maritima*** *ssp.* ***georgiensis***
      5 Strobili (15.2-) 18.5-22 (-25) mm long, >1.3× as long as wide; medium to large shrub 3.5-6 (-7.5) m tall, with a narrow to broad crown; [of s. DE and e. MD] ..... ***A. maritima*** *ssp.* ***maritima***

Alnus incana (Linnaeus) Moench *ssp.* ***rugosa*** (Du Roi) Clausen, Speckled Alder. Mt (VA): braided streamhead seepage swamps; rare. May-June; July-August. *A. incana* is here treated as a circumpolar complex consisting of several subspecies. Ssp. *incana* occurs in nc. and ne. Eurasia. Ssp. *rugosa* occurs from nw. Canada east to the Maritime Provinces, south to MD, VA, and WV, and IL. Ssp. *tenuifolia* (Nuttall) Breitung occurs in w. North America, from AK south to CA and NM. [= FNA, K, Z; > *A.*

incana var. *americana* Regel – C; > *A. rugosa* (Du Roi) Sprengel var. *americana* (Regel) Fernald – F; = *A. rugosa* (Du Roi) Sprengel – G, W, Y]

Alnus maritima (Marshall) Muhlenberg ex Nuttall *ssp.* ***georgiensis*** Schrader & Graves, Georgia Alder. Mt (GA): standing water of Ridge-and-Valley spring run; rare. Endemic to a single site in Bartow County, GA. It is one of three subspecies of *A. maritima*, each endemic to a small area – ssp. *maritima* of the Delmarva Peninsula of MD and DE, ssp. *georgiensis* Schrader & Graves of nw. GA, and ssp. *oklahomensis* Schrader & Graves of sc. OK. The closest relatives of *A. maritima* are in Asia. [= X; < *A. maritima* – FNA, K]

Alnus maritima (Marshall) Muhlenberg ex Nuttall *ssp.* ***maritima***, Seaside Alder, Delmarva Alder. Cp (DE, MD): streambanks, ponds, shores; rare. Endemic to six counties in the Delmarva Peninsula of MD and DE. See above for additional discussion of *A. maritima* in general. [= X; < *A. maritima* – FNA, C, F, G, K]

Alnus serrulata (Aiton) Willdenow, Tag Alder, Smooth Alder, Hazel Alder. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): streambanks, bogs, wet thickets; common. February-March; August-October. Nova Scotia west to s. Québec, MO, and OK, south to ne. FL, Panhandle FL, and TX. [= RAB, C, FNA, G, GW, K, W, Y, Z; > *A. serrulata* var. *serrulata* – F; > *A. serrulata* var. *subelliptica* Fernald – F; = *A. rugosa* – S, misapplied]

Alnus viridis (Villars) Lamarck & De Candolle *var.* ***crispa*** (Aiton) House, Green Alder, Mountain Alder. Mt (NC): grassy balds, shrub balds, spruce-fir forests, and rock outcrops at high elevations (1600-1900m) in the Roan Mountain Massif, Mitchell and Avery counties, NC and Carter County, TN; rare (though locally common). May-June; July. Ssp. *crispa* has variously been considered a varietally, subspecifically, and specifically distinct from typic *A. viridis*. *A. viridis* is here treated as a circumpolar complex of 4 subspecies. Ssp. *viridis* occurs in montane portions of Europe. Ssp. *sinuata* (Regel) Á. Löve & D. Löve occurs in w. Canada and south in the montane west to nw. United States. Ssp. *fruticosa* (Ruprecht) Nyman ranges from n. CA north to coastal AK, and in ne. Asia. Ssp. *crispa* is generally far northern, ranging across n. Canada, south to MA and c. NY, and disjunct at a few localities in PA and on the NC-TN border (Chester, Wofford, & Kral 1997). [= C; = *A. viridis* (Villars) Lamarck & De Candolle ssp. *crispa* (Aiton) Turrill – FNA, K, Z; = *A. crispa* (Aiton) Pursh – RAB, G, W, Y; > *A. crispa* var. *crispa* – F; < *A. alnobetula* (Ehrhart) K. Koch – S; > *Alnus mitchelliana* M.A. Curtis ex Gray]

* *Alnus glutinosa* (Linnaeus) Gaertner, Black Alder, European Alder. Sometimes cultivated, especially northward, and naturalized at least as far south as s. PA (Rhoads & Klein 1993); it has also been reported for Morgan County, TN (Chester, Wofford, & Kral 1997). [= FNA, C, F, G, K; = *Alnus alnus* (Linnaeus) Britton]

Betula Linnaeus 1753 (Birch)

A genus of 35-100 species, trees, shrubs, and subshrubs, of subarctic and temperate regions of the Northern Hemisphere. Section *Betula* (including natives *B. populifolia, B. papyrifera*, and *B. cordifolia*) is widely distributed in the northern hemisphere. Section *Costatae* (including *B. alleghaniensis, B. lenta, B. nigra*, and *B. uber*) occurs in e. North America and e. Asia. References: Grant & Thompson (1975); Furlow in FNA (1997); Furlow (1990)=Z; Hardin (1971)=Y; Järvinen et al. (2004); Govaerts & Frodin (1998); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaf blades suborbicular, the apex rounded; [section *Costatae*] ..... ***B. lenta var. uber***
1 Leaf blades ovate or triangular, the apex acute to acuminate.
  2 Bark yellowish-gray, yellowish, pink, reddish-brown, or dark brown; samara rounded or slightly retuse at its apex, the wings making up 1/2 or less of the width; fruiting peduncles sessile (peduncled in *B. nigra*); [section *Costatae*].
    3 Inner bark of the twigs bitter, not aromatic; leaves cuneate at the base ..... ***B. nigra***
    3 Inner bark of the twigs with odor and flavor of wintergreen; leaves rounded to subcordate at the base.
      4 Bark of stems 5-30 cm in diameter (on larger trees look up for branches) yellow or yellowish-gray, exfoliating in papery shreds (bark of larger trunks becoming platey, the plates not prominently marked horizontally by old lenticels); scales of fruiting catkins 6-13 mm long, pubescent and marginally ciliate ..... ***B. alleghaniensis***
      4 Bark of stems 5-30 cm in diameter (on larger trees look up for branches) reddish-brown or dark brown, tight (bark of larger trunks becoming platey, the plates prominently marked horizontally by old lenticels); scales of fruiting catkins 5-7 mm long, glabrous..... ..... ***B. lenta var. lenta***
  2 Bark white to pale gray; samara strongly retuse at its apex, the wings making up over 1/2 of the width; fruiting catkins peduncled; [section *Betula*].
    5 Leaves glabrous beneath or somewhat pubescent on the veins; bark of young stems remaining tight; leaf apex long-acuminate to attenuate; central lobe of infructescence scales shorter than the basal and lateral lobes.
      6 Leaf apex long-acuminate, but not attenuate; infructescence scales sparsely pubescent on the outer surface; bark of mature trees creamy to bright white ..... ***B. pendula***
      6 Leaf apex attenuate-acuminate; infructescence scales densely pubescent on the outer surface; bark of mature trees grayish white..... ..... ***B. populifolia***
    5 Leaves pubescent beneath, at least on the veins; bark of young stems exfoliating; leaf apex acute to short-acuminate; central lobe of infructescence scales equal to or longer than than the basal and lateral lobes.
      7 Twigs glabrous or slightly pubescent (and then glabrate in age); leaves cordate (rarely rounded) at the base; leaves with 9-12 lateral veins on each side of the midvein ..... ***B. cordifolia***
      7 Twigs densely pubescent; leaves cuneate to rounded (rarely truncate) basally; leaves with 6-9 lateral veins on each side of the midvein ..... ***[B. papyrifera]***

Betula alleghaniensis Britton, Yellow Birch. Mt (GA, NC, SC, VA): forests at medium to high elevations, rarely at low elevations; common (rare in SC). April-May; June-August. Newfoundland west to se. Manitoba, south to DE, PA, OH, n. IN, WI, MN, and IA, and in the mountains south to w. NC, n. GA, and e. TN. [= C, FNA, S, W, Y, Z; = *B. lutea* Michaux f. – RAB;

> *B. lutea* var. *lutea* – F, G; > *B. lutea* var. *macrolepis* Fernald – F, G; > *B. alleghaniensis* var. *alleghaniensis* – K; > *B. alleghaniensis* var. *macrolepis* (Fernald) Brayshaw – K]

Betula cordifolia Regel, Mountain Paper Birch. Mt (NC, VA): high elevation forests, primarily on talus of avalanche chutes, in the Black Mountains, Yancey County, NC, and on talus slopes and adjacent forests at high elevations, especially on quartzite on the western flank of the Blue Ridge, and on sandstone talus in the Ridge and Valley in VA; rare (NC Rare, VA Rare). May-August; July-September. Newfoundland and e. Québec south to the mountains of NY; disjunct in n. MN, w. VA, w. NC, and e. TN (Chester, Wofford, & Kral 1997). The question of the appropriate treatment of *B. cordifolia* and *B. papyrifera* is difficult (and still controversial). [= FNA, G, S, Y, Z; = *B. papyrifera* Marshall var. *cordifolia* (Regel) Fernald – RAB, C, F, K, W]

Betula lenta Linnaeus *var. **lenta***, Sweet Birch, Cherry Birch, Black Birch, "Mahogany." Mt (GA, NC, SC, VA), Pd (NC, SC, VA): forests at low to high elevations; common (uncommon in Piedmont). March-April; June-July. S. ME west to OH, south to GA and n. AL. This species is generally restricted elevationally in North Carolina to medium elevations and lower, but in VA it reaches higher elevations, where it can be as common as *B. alleghaniensis*. Once the primary source of methyl salicylate (wintergreen flavoring), used in medicines and confections; it is now produced synthetically. [= *B. lenta* – RAB, F, FNA, G, K, S, W, Z; < *B. lenta* – C, Y (also including *B. uber*)]

Betula lenta Linnaeus *var. **uber*** Ashe, Virginia Roundleaf Birch. Mt (VA): mountain forests (endemic to Smyth County, VA); rare. May-June; July-August. *B. lenta* var. *uber* is related very closely to *B. lenta* var. *lenta*, and is apparently endemic to Smyth County, VA. In addition to the characters in the key, it differs from *B. lenta* var. *lenta* in having the leaves 2-6 cm long (vs. 7-15 cm long), with 4-6 pairs of lateral veins (vs. 8-12 pairs). See Mazzeo (1974), Ogle & Mazzeo (1976), Hayden & Hayden (1984), and McAllister & Ashburner (2004) for additional information on this birch and its history. It does not breed "true" and should perhaps be considered a form of *B. lenta*. [< *B. lenta* Linnaeus – C, Y; *Betula uber* (Ashe) Fernald – F, FNA, K, W, Z; = *B. lenta* ssp. *uber* (Ashe) E. Murray; = *B. lenta* forma *uber* (Ashe) McAllister & Ashburner]

Betula nigra Linnaeus, River Birch, Red Birch. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): riverbanks, streambanks, floodplains, sandbars; common (uncommon in VA Mountains). March-April; May-June. NH west to se. MN and e. KS, south to ne. FL, FL Panhandle, and TX. [= RAB, C, F, FNA, G, GW, K, S, W, Y, Z]

* ***Betula pendula*** Roth, European Weeping Birch, European White Birch. Mt, Pd (VA): persistent and escaping from plantings; rare, native of Europe. [= C, F, FNA, K]

Betula populifolia Marshall, Gray Birch, White Birch. Mt (NC*, VA): native in old fields and young forests in the Big Meadows area on greenstone (Madison & Page counties, VA), disturbed areas; rare. May-June; June-July. Nova Scotia to s. Québec, south to s. NJ and MD, more or less disjunct in n. VA, s. Ontario, n. OH, and n. IN. [= RAB, C, F, FNA, G, K, W, Y, Z]

Betula papyrifera Marshall, Paper Birch, Canoe Birch, has sometimes been attributed to the Mountains of VA, but apparently these reports are based on *B. cordifolia* (see above). [= FNA, G, Y, Z; = *B. papyrifera* var. *papyrifera* – C, F, K, W]

* ***Betula pubescens*** Ehrhart *ssp. **pubescens***, European White Birch, Downy Birch, is reported as an introduction in e. GA (Jones & Coile 1988) and at scattered sites throughout PA (Rhoads & Klein 1993). [= FNA, K; = *B. alba* Linnaeus – C, F, G, an ambiguous name] {not yet keyed}

Carpinus Linnaeus 1753 (Hornbeam, Ironwood, Muscle-tree, Water-beech, Blue-beech)

A genus of about 26 species, trees, in temperate regions of the Northern Hemisphere, extending southward to se. Asia and Central America. The smooth gray bark gives *Carpinus* the names "Water-beech" and "Blue-beech", the fluted, sinewy appearance of the trunk the name "Muscle-tree", and the very hard, heavy wood the name "Ironwood." References: Furlow (1990)=Z; Hardin (1971)=Y; Furlow (1987a); Furlow (1987b)=X; Furlow in FNA (1997); Govaerts & Frodin (1998); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves narrowly ovate to oblong-ovate, 3-8.5 cm long, 1-4.5 cm wide, the apex acute, secondary teeth small and blunt, the lower leaf surface lacking conspicuous dark glands; bracts of the infructescence with rounded to subacute tips and few, blunt teeth; [primarily of the Coastal Plain and lower Piedmont] ..... ***C. caroliniana** var. **caroliniana***

1 Leaves ovate to elliptic, 5.8-12.5 cm long, 2.5-6.0 cm wide, usually abruptly narrowed to the tip (sometimes gradually tapered to a long, acuminate apex), the secondary teeth often almost as long as the primary teeth, sharp-tipped, the lower leaf surface with conspicuous dark-brown glands; bracts of the infructescence mostly sharp-tipped and bearing several sharp teeth; [primarily of the Mountains and Piedmont] .... ***C. caroliniana** var. **virginiana***

Carpinus caroliniana Walter *var. **caroliniana***, Coastal American Hornbeam. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, SC): streambanks, riverbanks, bottomland forests, lower slopes, maritime forests; common. March-April; September-October. S. NJ, e. MD, and e. VA south to c. peninsular FL, west to e. TX, and north in the inland to s. MO and s. IL. The validity of 2 taxa was established by Furlow (1987a, 1987b) largely through statistical methods. The two taxa have some morphologic and phytogeographic coherence, but intergradation appears to be extensive, and individual specimens (in the herbarium) or trees (in the field) may not be readily identifiable to variety. [= C, F; = *C. caroliniana* ssp. *caroliniana* – FNA, K, X, Z; < *C. caroliniana* – RAB, G, GW, S, WH, Y]

Carpinus caroliniana Walter *var. **virginiana*** (Marshall) Fernald, Inland American Hornbeam. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): rich cove forests, streambanks, riverbanks, bottomland forests, lower slopes; common. March-April; September-October. ME, Québec and s. Ontario west to MN, south to e. VA, c. NC, n. GA, n. AL, n. MS, AR, and se. OK. See above for discussion of the two varieties. [= C, F; = *C. caroliniana* ssp. *virginiana* (Marshall) Furlow – FNA, K, W, X, Z; < *C. caroliniana* – RAB, G, GW, S, Y]

Corylus Linnaeus 1753 (Hazelnut, Filbert)

A genus of about 15-18 species, shrubs and trees, of temperate regions of the Northern Hemisphere. Eurasian species of this genus, *C. avellana* Linnaeus and *C. maxima* P. Miller, are the sources of commercial filberts or hazelnuts. They are sometimes cultivated in North America, especially in the Pacific Northwest. Our wild species are also excellent eating, but wild animals, especially squirrels, usually harvest them before they are ripe. References: Furlow in FNA (1997); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Whitcher & Wen (2001); Forest & Bruneau (2000); Govaerts & Frodin (1998).

1 Mature involucre 1.5-3 cm long, the lobes flattened and laciniate; young twigs and petioles stipitate-glandular; [section *Corylus*, subsection *Corylus*] ..... ***C. americana***
1 Mature involucre 4-7 cm long, extended into a tubular beak; young twigs and petioles villous, glandless; [section *Corylus*, subsection *Siphonochlamys*] ..... ***C. cornuta* var. *cornuta***

Corylus americana Walter, American Hazelnut, American Filbert. Mt, Pd, Cp (GA, NC, SC, VA): rocky woodlands, mesic to rich forests and thickets; common. February-March; September-October. ME west to Saskatchewan, south to GA, LA, and OK. [= RAB, C, FNA, K, S, W, Y, Z; > *C. americana* var. *americana* – F, G; > *C. americana* var. *indehiscens* Palmer & Steyermark – F, G]

Corylus cornuta Marshall *var.* ***cornuta***, Beaked Hazelnut. Mt, Pd (GA, NC, SC, VA): dry rocky woodlands, thickets, high elevation forests and openings, seepage swamps; common. February-March; August-October. The species ranges from Newfoundland west to British Columbia, south to NJ, n. GA, e. TN (Chester, Wofford, & Kral 1997), OH, MO, CO, and CA. Var. *cornuta* occupies most of that range; var. *californica* (A. de Candolle) Sharp [ssp. *californica* (A. de Candolle) E. Murray], a small tree, is far western and grades into var. *cornuta*. [= K, Z; < *C. cornuta* – RAB, C, F, G, S, W, Y; = *C. cornuta* ssp. *cornuta* – FNA]

Ostrya Scopoli 1760 (Hop-hornbeam, Ironwood)

A genus of 7-9 species, trees, of temperate regions of the Northern Hemisphere. References: Furlow in FNA (1997); Govaerts & Frodin (1998); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Ostrya virginiana (P. Miller) K. Koch, American Hop-hornbeam, Ironwood. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): mesic to dry forests, often rocky, especially over basic rocks, reaching high elevations; common. April-May; August-October. Nova Scotia west to Manitoba, south to c. peninsular FL, Panhandle FL, and TX. One of our heaviest and hardest woods. [= RAB, C, FNA, G, S, W, Y, Z; > *O. virginiana* var. *lasia* Fernald – F; > *O. virginiana* var. *virginiana* – F; = *O. virginiana* var. *virginiana* – K]

BIGNONIACEAE A.L. de Jussieu 1789 (Bignonia Family)

A family of about 110 genera and 800 species, trees, shrubs, and lianas, mainly tropical and especially of South America. The monophyly of the Bignoniaceae (excluding *Paulownia*) was confirmed by Spangler & Olmstead (1999). References: Manning (2000)=Z; Spangler & Olmstead (1999); Fischer, Theisen, & Lohmann in Kubitzki (2004).

1 Leaves simple, cordate; plant a tree; corolla white (marked internally with other colors); [tribe *Tecomeae*] ..... ***Catalpa***
1 Leaves pinnately compound; plant a vine; corolla reddish or yellowish.
  2 Leaves 7-15-foliolate, with a leaflet in the terminal position; [tribe *Tecomeae*] ..... ***Campsis***
  2 Leaves 2-foliolate, with a 3-branched tendril in the terminal position; [tribe *Bignonieae*].
    3 Tendrils not hooked, claw-like ..... ***Bignonia***
    3 Tendrils hooked, claw-like ..... ***Macfadyena***

Bignonia Linnaeus 1753 (Cross-vine)

A monotypic genus, a woody vine, of Southeastern North America. References: Manning (2000)=Z; Fischer, Theisen, & Lohmann in Kubitzki (2004).

Bignonia capreolata Linnaeus, Cross-vine. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): swamp forests, bottomlands, forests, woodlands; common (rare in Mountains). April-May; July-August. MD west to s. OH and s. MO, south to c. peninsular FL and e. TX. This species is absent from most of the Mountains in our area (also scarce in the Piedmont of Virginia and upper Piedmont of NC), reappearing at lower elevations on the west side of the Blue Ridge. Though primarily a species of swamp and bottomland forests, *Bignonia* often occurs as well in mesic or even dry forests, where it generally remains stunted (most individuals with only a few leaves) and does not flower or fruit. [= C, F, GW, K, W, WH, Z; = *Anisostichus capreolata* (Linnaeus) Bureau – RAB, G; = *Anisostichus crucigera* (Linnaeus) Bureau – S]

Campsis Loureiro 1790 (Trumpet-creeper)

The only other species in the genus is the e. Asian *C. grandiflora* (Thunberg) K. Schumann. Wen & Jansen (1995) estimated the age since divergence to be 24.4 million years, based on molecular divergence. References: Manning (2000)=Z; Wen & Jansen (1995); Fischer, Theisen, & Lohmann in Kubitzki (2004).

Campsis radicans (Linnaeus) Seemann ex Bureau, Trumpet-creeper. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): bottomland forests, swamp forests, fencerows, old fields, forests, thickets, disturbed areas; common. June-July; September-October. NJ west to IA, south to s. FL and c. TX. In the pre-Columbian landscape this plant was primarily limited to swamps and bottomlands; it has done well as a weedy colonizer of abandoned farmland, fencerows, and thickets (where particularly conspicuous on fenceposts and old tobacco barns). In swamps of the Coastal Plain it is a common liana, often with its foliage in the canopy 30-40 m above the ground, and with stems to 15 cm in diameter. Even when the foliage cannot be seen, *Campsis* is immediately recognizable by its shreddy tan or yellow bark (unlike any of our other high-climbing vines). [= RAB, C, F, G, GW, K, W, WH, Z; = *Bignonia radicans* Linnaeus – S]

Catalpa Scopoli 1777 (Catalpa)

A genus of about 10 species, trees, of e. North America (2 species), e. Asia (4 species), and the West Indies (4 species). References: Manning (2000)=Z; Paclt (1952)=Y; Fischer, Theisen, & Lohmann in Kubitzki (2004).

1 Flowers creamy yellow, striped inside with deeper yellow and spotted with dark violet; leaves usually lobed; seeds elliptical, 2.5-3 mm long, 8-10 mm wide ..... *[C. ovata]*
1 Flowers white or pale rose, striped inside with yellow and spotted with purple; leaves rarely lobed; seeds elongate, 4-10 mm long, 20-35 mm wide.
  2 Corolla 2-4 cm wide, the lower corolla lobe densely spotted with purple, entire; pod 6-10 mm thick, each valve 9-15 mm wide when flattened; seeds with 2 elongated wings, each wing narrowing to an acutish end, the hairs at the end appressed to one another in 2 planes, thus forming a pointed tail; fresh foliage with a fetid odor ..... ***C. bignonioides***
  2 Corolla 4-6 cm wide, the lower corolla lobe sparsely spotted with purple, notched; pod 10-15 mm thick, each valve 13-18 mm wide when flattened; seeds with 2 elongated wings, each wing narrowing only slightly to a rounded or oblique end, the hairs at the end appressed to one another only in one plane, thus forming a flattish fringe; fresh foliage essentially odorless ..... ***C. speciosa***

Catalpa bignonioides Walter, Southern Catalpa. Cp (FL, GA, NC*, SC*), Mt*, Pd* (GA*, NC*, SC*, VA*): bottomlands and streambanks (as a native), escaped or persistent after cultivation; uncommon. June; October. S. GA, ne. FL, n. peninsular FL, and Panhandle FL west to s. MS (or LA?), on the Coastal Plain, early naturalized in a more widespread area, and now extending north to CT and MI. [= RAB, C, F, G, GW, K, W, WH, Z; = *C. catalpa* (Linnaeus) Karsten – S]

Catalpa speciosa (Warder) Warder ex Engelmann, Northern Catalpa. Cp (GA*, KY, NC*, SC*, TN, VA*), Pd* (GA*, NC*, SC*, VA*), Mt* (NC*, SC*, VA*): escaped or persistent after cultivation, and sometimes thoroughly naturalized; uncommon, native of the northern Mississippi River Embayment. May-June; July-August. S. IN and s. IL, south to w. TN and e. AR; early naturalized in a more widespread area. [= RAB, C, F, G, K, S, W, Z]

Catalpa ovata G. Don, Chinese Catalpa. Suburban woodlands; rare, but beginning to be considered invasive. Introduced in WV, MD, DC, PA, and other northeastern states (Manning 2000; Kartesz 1999). [= C, F, G, K, Z; > *C. ovata* var. *ovata* – Y; > *C. ovata* var. *flavescens* Bean -- Y]

Macfadyena Alphonse de Candolle 1845 (Claw-vine)

A genus of 3-4 species, woody vines, of Mexico and the West Indies south through Central America to northern South America. References: Manning (2000)=Z; Fischer, Theisen, & Lohmann in Kubitzki (2004).

* ***Macfadyena unguis-cati*** (Linnaeus) A.H. Gentry, Claw-vine, Cat's-claw-vine. Cp (GA, SC): cultivated and naturalized; rare, native of tropical America. This vine is introduced and naturalized in s. and e. GA (Jones & Coile 1988) and is locally commonly naturalized in Charleston. [= K, Z; = *Bignonia unguis-cati* Linnaeus]

BORAGINACEAE A.L. de Jussieu 1789 (Borage Family)
[also see *HELIOTROPIACEAE*]

A family of about 130 genera and ca. 2500 species, herbs, shrubs, and trees, nearly cosmopolitan (Al-Shehbaz 1991). Closely related to the Hydrophyllaceae, and the two may either be combined or subfamily Heliotropioideae elevated to family status as Heliotropiaceae (Ferguson 1998; Diane, Förther, & Hilger 2002; Hilger & Diane 2003). References: Al-Shehbaz (1991)=Z throughout the family. Key to genera based on RAB, C, and Z.

1 Ovary slightly 2-4-lobed, or not at all lobed; style terminal or reduced to a sessile terminal stigma ..... [see ***Heliotropium*** in ***HELIOTROPIACEAE***]
1 Ovary deeply 4-parted; style gynobasic; [subfamily *Boraginoideae*].
  2 Mericarps with glochidiate prickles (like grappling hooks), these visible early in development.
    3 Mericarps spreading or divergent, attached to the gynobase on the upper third of the mericarp; [tribe *Cynoglosseae*] ..... ***Cynoglossum***

3 Mericarps erect, attached to the gynobase near the middle of the mericarp; [tribe *Eritrichieae*]
4 Fruiting pedicels deflexed; plant perennial or biennial ..... ***Hackelia***
4 Fruiting pedicels erect-ascending; plant annual ..... ***Lappula***
2 Mericarps smooth, rugose, or pitted, lacking glochidiate prickles.
5 Corolla rotate, lacking a well-developed tube, blue; [tribe *Boragineae*] ..... ***Borago***
5 Corolla with a well-developed tube at least 3 mm long, of various colors (including blue).
6 Corolla lobes distinctly unequal, pink to blue.
7 Stamens equal in length, entirely included within the corolla tube ..... ***Anchusa***
7 Stamens unequal in length, the longer conspicuously exserted ..... ***Echium***
6 Corolla lobes equal, of various colors (including pink to blue).
8 Mericarps attached laterally to a pyramidal gynobase.
9 Corolla yellow, the tube 4-5 mm long; corolla throat lacking appendages ..... ***Amsinckia***
9 Corolla white (with a yellow eye), or pink to blue, the tube 6-20 mm long; corolla throat with appendages.
10 Corolla pink to blue (rarely white), 18-25 mm long; leaves elliptic or ovate; [plant a native, of moist, nutrient-rich habitats, and sometimes grown as an ornamental] ..... ***Mertensia***
10 Corolla white with a yellow eye; leaves linear; [plant a rare alien, of disturbed habitats] ..... ***Plagiobothrys***
8 Mericarps attached basally to a flat or broadly convex gynobase.
11 Mericarps laterally compressed, with an evident raised margin ..... ***Myosotis***
11 Mericarps neither laterally compressed nor with an evident thickened margin.
12 Mericarps with a prominent, toothed, basal rim ..... ***Symphytum***
12 Mericarps lacking a prominent, toothed, basal rim.
13 Corolla lobes erect or slightly spreading, acute to acuminate; style exserted ..... ***Onosmodium***
13 Corolla lobes spreading, rounded; style included.
14 Corolla whitish or bluish white; plant annual from a slender taproot; leaves without evident lateral veins; mericarps brown, dull, wrinkled and pitted; [plant a weedy alien] ..... ***Buglossoides***
14 Corolla bright yellow-orange, or greenish-white; plant perennial from a thickened, woody rhizome; mericarps white, shining, smooth or pitted; [plant a native] ..... ***Lithospermum***

Amsinckia Lehmann (Fiddleneck)

A genus of about 15 species, herbs, of western North America and western South America. References: Al-Shehbaz (1991)=Z.

* ***Amsinckia menziesii*** (Lehmann) A. Nelson & Macbride. Pd (NC), Cp (SC): disturbed areas, waste areas near wool-combing mill; rare, native of w. United States. May-September. [= Z; >< *A. hispida* (Ruiz & Pavón) I.M. Johnston – RAB, misidentification; > *A. menziesii* var. *menziesii* – K; >< *A. parviflora* Heller – S, misidentification; >< *Amsinckia lycopsoides* Lehmann, misidentification]

Anchusa Linnaeus (Bugloss, Alkanet)

A genus of about 35 species, herbs, of Europe, n. Africa, and w. Asia. References: Al-Shehbaz (1991)=Z.

* ***Anchusa arvensis*** (Linnaeus) M. Bieberstein, Small Bugloss, Alkanet. Pd (NC, VA): disturbed areas, rare, native of Europe. [= C, K; = *Lycopsis arvensis* Linnaeus – F, G, S]

Borago Linnaeus (Borage)

A genus of 3 species, herbs, of Mediterranean Europe and Asia. References: Al-Shehbaz (1991)=Z.

* ***Borago officinalis*** Linnaeus, Borage. Pd (VA): disturbed areas; rare, native of s. Europe. [= C, F, G, K, Z]

Buglossoides Moench (Corn-gromwell)

A genus of about 7 species, herbs or shrubs, of temperate Eurasia. References: Al-Shehbaz (1991)=Z.

* ***Buglossoides arvensis*** (Linnaeus) I.M. Johnston *ssp.* ***arvensis***, Corn-gromwell. Mt (NC, SC, VA), Pd, Cp (GA, NC, SC, VA): roadsides, dry disturbed areas, sandy fields; common, native of Eurasia. March-June. Other subspecies are not known to be naturalized in our area. [= Z; < *B. arvensis* – K; < *Lithospermum arvense* Linnaeus – RAB, C, F, G, S, W]

Cynoglossum Linnaeus (Comfrey)

A genus of about 75 species, herbs, of temperate regions. References: Al-Shehbaz (1991)=Z.

1 Flowering stem with leaves above the first inflorescence branch; corolla reddish-purple; [plant a biennial alien, weedy] ..... ***C. officinale***
1 Flowering stem leafless above the first branch; corolla blue or white; [plant a perennial native, not weedy].

2 Nutlets 3.5-5 mm; calyx at anthesis 2-2.5 mm long; corolla 6-8 mm wide, the lobes oblong and not overlapping..... ***[C. virginianum var. boreale]***

2 Nutlets 5.5-9 mm; calyx at anthesis (3.0-) 3.5-4.5 mm long; corolla (8-) 10-12 mm wide, the lobes broadly rounded and more or less overlapping ..... ***C. virginianum var. virginianum***

* ***Cynoglossum officinale*** Linnaeus, Garden Comfrey, Hound's-tongue. Mt (NC, VA), Pd (VA): disturbed areas, roadsides, pastures, calcareous shale barrens; common (rare south of VA), native of Eurasia. May-July. [= RAB, C, F, G, K, S, W, Z]

Cynoglossum virginianum Linnaeus ***var. virginianum***, Wild Comfrey. Mt, Pd, Cp (GA, NC, SC, VA): moist deciduous forests; common (rare in Coastal Plain). April-June. Var. *virginianum* ranges from CT west to OK, south to FL and LA. [= C, K; < *C. virginianum* – RAB, W; = *C. virginianum* – F, G, Z; = *C. virginicum* – S, orthographic error]

Cynoglossum virginianum Linnaeus var. *boreale* (Fernald) Cooperrider, Northern Hound's-tongue, ranges from New Brunswick west to British Columbia, south to CT, NY, c. PA, n. OH, MI, and MN. Cooperrider (1995) prefers varietal status for this taxon, stating that in OH there are numerous intermediates, while Voss (1996) and Rhoads & Klein (1993) maintain *C. boreale* at the species level. [= C, K; = *C. boreale* – F, G, Z]

Echium Linnaeus (Viper's-bugloss, Blueweed)

A genus of about 60 species, herbs, widespread in the Old World. The common name is pronounced "bew-gloss," not "bug-loss," as it refers to an ox's tongue rather than the departure of insects. References: Al-Shehbaz (1991)=Z.

1 Hairs of the stem pustular-based ..... ***[E. pustulatum]***

1 Hairs of the stem not pustular-based ..... ***E. vulgare***

* ***Echium vulgare*** Linnaeus, Viper's-bugloss, Blueweed. Mt, Pd (NC, SC, VA), Cp (VA): roadsides, dry pastures, disturbed areas; common, native of Mediterranean Europe. June-September. [= RAB, C, K, W; = *E. vulgare* var. *vulgare* – F, G; < *E. vulgare* – Z (also see *E. pustulatum*)]

* ***Echium pustulatum*** Sibthorp & Smith, Blue-devil, is reported by F for "N.J. to W.Va.," and by G and K as south to VA. It differs in having pustular-based hairs on the foliage. [= K; = *E. vulgare* var. *pustulatum* (Sibthorp & Smith) Coincy – F, G; < *E. vulgare* – Z]

Hackelia Opiz (Stickseed)

A genus of ca. 45 species, of north temperate regions, Central America, and South America, especially diverse in w. North America. References: Al-Shehbaz (1991)=Z.

Hackelia virginiana (Linnaeus) I.M. Johnston, Virginia Stickseed. Mt, Pd (GA, NC, SC, VA), Cp (VA): rich forests and woodlands; common (rare south of VA). June-September. S. Québec west to ND, south to ne. GA (Jones & Coile 1988), LA, and TX. [= RAB, C, F, G, K, W, Z; = *Lappula virginiana* (Linnaeus) Greene – S]

Lappula Moench (Sheepbur)

A genus of about 40 species, of Eurasia, w. North America. References: Al-Shehbaz (1991)=Z.

1 Nutlets with 1 row of marginal prickles ..... ***L. occidentalis var. occidentalis***

1 Nutlets with 2-3 rows of marginal prickles ..... ***[L. squarrosa]***

* ***Lappula occidentalis*** (S. Watson) Greene ***var. occidentalis***. Cp (SC): waste areas near wool-combing mill; rare, perhaps only a waif, native of w. North America. April-June. [= K; = *L. redowskii* var. *redowskii* – C, Z; = *L. redowskii* (Hornemann) Greene var. *occidentalis* (S. Watson) Rydberg – F, G]

* *Lappula squarrosa* (Retzius) Dumortier. Introduced south to MD, WV, KY, and TN. [= C, Z; = *L. echinata* Gilibert – F, G; = *L. lappula* (Linnaeus) Karst. – S]

Lithospermum Linnaeus (Gromwell, Puccoon, Stoneseed)

A genus of about 45 species, herbs (mostly perennials), nearly cosmopolitan. References: Cusick (1985)=Y; Al-Shehbaz (1991)=Z.

1 Corolla white or yellowish-white, the tube 4-8 mm long.

2 Plant with basal rosette; lower cauline leaves about equal in size to the upper cauline leaves; leaves acute to obtuse ..... ***L. tuberosum***

2 Plant lacking basal rosette; lower cauline leaves smaller than the upper cauline leaves; leaves acuminate or acute.

3 Upper stem internodes mostly 3-6 cm long; leaves mostly >2 cm wide, acuminate ..... ***L. latifolium***

3 Upper stem internodes mostly 1-2 cm long; leaves mostly <2 cm wide, acute ..... ***[L. officinale]***

1 Corolla yellow-orange, the tube 7-14 mm long.
4 Plant with dense, soft, appressed pubescence, the hairs usually without pustular bases; calyx lobes 6-8 mm long at maturity; nutlets 2-3 mm long; [mostly of rocky or clayey circumneutral soils of the Piedmont and Mountains] ..... ***L. canescens***
4 Plant with scattered, stiff, spreading pubescence, the hairs with or without pustular bases; calyx lobes 10-15 mm long at maturity; nutlets 3.5-4.5 mm long; [variously of sandy acidic soils of the Coastal Plain or inland].
5 Pubescence with slender bases; mature calyx lobes flat; plants with 15-25 well-developed leaves below the inflorescence; [of sandy Coastal Plain habitats from se. VA southward] ..... ***L. caroliniense***
5 Pubescence with pustular bases; mature calyx lobes strongly keeled; plants with (30-) 35-45 well-developed leaves below the inflorescence; [inland, known from west and north of our area] ..... ***[L. croceum]***

Lithospermum canescens (Michaux) Lehmann, Hoary Puccoon, Indian-paint. Pd (NC, SC, VA), Mt (GA, VA), Cp? (VA): dry woodlands and glades over calcareous rocks (such as limestone, dolostone) or mafic rocks (such as diabase); uncommon (rare in NC). April-May. Ontario west to Saskatchewan, south to c. NC, nw. GA, AL, and TX. [= RAB, C, F, G, K, W, Y, Z; = *Batschia canescens* Michaux – S]

Lithospermum caroliniense (Walter ex J.F. Gmelin) MacMillan, Coastal Plain Puccoon. Cp (GA, SC, VA): sandhills, dry sandy soils; common (rare north of s. SC). April-June. A Southeastern Coastal Plain endemic: se. SC south to FL, and west to TX, on the Southeastern Coastal Plain; disjunct in e. VA. The disjunction from SC to se. VA, skipping over large amounts of apparently suitable sandhill habitat in NC, is surprising. The sibling taxa *L. caroliniense* and *L. croceum* have been variously treated as distinct species, subspecies, or varieties, or as mere forms (see synonymy). They appear to be as clearly separable as *L. caroliniense* is from *L. canescens*; I regard them as allopatric species. [= F; < *L. caroliniense* – RAB, G, Z; = *L. caroliniense* var. *caroliniense* – C, K; = *Batschia caroliniensis* Walter ex J.F. Gmelin – S; = *L. carolinense* ssp. *carolinense* – Y]

Lithospermum latifolium Michaux, American Gromwell, Broadleaf Gromwell. Mt (GA, VA): dry to moist woodlands over calcareous rocks; rare (GA Special Concern). May-June. NY west to MN, south to nw. GA, s. TN and MO. [= C, F, G, K, S, W, Y, Z]

Lithospermum tuberosum Rugel ex A.P. de Candolle, Southern Stoneseed. Mt (GA, VA), Pd (GA, SC), Cp (GA): nutrient-rich forests; rare (VA Watch List). March-June. KY and TN, south to FL and LA. [= RAB, C, F, G, K, S, Z]

Lithospermum croceum Fernald ranges from Ontario west to MT, south to w. PA, n. OH, AR, OK, and CO. Reports by Kartesz (1999) for WV, KY, and TN have not been verified. [= F; = *L. caroliniense* (Walter ex J.F. Gmelin) MacMillan var. *croceum* (Fernald) Cronquist – C, K; < *L. caroliniense* – G, Z; = *L. caroliniense* ssp. *croceum* A.W. Cusick – Y]

* *Lithospermum officinale* Linnaeus, European Gromwell, is native of Europe and occurs at scattered localities in ne. North America, south to PA and NJ (Kartesz 1999). [= C, F, G, K, Y, Z]

Mertensia Roth (Bluebell)

A genus of about 45 species, north temperate. References: Al-Shehbaz (1991)=Z.

Mertensia virginica (Linnaeus) Persoon ex Link, Virginia Bluebells, Virginia Cowslip. Mt (GA, NC, VA), Pd (NC, VA), Cp (VA): nutrient-rich, moist, alluvial soils of floodplain forests and thickets; common (rare south of VA) (GA Special Concern). March-June. NY west to WI, and IA, south to n. NC, nw. GA, AL, and n. AR. Pringle (2004) discusses the nomenclatural reasons for retaining the name *M. virginica*. [= RAB, C, F, G, K, S, W, Z; = *M. pulmonarioides* Roth]

Myosotis Linnaeus (Forget-me-not, Scorpion-grass)

A genus of about 100 species, temperate and montane tropical. References: Al-Shehbaz (1991)=Z. Key based closely on RAB and C.

1 Calyx strigose, the hairs neither spreading nor uncinate; [mostly of moist to wet habitats].
2 Corolla limb 2-5 mm wide; mericarps distinctly surpassing the style ..... ***M. laxa ssp. laxa***
2 Corolla limb 5-10 mm wide; mericarps not surpassing the style ..... ***M. scorpioides***
1 Calyx with some loose or spreading, uncinate hairs; [of various habitats, mostly dry].
3 Corolla limb 5-8 mm wide; perennial ..... ***M. sylvatica***
3 Corolla limb 1-4 mm wide; annual or biennial.
4 Calyx lobes unequal, 3 lobes shorter than the other 2; corolla white; [native, of dry or moist habitats].
5 Fruiting pedicels divergent; fruiting calyx deciduous, 3-10 mm long; inflorescence internodes usually longer than 10 mm; mericarps 1.4-2.2 mm long ..... ***M. macrosperma***
5 Fruiting pedicels more-or-less erect; fruiting calyx persistent, 3-5.5 mm long; inflorescence internodes usually shorter than 10 mm; mericarps 1.2-1.5 mm long ..... ***M. verna***
4 Calyx lobes equal, all 5 the same size; corolla blue (occasionally yellow or white); [alien, mostly of dry disturbed habitats].
6 Fruiting pedicels equaling or generally longer than the calyx ..... ***M. arvensis***
6 Fruiting pedicels distinctly shorter than the calyx.
7 Plants floriferous from about the middle upward; style surpassing the mericarps ..... ***M. discolor***
7 Plants floriferous nearly to the base; style shorter than the mericarps ..... ***M. stricta***

* ***Myosotis arvensis*** (Linnaeus) Hill, Field Forget-me-not, Field Scorpion-grass. Pd (NC, SC, VA), Cp (VA), Mt (NC): roadsides, fields, disturbed areas; rare, native of Eurasia. May-August. [= RAB, C, F, G, K, S, W, Z]

* ***Myosotis discolor*** Persoon, Yellow-and-blue Scorpion-grass, Changing Forget-me-not. Pd (GA, NC, SC, VA), Cp (VA): fields, disturbed areas, roadsides; uncommon, native of Europe. May-August. [= RAB, C, GW, K, Z; *? M. versicolor* (Persoon) Sm. – F, G]

Myosotis laxa Lehmann *ssp. laxa*, Smaller Forget-me-not, Tufted Forget-me-not. Mt, Pd, Cp (NC, VA): marshes, streambanks; common. May-August. The species is circumboreal, represented nearly throughout North America by ssp. *laxa*. The other subspecies are Eurasian. [= Z; < *M. laxa* – RAB, C, F, G, GW, K, S, W]

Myosotis macrosperma Engelmann, Bigseed Forget-me-not. Cp, Pd, Mt (GA, NC, SC, VA): bottomland forests and alluvial fields, probably associated with nutrient-rich soils; uncommon. April-May. MD west to MO, south to FL and TX. [= RAB, C, F, G, GW, K, S, W, Z]

* ***Myosotis scorpioides*** Linnaeus, Water Scorpion-grass. Mt (NC, VA), Pd, Cp (VA): wet meadows, streambanks; common, native of Europe. May-August. [= RAB, C, F, G, GW, K, W, Z; *? M. palustris* (Linnaeus) Hill – S]

* ***Myosotis stricta*** Link ex Roemer & J.A. Schultes, Blue Scorpion-grass. Pd (NC, VA), Cp (VA), Mt (NC): disturbed areas; uncommon, native of Eurasia. April-June. [= F, K, Z; *? M. micrantha* Pallas – RAB, C, G, apparently misapplied]

* ***Myosotis sylvatica*** Ehrhart ex Hoffman, Garden Forget-me-not. Pd (NC): gardens, rarely persistent or found as a waif; rare, native of Eurasia. April-September. [= RAB, C, F, G, K, Z]

Myosotis verna Nuttall, Early Forget-me-not. Cp, Pd, Mt (GA, NC, SC, VA): dry woodlands, roadsides, disturbed areas, dry fields; common. March-July. ME west to SD, south to GA and TX; also from ID and British Columbia south to OR. [= RAB, C, F, G, K, W, Z; = *M. virginica* – S, misapplied]

Onosmodium Linnaeus (Marbleseed, False-gromwell)

A genus of about 7 species (or fewer species and the same number of taxa in some interpretations), perennial herbs, of North America. References: Cochrane (1976)=X; Turner (1995a)=Y; Al-Shehbaz (1991)=Z. Key based in part on X and Y.

1 Corolla lobes yellow to orange; nutlet 2.0-2.8 mm long; corolla lobes **either** 2.5-4× as long as wide and acuminate (*O. virginianum*) **or** 1.5-2× as long as wide, acute (*O. decipiens*).
  2 Stem hairs 2.5-5.0 mm long; corolla lobes 1.5-2× as long as wide, acute; tips of the anthers reaching the base of the corolla sinuses; [endemic to Ketona dolomite glades, Bibb County, c. AL] ..... ***[O. decipiens]***
  2 Stem hairs < 2.0 mm long; corolla lobes 2.5-4× as long as wide and acuminate; tips of the anthers below the corolla sinuses; [widespread in our area] ..... ***O. virginianum***
1 Corolla lobes dull greenish-white; nutlet 2.5-3.0 mm long; corolla lobes 1.5-2× as long as wide, acute.
  3 Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white) ..... ***[O. molle]***
  3 Leaf vestiture at least in part of spreading or ascending hairs.
    4 Stems mostly glabrous below the inflorescence branches ..... ***[O. subsetosum]***
    4 Stems persistently and obviously pubescent below the inflorescence branches.
      5 Corolla 6-10 mm long; nutlets flared at the base, forming a collar; longest stem hairs near midstem > 2.3 mm long ..... ***O. hispidissimum***
      5 Corolla 11-20 mm long; nutlets tapered to the base, lacking a collar; longest stem hairs near midstem < 2.2 mm long ..... ***O. occidentale***

Onosmodium hispidissimum Mackenzie, Eastern Prairie Marbleseed, Shaggy Marbleseed. Mt (VA): calcareous woodlands, barrens, and glades, and nearby in disturbed areas, such as older pasture edges; rare. June-July. W. NY and Ontario west to MN, south to sc. PA (Rhoads & Klein 1993), w. VA, e. TN (Chester, Wofford, & Kral 1997), LA, and TX. This species was attributed to NC by F and S; the documentation of these reports is not known. [= G, S, W; = *O. molle* Michaux var. *hispidissimum* (Mackenzie) Cronquist – C; > *O. hispidissimum* var. *hispidissimum* – F; > *O. hispidissimum* var. *macrospermum* Mackenzie & Bush – F; = *O. molle* Michaux ssp. *hispidissimum* (Mackenzie) Boivin – K, X, Z; = *O. bejariense* Alphonse de Candolle ssp. *hispidissimum* (Mackenzie) B.L. Turner – Y]

Onosmodium occidentale Mackenzie. Mt (GA): open woodlands over limestone; rare (GA Special Concern). Ranges east to e. TN (Chester, Wofford, & Kral 1997) and nw. GA (Jones & Coile 1988). [= F, G; *O. molle* Michaux var. *occidentale* (Mackenzie) I.M. Johnston – C; *O. molle* Michaux ssp. *occidentale* (Mackenzie) T.S. Cochrane – K, X, Z; *O. molle* – S, in part; *O. bejariense* Alphonse de Candolle var. *occidentale* (Mackenzie) B.L. Turner – Y]

Onosmodium virginianum (Linnaeus) Alphonse de Candolle, Virginia Marbleseed. Cp, Pd, Mt (GA, NC, SC, VA): sandhill woodlands, shell middens in the outer Coastal Plain, woodlands and barrens over diabase and other mafic rocks in the Piedmont and low Mountains, barrens, glades, or woodlands over calcareous rocks in the Mountains; uncommon, rare in NC and VA (NC Watch List, VA Rare). April-September. LA to FL, north to NY and MA, primarily on the Coastal Plain; the species has become very rare north of NC. It is peculiarly distributed in our area, occurring on highly acidic sands in the fall-line sandhills, but seemingly restricted to circumneutral soils derived from mafic rocks (Piedmont), calcareous rocks (Mountains), or calcareous shell (Coastal Plain) in the rest of our area. The unifying ecological factor determining its distribution may be an open, woodland condition maintained by fire. The species seems characteristically to occur in very small populations, consisting often of fewer than five plants. [= RAB, C, F, G, K, S, W, Y, Z]

Onosmodium decipiens J. Allison, Deceptive Marbleseed. Dolomitic Ketona glades. April-early May; June-August. Endemic to c. AL (Bibb County) (Allison & Stevens 2001).

Onosmodium molle Michaux. Limestone barrens. C. KY, c. TN (Chester, Wofford, & Kral 1997), nw. AL, and disjunct in the Ozarkian Highlands of MO. *O. molle* was attributed to our area (Durham County, NC) (RAB); Baskin *et al.* (1983) determined that this report was based on a misidentification of a specimen of *O. virginianum*. [= F, G, Y; = *O. molle* var. *molle* – C; = *O. molle* ssp. *molle* – K, X, Z; < *O. molle* – S]

Onosmodium subsetosum Mackenzie & Bush ranges east to c. and sc. TN (Chester, Wofford, & Kral 1997). [= F, G; = *O. molle* Michaux ssp. *subsetosum* (Mackenzie & Bush) T.S. Cochrane – K, X, Z; < *O. molle* – S; = *O. bejariense* Alphonse de Candolle var. *subsetosum* (Mackenzie & Bush) B.L. Turner – Y]

Plagiobothrys Fischer & C.A. Meyer (Popcorn-flower)

A genus of about 70 species, of w. North America, w. South America, e. Asia, and Australia. References: Al-Shehbaz (1991)=Z; Chambers (1989)=Y.

* ***Plagiobothrys figuratus*** (Piper) I.M. Johnston ex M.E. Peck *ssp. figuratus*, Popcorn-flower. Pd (NC): fields and roadsides; rare, native of nw. North America. April-May. [= K, Y; = *P. hirtus* (Greene) I.M. Johnston var. *figuratus* (Piper) I.M. Johnston – RAB, Z; < *P. hirtus* – F, G]

Symphytum Linnaeus (Comfrey)

A genus of ca. 25 species, herbs, of Europe. References: Al-Shehbaz (1991)=Z.

1 Upper leaves not decurrent, or decurrent < 1 cm below the leaf attachment; pubescence of stem in part of strong, recurved prickles (resembling miniature rose thorns) ..... ***[S. asperum]***
1 Upper leaves decurrent on the stem; pubescence of the stem not of prickles ..... ***S. officinale***

* ***Symphytum officinale*** Linnaeus, Common Comfrey. Mt (GA, VA), Pd (VA): disturbed areas; uncommon, native of Europe. *Symphytum* is a traditional "medicinal herb," but recent evidence suggests that it can cause dangerous (even fatal) liver damage. [= C, F, G, K, S, Z]

* *Symphytum asperum* Lepechin, Prickly Comfrey, another Eurasian species, is reported by F as occurring south to MD. It may occur in our area. [= C, F, G, K, Z]

BRASSICACEAE Burnett 1835 ***or CRUCIFERAE*** A.L. de Jussieu 1789 (Mustard Family)

A family of about 340 genera and 3400 species, annuals, perennials, shrubs, and rarely trees and vines, of cosmopolitan distribution (but most diverse in the temperate Northern Hemisphere). References: Rollins (1993); Al-Shehbaz (1984, 1985a, 1985b, 1986, 1987, 1988a, 1988b); Appel & Al-Shehbaz in Kubitzki & Bayer (2003).

Alliaria Heister ex Fabricius 1759 (Garlic Mustard)

A genus of 2 species, annual or biennial herbs, of Eurasia. References: Rollins (1993)=Z; Al-Shehbaz (1988b)=Y.

* ***Alliaria petiolata*** (Bieberstein) Cavara & Grande, Garlic Mustard, Hedge Garlic. Mt (NC, VA), Pd, Cp (VA) {GA, SC}: moist forests in bottomlands and on slopes; common (uncommon in VA Piedmont, rare in NC and VA Coastal Plain), native of Europe. April-May; May-June. This species has become a noxious weed in ne. United States, invading undisturbed moist forests. Dhillion & Anderson (1999) report on physiological characteristics that make *Alliaria* a successful invader in shaded situations. [= RAB, C, K, W, Y, Z; = *Alliaria officinalis* Andrzejowski ex Bieberstein – F, G]

Alyssum Linnaeus 1753 (Alyssum, Madwort)

A genus of 170-190 species, herbs, of Eurasia. References: Rollins (1993)=Z; Al-Shehbaz (1987)=Y.

* ***Alyssum alyssoides*** (Linnaeus) Linnaeus, Yellow Alyssum. Mt, Pd, Cp (VA): roadsides, disturbed areas, especially in dry, barren soil; uncommon, native of Europe. June-September. [= C, F, G, K, W, Z; > *A. alyssoides* var. *alyssoides* – Y]

Arabidopsis Heynhold (Mouse-ear Cress)

A genus of about 9 species, annual and perennial herbs, circumboreal and most diverse in Eurasia. References: Rollins (1993)=Z, Al-Shehbaz (1988a)=Y; O'Kane & Al-Shehbaz (1997)=X; O'Kane & Al-Shehbaz (2003); Koch, Bishop, & Mitchell-Olds (1999); Koch & Al-Shehbaz (2002). Key based in part on O'Kane & Al-Shehbaz (1997).

1 Fruit strongly flattened; petals 6-10 mm long; [native perennial, of calcareous and mafic rock outcrops] ..... ***A. lyrata ssp. lyrata***
1 Fruit terete; petals 2-4 mm long; [alien annual, of disturbed, weedy sites] ..... ***A. thaliana***

Arabidopsis lyrata (Linnaeus) O'Kane & Al-Shehbaz *ssp.* ***lyrata***, Lyreleaf Rockcress, Dwarf Rockcress. Mt (GA, NC, VA), Pd, Cp (NC, VA): rock crevices in or thin soil around calcareous or mafic rock outcrops; uncommon, rare in NC (GA Special Concern, NC Watch List). March-June; April-September. The species is widespread in n. North America and e. Asia, south in e. North America to NC, e. TN, and n. GA; ssp. *lyrata* is strictly North American. The GA record is an old and indefinite collection ("northern Georgia") by Vasey. [= X; < *Arabis lyrata* Linnaeus – RAB, C, F, G, K, S, W, X; = *A. lyrata* var. *lyrata* – Y, Z]

* ***Arabidopsis thaliana*** (Linnaeus) Heynhold, Mouse-ear Cress. Cp, Pd, Mt (GA, NC, SC, VA): disturbed areas, fields, roadsides, lawns; common, native of Eurasia. March-May. *Arabidopsis thaliana* has sometimes been referred to as the white mouse of the vascular plant world, having been very extensively used as an experimental plant; a journal, the Arabidopsis Information Service, publishes annual bibliographies of studies using this plant. [= RAB, C, F, G, K, S, W, X, Y, Z]

Arabis Linnaeus 1753 (Rockcress)

The circumscription of *Arabis* is in flux; there is increasing evidence that the broad circumscription traditionally employed in most North American floras includes discordant elements. Based on molecular phylogenetic studies and morphology, *Arabis* in our area should be divided into 4 genera, as follows: *Arabidopsis (A. lyrata); Arabis* sensu stricto (n=8) (*A. hirsuta var. adpressipilis, A. hirsuta var. pycnocarpa, A. georgiana*); *Boechera* Löve & Löve (n=7) (*A. canadensis, A. drummondii, A. laevigata var. burkii, A laevigata var. laevigata, A. missouriensis, A. patens, A. perstellata var. ampla, A. serotina, A. shortii*); and *Turritis* (*A. glabra var. glabra*). References: Hopkins (1937)=Z; Rollins (1993)=Y; Al-Shehbaz (1988a)=X; Al-Shehbaz (2003)=Q; Koch, Bishop, & Mitchell-Olds (1999); Koch & Al-Shehbaz (2002). [also see *Arabidopsis, Boechera, Turritis*]

1 Plants matted from a branching caudex, perennial; [cultivated and rarely persistent or escaped] ..... ***[A. caucasica]***
1 Plants unbranched, biennial; [native to our area].
  2 Petals 6-9 mm long; siliques 2.5-7 cm long.
    3 Siliques (4.5-) 5-7 cm long; [endemic to w. GA and c. AL] ..... ***A. georgiana***
    3 Siliques 2.5-4 cm long; [of se. PA, c. PA, and IN south to NC, e. TN, and AL] ..... ***A. patens***
  2 Petals 3-5 mm long; siliques 3-6 cm long; [collectively known from NC, TN, VA, and northward and westward from those states].
    4 Stem pubescence primarily appressed and of 2-armed or dolabriform hairs ..... ***A. pycnocarpa var. adpressipilis***
    4 Stem pubescence primarily spreading and of simple hairs ..... ***[A. pycnoacrpa var. pycnocarpa]***

Arabis georgiana R.M. Harper, Georgia Rockcress. Mt, Pd, Cp (GA): nutrient-rich streambanks and rock outcrops; rare (US Candidate, GA Threatened). April-May; May-early July. Endemic to n. and sw. GA and c. AL. It differs from our other species by the following combination of characters: fruits 5-7 cm long, borne appressed to ascending, leaves with bifurcate, trifurcate, or stellate hairs. See Patrick, Allison, & Krakow (1995). [= K, Y, Z]

Arabis patens Sullivant, Spreading Rockcress. Mt (GA, NC, VA), Pd (VA): thin soils around calcareous or dolomitic outcrops, very rarely in nutrient-rich seepage from mafic rocks; rare (GA Special Concern, NC Rare, VA Rare). May-June; June-August. Irregularly distributed, primarily in the sedimentary rock Appalachians, from se. PA, c. PA, and IN south to NC, e. TN, and AL. In NC, this species occurs over marble at Blowing Spring, Nantahala River Gorge, Swain County, at various sites over calcareous sedimentary rocks in the Hot Springs Window, near Hot Springs, Madison County, and in nutrient-rich seepage from amphibolite at Chimney Rock, Rutherford County. [= RAB, C, F, G, K, S, W, X, Y, Z; = *Boechera patens* (Sullivant) Al-Shehbaz – Q]

Arabis pycnocarpa M. Hopkins *var.* ***adpressipilis*** M. Hopkins, Slender Rockcress, Hairy Rockcress. Pd (NC), Mt (NC, VA): thin soils near outcrops of mafic or other rock weathering to nutrient-rich soils; rare (NC Rare, VA Rare). April-May; May-June. Var. *adpressipilis* ranges from OH to IL, south to AR, c. TN, and LA; disjunct east of the mountains in NC. Related to, but specifically distinct from, *A. hirsuta* (Linnaeus) Scopoli of Europe and *A. eschscholtziana* Andrzejowski in Ledebour of w. North America. [= Z; = *A. hirsuta* (Linnaeus) Scopoli var. *adpressipilis* (M. Hopkins) Rollins – C, F, G, X, Y; < *A. hirsuta* var. *pycnocarpa* (M. Hopkins) Rollins – K; > *A. ovata* Michaux – S]

* *Arabis caucasica* Willdenow, Gray Rockcress. Introduced in KY and TN (Kartesz 1999). [= K, Y; *? A. alpina* (Linnaeus) var. *albida* (Steven ex Jacquin) Paoletti]

Arabis pycnocarpa M. Hopkins var. *pycnocarpa*. Québec west to AK, south to e. and sw. PA (Rhoads & Klein 1993), AR, and AZ, primarily west of the Blue Ridge. Reports of this taxon from GA (Fernald 1950, Kartesz 1999, Hopkins 1937) are based on material collected by A.W. Chapman near Rome, and later described as *Arabis georgiana*. (See discussion under *A. pycnocarpa* var. *adpressipilis*). [= *A. hirsuta* (Linnaeus) Scopoli var. *pycnocarpa* (M. Hopkins) Rollins – C, F, G, X, Y; < *A. hirsuta* (Linnaeus) Scopoli var. *pycnocarpa* – K (also see var. *adpressipilis*); = *A. pycnocarpa* M. Hopkins var. *typica* – Z]

Armoracia Gaertner, Meyer, & Scherbius 1800 (Horseradish, Lake Cress)

A genus of 3 species, perennial herbs, of Eurasia. References: Al-Shehbaz & Bates (1987)=Z; Rollins (1993)=Y; Al-Shehbaz (1988a)=X. [also see *Neobeckia*]

1 Plant aquatic; stem submersed or prostrate; fruit unilocular ..... ***[see Neobeckia aquatica]***
1 Plant terrestrial; stem erect; fruit bilocular ..... ***A. rusticana***

* ***Armoracia rusticana*** P. Gaertner, Meyer, & Scherbius, Horseradish. Mt (NC): persistent after cultivation; rare, native of Europe. May-July. The root is grated to provide the condiment. [= RAB, C, G, K, X, Y, Z; =*? A. lapathifolia* Gilibert – F; = *A. armoracia* (Linnaeus) Britton – S]

Barbarea R. Brown 1812 (Winter-cress, Creasy Greens)

A genus of about 20 species, biennial and perennial herbs, semicosmopolitan. References: Al-Shehbaz (1988a)=Y; Rollins (1993)=Z.

1 Basal leaves with 4-10 pairs of lateral lobes; siliques 4.5-7 cm long; pedicels 1.2-1.8 mm thick..... ***B. verna***
1 Basal leaves with 1-4 pairs of lateral lobes; siliques 1.5-3 cm long; pedicels 0.5-1.0 mm thick..... ***B. vulgaris***

* ***Barbarea verna*** (P. Miller) Ascherson, Early Winter-cress. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): fields, disturbed areas; common, native of Eurasia. March-June. Formerly a commonly used winter and spring green in rural parts of our area. [= RAB, C, F, G, K, W, Y, Z; = *Campe verna* (P. Miller) Heller – S]

* ***Barbarea vulgaris*** R. Brown, Common Winter-cress, Yellow Rocket. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): fields, disturbed areas; common, native of Eurasia. April-June. Additional study is needed of the various infraspecific or specific taxa recognized by some authors (particularly Europeans) in what is here considered a variable species; see Stace (1997), for instance. [= RAB, C, K, W, Y, Z; > *B. vulgaris* var. *vulgaris* – F, G; > *B. vulgaris* var. *arcuata* (Opiz ex J. & K. Presl) Fries – RAB, F, G; > *Campe barbarea* (Linnaeus) W. Wight ex Piper – S; > *Campe stricta* (Andrzejowski) W. Wight ex Piper – S; > *B. vulgaris* var. *sylvestris* Fries]

Berteroa A.P. de Candolle 1821 (Hoary Alyssum)

A genus of about 5 species, annual or perennial herbs, of Europe and the Middle East. References: Rollins (1993)=Z; Al-Shehbaz (1987)=Y.

* ***Berteroa incana*** (Linnaeus) A.P. de Candolle, Hoary Alyssum. Pd, Mt (VA): disturbed areas; uncommon, native of Europe. [= C, F, G, K, Y, Z]

Boechera Löve & Löve 1975 (Rockcress)

Most of our native eastern North American "*Arabis*" are now in *Boechera*. References: References: Al-Shehbaz & Windham in FNA (in prep.); Windham & Al-Shehbaz (2007); Hopkins (1937) =Z; Rollins (1993)=Y; Wieboldt (1987); Al-Shehbaz (1988a)=X; Al-Shehbaz (2003)=Q; Koch, Bishop, & Mitchell-Olds (1999); Koch & Al-Shehbaz (2002).

1 Pedicels of flowers or fruits deflexed..... ***B. canadensis***
1 Pedicels of flowers or fruits erect, ascending, or spreading.
  2 Mature fruits < 4 cm long; stems branched or simple at the base.
    3 Stem leaves (most of them) < 5 mm wide; stems branched at the base..... ***[see Arabidopsis lyrata ssp. lyrata]***
    3 Stem leaves (most of them) > 8 mm wide; stems simple at the base.
      4 Lower cauline leaves glabrous or sparsely pubescent on the upper surface; fruits erect and appressed, 3-5 cm long..... ***[see Arabis]***
      4 Lower cauline leaves hirsute or strigose on the upper surface; fruits widely ascending or spreading. 1.5-4 cm long.
        5 Petals 6-9 mm long; fruiting pedicels 10-16 mm long; mature fruits 2.5-4 cm long; pubescence of the lower leaf surface simple; seeds winged..... ***[see Arabis patens]***
        5 Petals 2-5 mm long; fruiting pedicels 2-10 (-13) mm long; mature fruits 1.5-3 cm long; pubescence of the leaf surface stellate; seeds wingless.
          6 Petals 3-5 mm long, pink or purplish; fruiting pedicels 5-10 (-13) mm long; siliques 1.5-2 cm long; pubescence of the upper leaf surface stellate..... ***[B. perstellata]***
          6 Petals 2-3 mm long, white to cream; fruiting pedicels 2-3.5 mm long; siliques 1.5-3 cm long; pubescence of the upper leaf surface simple..... ***B. shortii***
  2 Mature fruits > 4 cm long; stems generally simple at the base.
    7 Fruits erect, appressed against the stem, the fruiting inflorescence < 2 cm in diameter.
      8 Mature fruits terete, (4-) 7-9.5 cm long; basal leaves 5-12 cm long, stellate pubescent; cauline leaves 4-12 cm long; pubescence of the stem mostly of spreading, simple hairs..... ***[see Turritis]***
      8 Mature fruits flat, 1.5-10 cm long; basal leaves 2-8 cm long, nearly glabrous; cauline leaves 1-4 cm long; pubescence of the stem mostly of appressed, forked hairs.
        9 Mature fruits 4-10 cm long, 1.5-2.5 mm wide, with 2 rows of seeds in each locule..... ***[B. stricta]***
        9 Mature fruits 1.5-7 cm long, 0.7-1.1 mm wide, with 1 row of seeds in each locule..... ***[see Arabis]***
    7 Fruits ascending to spreading (not erect and appressed to the stem), the fruiting inflorescence > 4 cm in diameter.
      10 Cauline leaves not at all auricled or sagittate-clasping at the base.
        11 Calyx 2.9-4.8 mm long; flowering April-May; plant unbranched or with 1-3 branches (sometimes more if the main stem damaged), the inflorescence thus a raceme or slightly paniculate; mature fruits 5.2-9.8 cm long; seeds 64-80 per silique; seeds with wing 0.2-0.5 mm wide..... ***B. burkii***

11 Calyx 2.0-3.3 mm long; flowering mid July-September; plant with numerous branches (well-developed plants usually with at least 10), the inflorescence thus a diffuse panicle; mature fruits 4.3-8.0 cm long; seeds 30-42 per silique; seeds with wing 0.1-0.2 mm wide ..... ***B. serotina***

10 Cauline leaves auricled or sagittate-clasping at the base.

12 Mature fruits 2.5-4.5 cm long ..... ***B. patens***

12 Mature fruits 5-10 cm long.

13 Basal leaves subentire to serrate or sinuate-serrate; petals white, to 5 mm long, equalling or slightly surpassing the sepals; longest cauline leaves usually 8-18 cm long; plant glaucous ..... ***B. laevigata***

13 Basal leaves sharply serrate-dentate to strongly laciniate or lyrate-pinnatifid; petals creamy-white, to 8 mm long, about 2× the length of the sepals; longest cauline leaves usually 3-5 cm long; plant green or red-tinged ..... ***B. missouriensis***

Boechera burkii (Porter) Windham & Al-Shehbaz, Burk's Smooth Rockcress. Mt (NC, VA): limestone barrens, shale barrens, and other dry, rocky habitats; rare (NC Watch List). April-May. E. and c. PA south to e. WV, ne. TN, and w. NC in the sedimentary rock Appalachians. Windham & Al-Shehbaz (2007) … RAB assigns this variety to NC based on somewhat aberrant specimens from high elevation cove forests; these are better assigned to *B. laevigata* var. *laevigata*. Hopkins (1937), however cites a specimen from Hot Springs, Madison County, NC, an area with plausible habitats (dry sedimentary rock woodlands, shale barrens). [= FNA; = *Arabis laevigata* (Muhlenberg ex Willdenow) Poiret var. *burkii* Porter – C, K, W, X, Y; < *A. laevigata* var. *burkii* – F, G, Z (also see *A. serotina*); < *A. burkii* (Porter) Small – S, misapplied in part; < *Boechera laevigata* – Q]

Boechera canadensis (Linnaeus) Al-Shehbaz, Sicklepod, Canada Rockcress. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, VA): thin soils around rock outcrops, especially mafic or calcareous, and in dry to mesic, nutrient-rich, often rocky woodlands over mafic or calcareous rocks; uncommon (rare in Coastal Plain). May-July; June-August. Québec and ND south to Panhandle FL and TX. [= FNA, Q, WH; = *Arabis canadensis* Linnaeus – RAB, C, F, G, K, S, W, X, Y, Z]

Boechera laevigata (Muhlenberg ex Willdenow) Al-Shehbaz, Common Smooth Rockcress. Mt, Pd (GA, NC, SC, VA), Cp (VA): rocky woodlands and forests, rock outcrops, especially mafic or calcareous, but also on more acidic substrates, rarely also in bottomlands; common (uncommon in VA Coastal Plain). April-May; May-June. ME west to MN and SD, south to GA, AL, MS, AR, OK, and CO. Of our *Arabis*, *A. laevigata* var. *laevigata* is the most common, being the least limited to calcareous substrates. [= FNA; = *Arabis laevigata* (Muhlenberg ex Willdenow) Poiret *var. laevigata* – RAB, C, F, G, K, W, X, Y, Z; > *A. laevigata* var. *laevigata* – RAB; > *A. laevigata* var. *burkii* – RAB, misapplied; >< *A. burkii* (Porter) Small – S, misapplied in part; > *A. laevigata* – S; < *Boechera laevigata* – Q]

Boechera missouriensis (Greene) Al-Shehbaz, Missouri Rockcress. Pd (GA, NC, SC): thin soil around outcrops of metamudstone, diabase, or granite; rare (GA Special Concern, NC Rare, SC Rare). April-May; May-June. ME to WI, south to KY, AR, and OK; disjunct eastward in NC, SC, and GA. [= FNA, Q; = *Arabis missouriensis* Greene – C, K, X, Y; = *A. laevigata* var. *missouriensis* – RAB; > *A. missouriensis* var. *missouriensis* – F; > *A. viridis* Harger var. *viridis* – G, Z]

Boechera serotina (Steele Windham & Al-Shehbaz, Shale Barren Rockcress. Mt (VA): shale barrens; rare (US Endangered, VA Threatened). Mid-July-September. Endemic to Devonian and Ordovician shales of w. VA and e. WV. Wieboldt (1987) has clarified the taxonomy of this species and *A. laevigata* var. *burkii*. Also see Porter & Wieboldt (1991) for further discussion. [= FNA; = *Arabis serotina* Steele – C, K, X, Y; < *A. laevigata* var. *burkii* – F, G, Z (included within concept of *A. laevigata* var. *burkii* by Z and most earlier floras); < *Boechera laevigata* – Q]

Boechera shortii (Fernald) Al-Shehbaz. Pd (VA): nutrient-rich alluvial and river bluff forests (along the Potomac River in our area); rare (VA Rare). April-May. NY west to MN, south to n. VA, nc. TN (Chester, Wofford, & Kral 1997), and AR. [= FNA, Q; = *Arabis shortii* (Fernald) Gleason – C, G, K, X, Y; = *A. perstellata* E.L. Braun var. *shortii* Fernald – F; = *A. dentata* (Torrey) Torrey & A. Gray – S, Z (name preoccupied); > *A. shortii* var. *phalacrocarpa* (M. Hopkins) Steyermark]

Boechera perstellata (E.L. Braun) Al-Shehbaz is apparently endemic to KY and c. TN (Chester, Wofford, & Kral 1997). [= FNA, Q; = *Arabis perstellata* – K, Y; > *Arabis perstellata* E.L. Braun var. *perstellata* – X; > *Arabis perstellata* E.L. Braun var. *ampla* Rollins – X]

Boechera stricta (Graham) Al-Shehbaz. Labrador and AK south to NJ, DE, OH, IL, NM, AZ, and CA. [= FNA, Q; = *Arabis drummondii* A. Gray – C, F, G, K, Y; > *A. drummondii* A. Gray var. *typica* – Z; = *Boechera drummondii* (A. Gray) Löve & Löve, illegitimate name]

Brassica Linnaeus 1753 (Mustard, Turnip, Rape, Cabbage, Collard Greens, Kale, Broccoli, Cauliflower, Kohlrabi, Rutabaga, Bok-Choy, Chinese Cabbage, Brussels Sprouts)

A genus of about 40 species, herbs, of the Old World. References: Rollins (1993)=Z; Al-Shehbaz (1985b)=Y. Key adapted from Z. [also see *Erucastrum, Sinapis*]

1 Upper cauline leaves auriculate, slightly to strongly clasping the stem; [section *Rapa*].

2 Petals 10-18 mm long, dark yellow; beak of the silique usually 7-10 mm long; plant usually glaucous; siliques 5-10 cm long ..... ***Br. napus***

2 Petals 6-10 (-11) mm long, pale yellow; beaks of the silique usually 10-15 mm long; plant usually green; siliques 3-7 cm long ..... ***Br. rapa var. rapa***

1 Upper cauline leaves petiolate, or sessile and cuneate.

3 Pedicels and siliques widely spreading to divaricately ascending; siliques 2-4 cm long, terete or nearly so; [section *Rapa*] ..... ***Br. juncea***

3 Pedicels and siliques erect and appressed to the rachis; siliques 1-2 cm long, more-or-less 4-angled; [section *Melanosinapis*] ..... ***Br. nigra***

* ***Brassica juncea*** (Linnaeus) Czernjaew, Leaf Mustard, Brown Mustard, Indian Mustard, Mustard Greens, Chinese Mustard. Cp (GA, SC, VA), Mt (NC, SC, VA), Pd (SC, VA): fields, disturbed areas; uncommon, native of Eurasia. April-June. This species is apparently a recently derived polyploid (n=18) of *B. nigra* (n=8) and *B. rapa* (n=10). The seeds of this species are one

source of table mustard; other components include *B. nigra* and *Sinapis alba*. [= RAB, C, G, K, W, Y, Z; > *B. juncea* – S; > *B. japonica* Thunberg – S]

* ***Brassica napus*** Linnaeus, Rutabaga, Rape, Canola, Colza, Swede. Mt, Pd (GA, NC, SC, VA?), Cp (SC): fields, disturbed areas; rare, native of Eurasia. May-July. This species is apparently a recently derived polyploid (n=19) of *B. oleracea* (n=9) and *B. rapa* (n=10). The seeds of this species are the source of "canola" oil, the name recently coined by marketers from "**Ca**nadian" + "**oil**" + "**low**" + "**acid**" to avoid the negative connotation of "rape." [= K, W, Y, Z; < *B. napus* – RAB (also see *B. rapa*)]

* ***Brassica nigra*** (Linnaeus) W.D.J. Koch, Black Mustard, Charlock. Cp, Pd, Mt (VA) {NC}: fields, disturbed areas; uncommon, native of Eurasia. May-August. The seeds of this species are one source of table mustard; other species used include *B. juncea* and *Sinapis alba*. [= C, F, G, K, S, Y, Z; = *Sinapis nigra* Linnaeus]

* ***Brassica rapa*** Linnaeus *var. **rapa***, Turnip, Bird's-rape, Field Rape, Field Mustard, Bok-choy, Chinese Cabbage. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (NC, SC, VA): fields, disturbed areas; common, native of Europe. March-June. *B. rapa* is cultivated in a variety of forms, *B. rapa* var. *chinensis* (Linnaeus) Kitam. (Bok-choy or Pak-choi) and *B. rapa* var. *amplexicaulis* Tanaka & Ono (Chinese Cabbage). [= K; < *B. rapa* – C, Y, Z; < *B. napus* – RAB; > *B. rapa* – G; > *B. campestris* Linnaeus – G, S]

* *Brassica oleracea* Linnaeus is commonly cultivated in our area in a variety of forms, including *B. oleracea* var. *acephala* A.P. de Candolle (Collard Greens, Kale), *B. oleracea* var. *capitata* Linnaeus (Cabbage), *B. oleracea* var. *italica* Plenck (Broccoli), *B. oleracea* var. *botrytis* Linnaeus (Cauliflower), *B. oleracea* var. *gemmifera* Zenk (Brussels Sprouts), and *B. oleracea* var. *gongylodes* Linnaeus (Kohlrabi). [= K] {not keyed}

Braya Sternberg & Hoppe 1815

A genus of about 6 species, perennial herbs, of alpine and arctic Eurasia and North America. References: Rollins (1993)=Z.

*? ***Braya humilis*** (C. A. Meyer) B.L. Robinson. (VA): rare, perhaps introduced. Ranging from boreal e. Asia and North America south to VT, MI, CO, and (probably as an introduction) VA. [= C, K, Z; > *B. humilis* var. *leiocarpa* (Trautvetter) Fernald – F, G]

Bunias Linnaeus 1753 (Warty-cabbage)

A genus of 3 species, herbs, of Eurasia. References: Rollins (1993)=Z.

1 Plant an annual; cauline leaves < 5 cm long; siliques 10-12 mm long, more-or-less straight, 4-winged, spiny; seeds 3-4 per silique ..... ***B. erucago***

1 Plant a perennial; cauline leaves > 10 cm long; siliques 5-10 mm long, usually curved, not winged, verrucose; seeds 1 per silique ..... ***B. orientalis***

* ***Bunias erucago*** Linnaeus, Southern Warty-cabbage. Cp? (VA): disturbed areas; rare, native of Europe. April-June. [= C, K, Z]

* ***Bunias orientalis*** Linnaeus, Warty-cabbage. Pd (VA): disturbed areas; rare, native of Europe. June-July. [= C, F, G, K, Z]

Cakile P. Miller 1754 (Sea Rocket)

A genus of about 7-8 species, annual herbs, primarily of coastal North America, Europe, and North Africa. References: Rollins (1993)=Z; Rodman (1974)=Y; Al-Shehbaz (1985b)=X.

Identification notes: The siliques of *Cakile* are divided near their middle by an abscission zone into two halves, each with a single seed: the upper abscises and disperses by water or wind, the lower remains attached to the parent plant. The size of the two segments and the contour of the abscised surface remaining on the lower segment are important taxonomic characters.

1 Lower silique segment with 2 opposite lateral horns or wings on the sides prolonged upward into sharp triangular wedges, concave in between; petals lavender (rarely white), 8-14 mm long, 3-6 mm wide; most of the leaves deeply pinnatifid into 6-9 lobes ..... ***C. maritima ssp. maritima***

1 Lower silique segment without lateral horns, triangular wedges absent to 1.5 mm high; petals white (rarely lavender), 4-10 mm long, 1.4-3 mm wide; most of the leaves with a few to many irregular teeth (or pinnatifid in *C. lanceolata* ssp. *pseudoconstricta*).

2 Infructescences usually >20 cm long; [of the Gulf Coast] ..... ***[C. lanceolata ssp. pseudoconstricta]***

2 Infructescences 10-20 cm long; [collectively widespread].

3 Siliques 3-4 mm wide, the beak conical and acute at the apex; [of the Gulf Coast] ..... ***[C. constricta]***

3 Siliques 5-9 mm wide, the beak somewhat flattened and typically rather blunt; [of the Atlantic Coast].

4 Upper fruit segment 7-15 mm long, 4-angled (to weakly 8-ribbed); articulating surface of lower fruit segment flat to concave and with 2 (-6) small teeth projecting upward or the sides prolonged upward into 2 opposite triangular wedges; [of NC northward to Labrador] ..... ***C. edentula***

4 Upper fruit segment 12-20 mm long, 8-ribbed; articulating surface of lower fruit segment flat (to slightly convex or concave) and without teeth; [of NC southward to St. Lucie County, FL] ..... ***C. harperi***

Cakile edentula (Bigelow) Hooker, Northeastern Sea Rocket. Cp (NC, VA): beaches, at or near the wrack line; common. May-June (-October). Labrador south to NC; introduced in various other shores around the world, including w. North America and Australia. See *C. harperi* for discussion of the relation between these taxa. [= RAB, S; = *C. edentula* var. *edentula* – C, F, G; = *C. edentula* ssp. *edentula* – GW; = *C. edentula* ssp. *edentula* var. *edentula* – K, X, Y, Z]

Cakile harperi Small, Southeastern Sea Rocket. Cp (FL, GA, NC, SC): beaches, at or near the wrack line; common. May-June (-October). A Southeastern Coastal Plain endemic: e. NC south to the east coast of c. peninsular FL. Rodman (1974) and most authors since have treated *C. harperi* as *C. edentula* ssp. *harperi* (Small) Rodman. Rodman further treats the Great Lakes and ne. United States coastal populations (respectively) as *C. edentula* ssp. *edentula* var. *lacustris* Fernald and *C. edentula* ssp. *edentula* var. *edentula*. Rodman points out the morphologic distinctions between the three taxa, the chemical differences between "*edentula*" and "*harperi*," and the rarity or absence of intermediates in areas of pairwise overlap between the 3 entities. The geographic / morphologic pattern is not clinal, but is rather a sharp step function, with an overlap in the distribution of (and rare hybridization between) two largely distinct taxa. The few intermediates can be interpreted as hybrids or very limited and local introgression between otherwise distinct (though related) taxa. *C. harperi* shows greater chemical similarity to *C. constricta* Rodman and *C. lanceolata* (Willdenow) O.E. Schultz than to *C. edentula*, and also shows some morphologic affinities with these more southern taxa. For these reasons I prefer the simplicity of treating the three taxa as binomial species. [= RAB, S; = *C. edentula* (Bigelow) Hooker ssp. *harperi* (Small) Rodman – GW, K, WH, X, Y, Z]

* ***Cakile maritima*** Scopoli *ssp.* ***maritima***, European Sea Rocket. Cp (NC, VA): beaches, at or near the wrack line; uncommon, native of Europe. The other subspecies are also European but are apparently not introduced in our area. The NC location was on ballast at Wilmington, and is apparently not persistent. VA locations are, however, well-established. [= X, Y; < *C. maritima* – C, F, G, K, Z; = *C. cakile* (Linnaeus) Karstens – S]

Cakile constricta Rodman, Gulf Coast Sea Rocket. {FL, AL, MS, LA}: beaches, coastal sands. February-October. Panhandle FL west to TX. [= GW, K, X, Y, Z; < *C. lanceolata* (Willdenow) O.E. Schulz – S, WH]

Cakile lanceolata (Willdenow) O.E. Schulz ssp. *pseudoconstricta* Rodman. Beaches, coastal sands. January-December. FL, AL, LA, TX, Tamaulipas. [= K, X, Y, Z; < *C. lanceolata* – GW, S, WH]

Calepina Adanson 1763

A monotypic genus, an annual herb, of c. and sw. Asia. References: Rollins (1993)=Z; Al-Shehbaz (1985b)=Y.

* ***Calepina irregularis*** (Asso) Thellung. Mt (NC), Pd, Cp (VA): fields, disturbed areas; rare, native of Eurasia. April. [= RAB, C, K, Y, Z]

Camelina Crantz 1762 (Gold-of-pleasure, False-flax)

A genus of 6-7 species, herbs, of se. Europe and the Middle East. References: Rollins (1993)=Z; Al-Shehbaz (1987)=Y.

1 Siliques 4-7 mm long; leaves and stem rough-hairy, the stellate trichomes exceeded by simple trichomes (which are 1-2 mm long) ..... ***C. microcarpa***

1 Siliques 7-12 mm long; leaves and stem glabrate to sparsely hairy, the stellate trichomes as long as the few simple trichomes ..... ***C. sativa***

* ***Camelina microcarpa*** Andrzejowski ex A.P. de Candolle, Lesser Gold-of-pleasure. Pd (GA, NC, VA), Mt (NC, VA), Cp (NC, SC, VA): fields, disturbed areas; uncommon, native of Eurasia. April-May. [= RAB, C, F, G, K, S, W, Y, Z]

* ***Camelina sativa*** (Linnaeus) Crantz, Gold-of-pleasure, False-flax. Pd (NC, VA): fields, disturbed areas; rare, native of Eurasia. April-May. [= RAB, C, F, G, S, Y, Z; > *C. sativa* ssp. *sativa* – K]

Capsella Medikus 1792 (Shepherd's Purse)

A monotypic genus, an annual or biennial herb, of Europe. References: Rollins (1993)=Z; Al-Shehbaz (1986)=Y.

* ***Capsella bursa-pastoris*** (Linnaeus) Medikus, Common Shepherd's Purse. Cp, Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common, native of Europe. March-June. *C. rubella* Reuter, Pink Shepherd's Purse, is sometimes distinguished (as by F, G, Stace 1997), and occurs in our area. It is alleged to be diploid (vs. tetraploid), to have pink petals 1-2 mm long (vs. white, 2-3 mm long), and lateral margins of the fruit concave (vs. straight to convex). Al-Shehbaz (1986) considered the character correlations to be poor, not warranting taxonomic recognition. [= RAB, C, K, W, Y, Z; > *C. bursa-pastoris* – F, G; > *C. rubella* Reuter – F, G; > *C. gracilis* Gren. – F; = *Bursa bursa-pastoris* (Linnaeus) Britton – S]

Cardamine Linnaeus 1753 (Bittercress, Toothwort)

A genus of about 200 species, herbs, cosmopolitan. *Dentaria* should apparently be included (Sweeney & Price 2000). References: Rollins (1993)=Z; Sweeney & Price (2001)=Y; Al-Shehbaz (1988a)=X; Sweeney & Price (2000); Franzke et al. (1998). Key based in part on Turrill, Evans, & Gilliam (1994) and Y.

1 Leaves palmately divided (if 1-ternate, then palmately so, the terminal leaflets on a petiolule the same length as the those of the lateral leaflets); [*Dentaria*].
2 Plants entirely glabrous (including on the leaf margins); leaflets highly dissected with linear to filiform segments; [in our area known from Piedmont of NC and VA] ..... ***C. dissecta***
2 Plants with marginal leaf trichomes, and often also pubescent on the stem, inflorescence, and petioles; leaflets entire, toothed, or deeply lobed; [collectively widespread in our area].
3 Trichomes of leaf margins appressed and ca. 0.1 mm long; stem leaves 2 (-3), opposite; lateral leaflets of stem leaves very rarely incised, the leaf being (and appearing merely 3-foliolate, though teeth may be prominent and lacerate); basal leaves usually present at flowering.
4 Rhizome with 2-3 cm long segments, each separated by a narrow and fragile connecting portion (which typically is broken on herbarium specimens), and lacking "teeth" (actually prominent reduced leaves); leaflets of the stem leaves (2.5×-) avg. 5× (-7×) as long as wide (thus proportionately much narrower than the leaflets of the basal leaves); central leaflet of stem leaves (2.5-) avg. 3.25 (-4) cm long × (0.5-) avg. 0.75 (-1.0) cm wide ..... ***C. angustata***
4 Rhizome elongate and of uniform diameter, lacking definite segments, but with periodic "teeth" (prominent reduced leaves) along it; leaflets of the stem leaves (2×-) avg. 3× (-4×) as long as wide (thus proportionately similar to the leaflets of the basal leaves); central leaflet of stem leaves (4-) avg. 6 (-8) cm long × (1.5-) avg. 2 (-2.5) cm wide ..... ***C. diphylla***
3 Trichomes of leaf margins erect and 0.2-0.3 mm long; stem leaves 3, whorled; lateral leaflets of stem leaves usually incised into 2 main lobes, giving the leaf a superficially somewhat 5-parted appearance; basal leaves usually absent (or often present in *C. maxima*) at flowering.
5 Rhizome with 2-3 cm long segments, each separated by a narrow and fragile connecting portion (which typically is broken on herbarium specimens); upper stem pubescent ..... ***C. concatenata***
5 Rhizome elongate, with alternating thicker and thinner portions (but not fragile and easily separating); upper stem glabrous ..... ***[C. maxima]***

1 Leaves simple, pinnately lobed, or pinnately divided (if 1-ternate, then pinnately so, the terminal leaflet on a longer petiolule than those of the lateral leaflets); [*Cardamine* in the narrow sense].
6 Cauline leaves simple, sometimes the lower to middle cauline leaves with 1-2 pairs of very small lateral lobes.
7 Plant from a tuberous or bulbous base, erect and generally unbranched, not stoloniferous or rooting down from upper nodes after flowering; petals 7-20 mm long.
8 Stem glabrous; corolla white, rarely pink; stem leaves 4-12; silique 1.5-3 cm long, plus a 3-7 mm beak ..... ***C. bulbosa***
8 Stem cinereous-pubescent; corolla pink to lavender, rarely white; stem leaves 2-5; silique 1-2 cm long, plus a 2-4 mm beak ..... ***C. douglassii***
7 Plant from a fibrous root system, frequently much branched from the base, some of the branches becoming stoloniferous and rooting down at the upper nodes after flowering; petals 2-10 mm long or absent.
9 Petals absent or present, if present 0.7-2 mm long; silique 5-10 (-15) mm long, plus a 0.5-1.0 mm beak, on thick pedicels 1-3 (-6) mm long ..... ***C. longii***
9 Petals present, 2-10 mm long; silique 8-21 mm long, plus a 1-3 mm beak, on slender pedicels 10-20 mm long.
10 Petals 5-10 mm long, the tips spreading or ascending; anthers oblong, about 1 mm long; stylar beak of the silique 2-3 mm; mid-cauline and upper cauline leaves cordate, often clasping around the stem or branch; basal leaves with 0-1 pairs of lateral leaflets ..... ***C. rotundifolia***
10 Petals 3-5 mm long, the tips ascending or erect; anthers orbicular, ca. 0.3 mm across; stylar beak of the silique 1-1.5 mm; mid-cauline and upper cauline leaves cuneate, rounded, or truncate (rarely the mid-cauline leaves subcordate, but not clasping); basal leaves with 1-3 pairs of lateral leaflets ..... ***C. micranthera***
6 Cauline leaves 1-ternate or pinnatifid (if 1-ternate, the lateral leaflets about as large as the terminal leaflet).
11 Cauline leaves with 3-5 leaflets; petals 4-10 mm long; plant a perennial.
12 Stem glabrous at base; lower leaves green underneath; petioles auriculate at the base, the auricles 1-5 mm long, acute to acuminate; leaves 3 (-5)-foliolate; siliques 22-40 mm long ..... ***C. clematitis***
12 Stem pubescent at base; lower leaves purple underneath; petioles not auriculate at the base; leaves 3-5-foliolate; siliques 10-25 mm long.
13 Petals 6-9 mm long; stamens shorter than the petals by 1 mm or more; sepals 3-4 mm long; filaments obviously flattened ..... ***C. flagellifera var. flagellifera***
13 Petals 4-6 mm long; stamens equaling to slightly exceeding the petals; sepals 2.5-3.5 mm long; filaments terete to somewhat flattened ..... ***C. flagellifera var. hugeri***
11 Cauline leaves with 7-numerous leaflets; petals 1-4 mm long or absent (8-15 mm long in *C. pratensis* var. *palustris*); plant an annual, biennial, or perennial.
14 Petals 8-15 mm long ..... ***C. pratensis var. palustris***
14 Petals 1-4 mm long or absent.
15 Cauline leaves with prolonged sagittate-auriculate bases, the 13-19 leaflets acuminate ..... ***C. impatiens***
15 Cauline leaves without basal auricles, the 5-15 (-17) leaflets mostly obtuse.
16 Plant with many, persistent basal leaves forming a rosette; stem bases and petioles hirsute ..... ***C. hirsuta***
16 Plant with few or no basal leaves, not forming a rosette; stem bases and petioles glabrous (or sparsely hirsute).
17 Siliques <1 mm wide ..... ***C. debilis***
17 Siliques >1 mm wide.
18 Cauline leaves 2-4 cm long; terminal leaflet similar to the lateral leaflets in size and shape; leaflets neither decurrent along the rachis nor petiolulate; stem glabrous throughout ..... ***C. parviflora var. arenicola***
18 Cauline leaves 4-10 cm long; terminal leaflet broader than the lateral leaflets; leaflets either decurrent along the rachis or petiolulate; stem pubescent at base.
19 Leaflets petiolulate; stems flexuous; [alien weed] ..... ***C. flexuosa***
19 Leaflets decurrent on the rachis; stems typically erect; [native] ..... ***C. pensylvanica***

Cardamine angustata O.E. Schulz, Eastern Slender Toothwort. Pd, Mt (GA, NC, SC, VA), Cp (NC, SC, VA): rich, mesic forests; common (rare in VA Mountains and VA Coastal Plain). March-April; April-May. NJ and IN south to n. GA, c. TN, and ne. MS; disjunct in the Ouachita Mountains of AR. Var. *ouachitana* E.B. Smith, alleged to differ from var. *angustata* in its non-

ciliate leaves (vs. leaves with margins ciliate with antrorse trichomes 0.1 mm long), is apparently not a valid taxon. [= C, K, X, Y, Z; = *C. angustata* var. *angustata* – RAB; = *Dentaria heterophylla* Nuttall – F, G, S, W]

Cardamine bulbosa (Schreber ex Muhlenberg) Britton, Sterns, & Poggenburg, Bulbous Bittercress. Cp, Pd, Mt (GA, NC, SC, VA): swampy forests and bogs, primarily (but not strictly) in circumneutral soils over limestone or mafic rocks; uncommon. March-May; April-May. Widespread in e. North America. There has been recent disagreement over the correct nomenclature of this species (Kartesz & Gandhi 1992). [= RAB, F, G, GW, K, S, W, Z; = *C. rhomboidea* (Persoon) A.P. de Candolle – C, X]

Cardamine clematitis Shuttleworth ex A. Gray, Mountain Bittercress. Mt (NC, VA): shaded brookbanks, rock outcrops with seepage, at high elevations (1200m and above); rare. April-May; June-July. Endemic to the high elevation Southern Appalachians of w. NC, e. TN, and sw. VA. [= C, K, S, W, X, Z; < *C. clematitis* Shuttleworth ex Gray – RAB, F, G, GW (also see *C. flagellifera*)]

Cardamine concatenata (Michaux) O. Schwarz, Cutleaf Toothwort. Mt, Pd, Cp (GA, NC, SC, VA): rich, mesic forests; common (uncommon in VA Coastal Plain). March-May; April-May. ME, Québec and MN south to FL Panhandle, LA, and OK. [= RAB, C, K, X, Y, Z; = *Dentaria laciniata* Muhlenberg ex Willdenow – G, GW, S, W; > *Dentaria laciniata* var. *laciniata* – F; > *D. laciniata* var. *coalescens* Fernald – F]

* ***Cardamine debilis*** D. Don. Cp (GA): disturbed areas; rare, native of Europe. This species is similar to *C. pensylvanica* and *C. flexuosa* and may be overlooked (Rollins 1993, Brown & Marcus 1998). It is reported for e. GA (Jones & Coile 1988). [= K, Z]

Cardamine diphylla (Michaux) A. Wood, Crinkleroot, Toothwort. Mt (GA, NC, VA), Pd (NC): rich, mesic forests; common. April-May; May-June. New Brunswick west to MN, south to n. GA, SC, and AL. [= RAB, C, K, X, Y, Z; = *Dentaria diphylla* Michaux – F, G, W; > *Dentaria diphylla* – S; > *Dentaria incisa* Small – S]

Cardamine dissecta (Leavenworth) Al-Shehbaz, Dissected Toothwort. Pd (NC, VA), Mt (GA): rich, mesic forests; rare (GA Special Concern, NC Rare). March-April; April-May. Al-Shehbaz (1988c) describes the range as separated into four areas: c. AL (3 counties); c. NC and sc. VA (6 counties); nw. GA, c. TN, and s. KY (18 counties); and se. IN, ne. KY, and s. OH (6 counties). He states that *C. dissecta* is easily distinguished from its relatives "by its glabrous leaves that are divided into filiform to narrowly linear segments." See Al-Shehbaz (1988c) for additional discussion of the systematics, nomenclature, ecology, and distribution of this species. First reported for VA by Wieboldt et al. (1998). [= C, K, X, Y, Z; = *Cardamine angustata* var. *multifida* (Muhlenberg ex Elliott) Ahles – RAB; = *Dentaria multifida* Muhlenberg ex Elliott – F, G, W; > *Dentaria multifida* – S; > *Dentaria furcata* Small – S; = *Cardamine multifida* (Muhlenberg ex Elliott) Wood]

Cardamine douglassii Britton, Limestone Bittercress, Douglass's Bittercress, Purple Cress, Pink Spring-cress. Pd (NC, VA), Cp (VA): nutrient-rich, mesic forests, especially alluvial bottomlands, and in nutrient-rich seepages, in NC in the drainages of the Neuse, Meherrin, and (rarely) Cape Fear rivers; uncommon, rare in NC (NC Rare, VA Watch List). March-April; April-May. Fairly widespread in ne. United States, south to NC, sc. TN, and MO. [= RAB, C, F, G, K, GW, X, Z]

Cardamine flagellifera O.E. Schulz *var.* ***flagellifera***, Large-flowered Blue Ridge Bittercress. Mt (GA, NC, SC, VA), Pd (NC): in seepages, on streambanks, and in moist cove or bottomland forests, mainly at moderate to low elevations; uncommon (rare in GA, SC, and VA). March-May; June-July. *C. flagellifera* is endemic to the Southern Appalachians of w. NC, SC, e. TN, GA, VA, and WV, and is quite distinct from *C. clematitis*, as pointed out by Dudley (1974). Rollins's division of this species into two varieties (followins Small's recognition of two species) needs further evaluation. [= K, Z; < *C. flagellifera* – C, W, X; < *C. clematitis* – RAB, GW; = *C. flagellifera* – S]

Cardamine flagellifera O.E. Schulz *var.* ***hugeri*** (Small) Rollins, Small-flowered Blue Ridge Bittercress. Mt (NC, VA?), Pd (NC): in seepages, on streambanks, and in moist cove or bottomland forests, mainly at moderate to low elevations; rare. March-April; June-July. Endemic to the Southern Appalachians of NC and TN. [= K, Z; < *C. flagellifera* – C, W, X; < *C. clematitis* – RAB, GW; = *C. hugeri* Small – S]

* ***Cardamine flexuosa*** Withering, Woodland Bittercress. Mt, Cp, Pd (NC, VA): disturbed sites; rare, native of Europe. February-May. Lihová et al. (2006) show that Asiatic "*C. flexuosa*" is a distinct taxon from European *C. flexuosa* and will need a new name; at least some of our material is the Asiatic species, whose proper name is unclear (Lihová et al. 2006). Both the European and Asiatic taxa are allotetraploids of unclear parentage. [= RAB, F, K, X, Z]

* ***Cardamine hirsuta*** Linnaeus, Hairy Bittercress. Mt, Pd, Cp (GA, NC, SC, VA): disturbed areas, including fields and gardens; common, intoduced from Europe. February-May (or irregularly earlier in response to mild winter weather). [= RAB, C, F, G, GW, K, S, W, X, Z]

* ***Cardamine impatiens*** Linnaeus, Narrowleaf Bittercress. Mt (NC, VA), Pd (NC): alluvial floodplains, in the New River drainage; rare, native of Europe. June-July. See Poindexter (2006). [= C, F, K, X, Z]

Cardamine longii Fernald, Long's Bittercress. Cp (NC, VA): tidal freshwater marshes and cypress-gum swamps; rare (NC Rare, VA Watch List). June-September. Coastal in distribution, irregularly from ME south to NC. Difficult to distinguish from depauperate or submerged forms of *C. pensylvanica* with few leaflets; the short style (capsule beak) and short and thick pedicels appear to be the most reliable characteristics. [= C, F, K, X, Z]

Cardamine micranthera Rollins, Streambank Bittercress, Small-anthered Bittercress. Pd (NC, VA): sand and gravel bars in creeks, swampy floodplain woods, seepage over rocks; rare. April-May; May-June. A narrow endemic, known only from Stokes County, NC and Patrick County, VA; apparently extirpated from Forsyth County, NC. The description and key in RAB are partly in error, being based on the inadequate and unrepresentative material available at the time. *C. micranthera* is most closely related to *C. rotundifolia*, but also shows some affinities to *C. pensylvanica*. It can be distinguished from *C. rotundifolia* by the characters in the key; additionally, *C. micranthera* does not form proliferative branches from the upper nodes, generally branching from the base in vigorous plants, or unbranched in smaller plants. It can be distinguished from *C. pensylvanica* by its predominately simple leaves, especially those on the upper stem, the larger flowers, the petals 3-5 mm long (vs. 1.5-3 mm long), the fruiting pedicels thin, 10-20 mm long, spreading to ascending (vs. thick, 4-10 mm long, ascending). Wieboldt (1992) reasonably speculates that *C. micranthera* may be an in-breeding relative derived from *C. rotundifolia* in the Piedmont/Mountain interface. [= RAB, K, X, Z]

Cardamine parviflora Linnaeus *var.* ***arenicola*** (Britton) O.E. Schulz, Sand Bittercress. Mt, Pd, Cp (GA, NC, SC, VA): various habitats, primarily seasonally wet areas with shallow soil or sand, also on mafic outcrop glades, as on greenstone, diabase, and nutrient-rich granites; common. March-May. The typic variety is Eurasian; our variety is widespread in e. North America, also occurring in the Pacific Northwest. Our plant may warrant specific status. [= RAB, C, F, K, X, Z; < *C. parviflora* – G, GW, S, W; = *C. arenicola* Britton – S]

Cardamine pensylvanica Muhlenberg ex Willdenow, Quaker Bittercress. Mt, Pd, Cp (GA, NC, SC, VA): various wet habitats, especially swampy depressions, streambanks, small woodland seeps; common. March-May. Widespread, ranging over most of North America. [= RAB, C, G, GW, K, S, W, X, Z; > *C. pensylvanica* var. *pensylvanica* – F; > *C. pensylvanica* var. *brittoniana* Farwell – F]

Cardamine pratensis Linnaeus *var.* ***palustris*** Wimmer & Graebner, American Cuckoo-flower, Lady's-smock. Mt, Cp (VA): bogs and swamps; rare. April-July. Var. *palustris* ranges from Canada south to NJ, VA, OH, IN, MN, and British Columbia. The Eurasian var. *pratensis*, with pink (vs. white) flowers, is introduced in ne. North America and may occur in our area. These two varieties may not be distinguishable; Rollins combines var. *palustris* into var. *pratensis*. [= C, F, G; < *C. pratensis* var. *pratensis* – K, Z]

Cardamine rotundifolia Michaux, American Bittercress, Mountain Watercress. Mt, Pd (GA?, NC, VA): seepages, streambanks, swampy depressions; rare (NC Rare). April-May; June-July. Characteristically, *C. rotundifolia* branches from the upper nodes while in flower, the branches rooting down and proliferating vegetatively. This species is a rather broad endemic of the Central Appalachians, ranging from PA and w. NY, west to OH and KY, south to the Mountains and upper Piedmont of NC. [= RAB, C, F, G, GW, K, S, W, X, Z]

Cardamine maxima (Nuttall) Wood, Large Toothwort ranges south to NJ, PA, OH, WV, and KY. [= K, Y, Z; = *C.* ×*maxima* – C; = *Dentaria maxima* Nuttall – F, G]

Chorispora A.P. de Candolle 1821 (Chorispora)

A genus of 11 species, herbs, of Central Asia and the Middle East. References: Rollins (1993)=Z; Al-Shehbaz (1988d)=Y.

* *Chorispora tenella* (Pallas) A.P. de Candolle, Chorispora, Blue Mustard, native of w. Asia is well established in the w. United States, and occurs at scattered locations eastward, as in c. and w. TN (Chester, Wofford, & Kral 1997) and s. PA (Rhoads & Klein 1993). [= C, K, Y, Z]

Coincya Porta & Rigo ex Rouy 1891 (Wallflower-cabbage, Coincya)

A genus of 6 species, of c. and s. Europe and n. Africa. References: Rollins (1993)=Z; Leadlay & Heywood (1990)=Y; Al-Shehbaz (1985b)=X; Naczi & Thieret (1996)=Q.

* ***Coincya monensis*** (Linnaeus) Greuter & Burdet *ssp.* ***recurvata*** (Allioni) Leadlay, Wallflower-cabbage, Coincya. Mt (NC): roadsides; rare, native of Eurasia. May-July. Rollins (1961) discusses the occurrence of this species in w. NC. See Naczi & Thieret (1996) for an excellent discussion of this species' occurrence in North America. [= K, Q; *? Brassica erucastrum* – RAB, misapplied; *? Hutera cheiranthos* (Villars) Gomez-Campo – X; = *C. monensis* ssp. *recurvata* var. *recurvata* – Y, Z; *? Rhynchosinapis cheiranthos* (Villars) Dandy; *? C. cheiranthos* (Villars) Greuter & Burdet]

Conringia Adanson 1763 (Hare's-ear Mustard)

A genus of 6 species, herbs, of Europe and the Middle East. References: Rollins (1993)=Z; Al-Shehbaz (1985b)=Y.

* ***Conringia orientalis*** (Linnaeus) Andrzejowski, Hare's-ear Mustard, Treacle Mustard. Cp (NC), Pd (GA, NC, VA), Mt (VA): disturbed areas; rare, native of Eurasia. April-June. [= RAB, C, F, G, K, S, Y, Z]

Descurainia Webb & Berthelot 1836 (Tansy-mustard, Flixweed)

A genus of ca. 40 species, primarily of North and South America. References: Rollins (1993)=Z, Al-Shehbaz (1988b)=Y; Detling (1939)=X.

1 Silique 10-25 (-30) mm long, acute to acuminate, the seeds mostly in 1 row ..... ***D. sophia***
1 Silique 5-10 (-13) mm long, obtuse or clavate, the seeds mostly in 2 rows.
  2 Leaves densely gray-canescent; angle between fruiting pedicels and rachis ca. 75 degrees; pedicels glandular-puberulent, 6-12 mm long; plants 2-5 dm tall; [primarily of the Coastal Plain]..... ***D. pinnata var. pinnata***
  2 Leaves glabrous or glabrescent; angle between fruiting pedicels and rachis ca. 45 degrees; pedicels glabrous, 6-16 mm long; plants 3-7 dm tall; [primarily of the Mountains and Piedmont, rarely weedy in the Coastal Plain].
    3 Stems moderately to densely glandular and pubescent (but not canescent); siliques 5-10 (-12) mm long; pedicels 8-16 mm long..... ***D. pinnata var. brachycarpa***
    3 Stems sparsely pubescent to glabrous; siliques 8-12 mm long; pedicels 6-12 mm long ..... ***D. pinnata var. intermedia***

Descurainia pinnata (Walter) Britton *var.* ***brachycarpa*** (Richardson) Fernald, Northeastern Tansy-mustard. Mt, Pd (VA), Cp (NC*): dry rocky openings and woodlands; rare (VA Watch List). April-June. Québec west to Mackenzie, south to VA, TN, and TX; introduced in the Coastal Plain of NC. [= C, F, G; = *D. brachycarpa* (Richardson) O.E. Schulz – RAB; = *D. pinnata* ssp. *brachycarpa* (Richardson) Detling – K, X, Y, Z; < *D. pinnata* – W] {add S synonymy}

* ***Descurainia pinnata*** (Walter) Britton *var.* ***intermedia*** (Rydberg) C.L. Hitchcock. Cp (SC): waste areas near wool-combing mills; rare, native of w. North America. Also reported for WV (Kartesz 1999). [= *Descurainia pinnata* ssp. *intermedia* (Rydberg) Detling – K, X, Y, Z; = *Sophia intermedia* Rydberg – S]

Descurainia pinnata (Walter) Britton *var.* ***pinnata***, Southeastern Tansy-mustard. Cp (GA, NC, SC): open sandy areas, especially roadsides; common. February-May. E. NC south to FL, west to TX and OK. [= C, F, G; = *D. pinnata* – RAB (in the narrow sense); = *D. pinnata* ssp. *pinnata* – K, X, Y, Z; = *Sophia pinnata* (Walter) T.J. Howell – S]

* ***Descurainia sophia*** (Linnaeus) Webb ex Prantl, Herb Sophia. Pd (GA, NC, VA), Cp (NC, SC, VA), Mt (VA): disturbed areas; rare, native of Eurasia. April-June. [= RAB, C, F, G, K, X, Y, Z; = *Sophia sophia* (Linnaeus) Britton – S]

Diplotaxis A.P. de Candolle 1821 (Wall-rocket)

A genus of ca. 30 species, herbs, of Eurasia and Africa. References: Rollins (1993)=Z; Al-Shehbaz (1985b)=Y.

1 Leaves mostly basal or very low-cauline; plant annual or biennial; siliques lacking a stipe between the sepal scars and the base of the valves; [section *Anocarpum*] ..... ***D. muralis***
1 Leaves mostly cauline; plant perennial, becoming somewhat woody at the base; siliques with a 0.5-2 mm stipe between the sepal scars and the base of the valves; [section *Diplotaxis*] ..... ***D. tenuifolia***

* ***Diplotaxis muralis*** (Linnaeus) A.P. de Candolle, Annual Wall-rocket, Sand-rocket, Stinking Wall-rocket. Cp (VA): disturbed areas; rare, native of Europe. June-September. The report of this species for NC by Ahles & Radford (1959) was based on a misidentification of *Coincya muralis* (Naczi & Thieret 1996). [= C, F, G, K, S, Y, Z]

* ***Diplotaxis tenuifolia*** (Linnaeus) A.P. de Candolle, Perennial Wall-rocket, Flixweed. Cp, Pd (VA): disturbed areas; rare, native of Europe. July-October. [= C, F, G, K, S, Y, Z]

Draba Linnaeus 1753 (Draba, Whitlow-grass)

A genus of about 350 species, herbs, of Northern Hemisphere and Andean South America, particularly in arctic and alpine habitats. Molecular phylogenetic studies show that *Erophila* should be included in *Draba* (Koch & Al-Shehbaz 2002). References: Rollins (1993)=Z; Al-Shehbaz (1987)=Y; Koch & Al-Shehbaz (2002).

1 Leaves all basal; petals deeply bifid (about 1/2 way to base) ..... ***Dr. verna***
1 Leaves basal and cauline (the basal sometimes withering by fruiting); petals merely emarginate.
  2 Silique twisted; petals 5-6 mm long; styles conspicuous, 1.5-3 mm long; perennial; [on calcareous rock outcrops] ..... ***Dr. ramosissima***
  2 Silique not twisted; petals 0-5 mm long; styles absent to inconspicuous, 0-0.25 mm long; winter-annuals; [mostly in open situations in sandy or clayey soils, not over limestone].
    3 Silique 1-4 mm long; leaves extending upward into the lower branches of the inflorescence.
      4 Pubescence of the lower leaves of stalked cruciform trichomes; siliques densely pubescent; fruiting branches congested, mostly < 1 cm long and appearing almost glomerate ..... ***Dr. aprica***
      4 Pubescence of the lower leaves of sessile cruciform trichomes; siliques glabrous; fruiting branches elongate ..... ***Dr. brachycarpa***
    3 Silique 8-14 mm long; leaves low-cauline, not extending upward into the lower branches of the inflorescence.
      5 Inflorescence congested, the fruiting portion ca. 1.5 cm long; trichomes of the upper leaf surface simple or once-forked; pedicels glabrous ..... ***Dr. reptans***
      5 Inflorescence not congested, the fruiting portion mostly > 2.5 cm long; trichomes of the upper leaf surface dendritic; pedicels pubescent.
        6 Silique ca. 3-6× as long as wide, 5-15 mm long, 1.2-2.2 (-2.8) mm wide, pubescent with simple or branched trichomes ..... ***Dr. cuneifolia var. cuneifolia***
        6 Silique ca. 2× as long as wide, 5-8 mm long, 2.5-3.7 mm wide, pubescent with simple trichomes ..... ***Dr. platycarpa***

Draba aprica Beadle, Flatrock Draba, Open-ground Whitlow-grass, Sun-loving Draba, Granite Whitlow-wort. Pd (GA, SC), Mt (GA): shallow soils around and under *Juniperus virginiana* on granitic flatrocks and amphibolite outcrops; rare (GA Endangered, SC Rare). March-April; April-May. Ozark highlands of AR, MO, and OK; disjunct on granitic flatrocks in SC and GA. [= RAB, G, K, S, W, Y, Z]

Draba brachycarpa Nuttall ex Torrey & A. Gray, Short-fruited Draba. Pd, Cp (GA, NC, SC, VA), Cp (GA): granitic flatrocks, open places (fields, roadsides, woodland margins, disturbed areas); uncommon (VA Watch List). February-April; March-May. VA west to IN and KS, south to FL and TX. [= RAB, C, F, G, K, S, W, Y, Z]

Draba cuneifolia Nuttall ex Torrey & A. Gray *var.* ***cuneifolia***. Cp (GA, ?*NC, ?*SC): open blackland prairies, preferring rocky, bare soil, also waste areas around wool-combing mills, possibly other habitats; rare, in NC and SC perhaps only native of further west. February-March; March-April. All three varieties are primarily distributed in sw. United States, but the species extends as a native at least as far east as c. GA (Houston County) (Echols 2007) and AL, where it occurs in prairies. [= K, Z; < *D. cuneifolia* – RAB, C, F, G, S]

Draba platycarpa Torrey & A. Gray. Cp (SC): waste areas around wool-combing mill; rare, perhaps not established, native of w. North America. [= K, Z]

Draba ramosissima Desvaux, Rocktwist, Appalachian Draba. Mt (NC, VA), Pd (VA): in crevices of rock outcrops, or in dry talus slopes, over a variety of rock types (including limestone, dolostone, schist, gneiss, shale); common (rare in NC and VA Piedmont). April-May; May-July. W. MD and e. WV south through w. VA and e. KY south to w. NC and e. TN. [= RAB, K, S, W, Z]

Draba reptans (Lamarck) Fernald. Pd (NC), Cp (SC): dry soil; rare. February-March; March-April. MA and Ontario west to WA, south to NC, GA, TX and CA. The few occurrences in our area seem to make little ecological or phytogeographic sense; they may represent introductions. The first collection in our area was, however, by Walter. [= RAB, K, Z; > *D. reptans* var. *reptans* – C, F, G; > *D. caroliniana* Walter – S]

* ***Draba verna*** Linnaeus, Whitlow-grass Cp (NC, SC, VA), Pd, Mt (GA, NC, SC, VA): disturbed areas, especially in dry, barren soils, including granitic flatrocks; common, native of Europe. February-April; March-May. [= RAB, C, K, S, W, Z; > *D. verna* var. *verna* – F, G; > *D. verna* var. *boerhaavii* van Hall – F, G; = *Erophila verna* (Linnaeus) Besser]

Eruca P. Miller 1754 (Rocket-salad, Arugula)

A monotypic genus, an annual herb, native to Mediterranean Europe. References: Rollins (1993)=Z; Al-Shehbaz (1985b)=Y.

* ***Eruca vesicaria*** (Linnaeus) Cavanilles *ssp.* ***sativa*** (P. Miller) Thellung, Garden Rocket, Rocket-salad, Arugula. Pd (NC): cultivated as a salad green, persistent around gardens or occurring as a waif; rare, native of Mediterranean Europe. [= K, Y, Z; = *E. sativa* P. Miller – C, F; < *E. vesicaria* – G; < *E. eruca* (Linnaeus) Ascherson & Graebner – S]

Erucastrum K.B. Presl 1826 (Dog-mustard)

A genus of ca. 22 species, herbs, of Africa, Europe, and Arabia. References: Rollins (1993)=Z; Luken, Thieret, & Kartesz (1993); Al-Shehbaz (1985b)=Y.

* ***Erucastrum gallicum*** (Willdenow) O.E. Schulz, Dog-mustard. Mt (NC?, SC, VA): disturbed areas; rare, native of Europe. April-September. Luken, Thieret, and Kartesz (1993) discuss the introduction and spread of *E. gallicum* in North America. While only weakly naturalized in our area, *E. gallicum* seems likely to increase in abundance. The report of *Brassica erucastrum* for NC in RAB is apparently based on material of *Coincya muralis* (Naczi & Thieret (1996). [= C, F, G, K, Y, Z]

Erysimum Linnaeus 1753 (Wallflower, Treacle Mustard)

A genus of ca. 180 species, of the Northern Hemisphere. References: Al-Shehbaz (1988d)=Y; Rollins (1993)=Z.

1 Petals 13-25 (-30) mm long, 4-11 (-13) mm wide; seeds 2-3 mm long; biennial or perennial; [native, usually in thin rocky soil] ..... ***E. capitatum var. capitatum***

1 Petals 3.5-10 mm long, < 3 mm wide; seeds ca. 1 mm long; annual or biennial; [introduced, usually in disturbed situations].

2 Sepals 2-3.5 mm long; petals 3.5-5.5 mm long; fruits 1.2-3 cm long; pedicels slender, (6-) 8-12 (-14) mm long ..... ***E. cheiranthoides***

2 Sepals 4.5-5.5 mm long; petals 6-10 mm long; fruits (3-) 5-12 cm long; pedicels thick, 2-8 mm long ..... ***E. repandum***

Erysimum capitatum (Douglas ex Hooker) E.L. Greene *var.* ***capitatum***, Western Wallflower. Mt (VA): shale barrens and shale woodlands of Alleghany and Bath counties, VA; rare (VA Rare). April-July; June-August. Rollins (1993) interprets *E. capitatum* as including five varieties, all but the typic restricted to the Great Plains and west. Though most floras (including C, F, and G) give the impression that *Erysimum* is not native east of IL, MO, and AR ("rarely adventive farther east along railroads"), this taxon is native and relictual in w. VA, as well as in ec. TN (Chester, Wofford, & Kral 1997) and e. WV (Pendleton and Grant counties). [= K, Z; = *E. asperum* var. *asperum* – C, misapplied; > *E. arkansanum* Nuttall – F; < *E. asperum* – G, misapplied; < *Cheirinia aspera* (Nuttall) Britton – S, misapplied; = *Erysimum capitatum* ssp. *capitatum* – Y]

* ***Erysimum cheiranthoides*** Linnaeus, Wormseed Mustard. Pd (VA), Mt (NC, VA), Cp (VA): disturbed areas; uncommon, native of Eurasia. June-July; July-August. [= RAB, C, F, G, K, W, Y, Z; = *Cheirinia cheiranthoides* (Linnaeus) Link – S]

* ***Erysimum repandum*** Linnaeus, Treacle Mustard, Bushy Wallflower. Cp, Pd, Mt (NC, VA): disturbed areas; uncommon, native of Eurasia. April-May; May-July. [= RAB, C, F, G, K, Y, Z; = *Cheirinia repanda* (Linnaeus) Link – S]

* *Erysimum inconspicuum* (S. Watson) MacM. var. *inconspicuum*, Shy Wallflower. South to PA and MD. Var. *coarctatum* (Fernald) Rossback is more northern. [= K, Z; < *E. inconspicuum* – C, Y; = *E. inconspicuum* – F, G] {not yet keyed}

Hesperis Linnaeus 1753 (Dame's Rocket)

A genus of ca. 25 species, herbs, of Eurasia and n. Africa. References: Al-Shehbaz (1988d)=Y; Rollins (1993)=Z.

* ***Hesperis matronalis*** Linnaeus, Dame's Rocket. Mt (NC, VA), Pd, Cp (VA), {GA}: bottomlands, roadsides, moist forests; common (uncommon in Piedmont, rare in Coastal Plain), native of Europe. April-June. The flowers are white or pink. [= RAB, C, F, G, K, S, W, Y, Z]

Iberis Linnaeus 1753 (Candytuft)

A genus of ca. 40 species, herbs, of Eurasia and n. Africa. References: Rollins (1993)=Z.

* *Iberis amara* Linnaeus, Annual Candytuft, is reported from PA, WV, and KY (Kartesz 1999). [= C, K, Z]
* *Iberis sempervirens* Linnaeus, Evergreen Candytuft, is reported for NC and TN by Kartesz (1999), but the specimens he cites are from cultivated material. [= K]

Iodanthus Torrey & A. Gray 1840 (Purple Rocket)

A monotypic genus, a perennial herb, of e. North America. References: Al-Shehbaz (1988a)=Y; Rollins (1993)=Z.

Identification notes: *Iodanthus pinnatifidus* somewhat resembles *Hesperis matronalis* in overall appearance, but differs in the following ways: petals 10-13 mm long (vs. 20-25 mm long), siliques 2-4 cm long (vs. 5-10 cm long), pubescence of the lower stem of simple trichomes (vs. branched trichomes).

Iodanthus pinnatifidus (Michaux) Steudel, Purple Rocket, is a native crucifer occurring from w. PA west to MN and IA, south through WV and e. and c. TN to AL and TX. It may occur in the westernmost parts of our area, especially in sw. VA, in rich bottomlands. [= C, F, G, K, S, Y, Z]

Isatis Linnaeus 1753 (Woad)

A genus of about 50 species, herbs, of Eurasia and n. Africa. References: Rollins (1993)=Z.

* ***Isatis tinctoria*** Linnaeus, Woad. Mt, Pd (VA): disturbed areas; uncommon, native of Eurasia. April-June. Formerly cultivated as an important source of a blue dye. [= C, F, G, K, W, Z]

Leavenworthia Torrey 1837 (Glade Cress)

A genus of 8 species, annual herbs, endemic to e. North America. References: Al-Shehbaz (1988a)=Y; Rollins (1993)=Z. Key adapted from Rollins (1993).

1 Petals entire, white, < 7 mm long; leaf lobes deeply dentate, the terminal lobe only slightly larger than the larger lateral lobes ..... ***L. uniflora***
1 Petals deeply to shallowly emarginate (notched at the tip), yellow, white, or lavender, 7-15 mm long; leaf lobes entire to shallowly dentate, the terminal lobe markedly larger than the largest lateral lobes.
2 Siliques conspicuously torulose (constricted between the seeds), even when young ..... ***[L. torulosa]***
2 Siliques not torulose (constricted between the seeds) (or slightly so in *L. stylosa*).
3 Petals 7-10 mm long, shallowly emarginate; style 1-3 mm long; siliques flat; [of AL, GA, KY, and TN].
4 Petals yellow; [of AL and TN] ..... ***[L. exigua var. lutea]***
4 Petals white to pale lavender; [of KY, TN, and nw. GA].
5 Styles 1-2 mm long; sepals pale lavender; [of TN and nw. GA] ..... ***L. exigua var. exigua***
5 Styles 2-3 mm long; sepals green; [of KY] ..... ***[L. exigua var. laciniata]***
3 Petals 10-16 mm long, deeply emarginate; styles 2.5-7 mm long; siliques thick or flat; [of AL and TN].
6 Siliques thin, flat; styles 1.5-5.5 mm long; petals white to lavender; [of n. AL].
7 Styles 2-5.5 mm long; mature siliques cuneate at the base and acute at the tip; [of Colbert, Franklin, and Lawrence counties, AL] ..... ***[L. alabamica var. alabamica]***
7 Styles 1.5-2 (-3) mm long; mature siliques rounded at the basea nd at the tip; [of Morgan County, AL] ..... ***[L. alabamica var. brachystyla]***
6 Siliques thick, fleshy; styles 2.5-7 mm long; petals yellow, white, or lavender; [of n. AL and c. TN].
8 Siliques 12-15 mm long, 3-4 mm wide; seeds slightly elongate, cleft at one side of the long axis; [of Sumner, Smith, Wilson, Davidson, Rutherford, Bedford, and Maury counties, TN] ..... ***[L. stylosa]***
8 Siliques 6-12 mm long, 4-5 mm wide; seeds orbicular, cleft at the basal end; [of Lawrence and Morgan counties, AL].
9 Siliques 6-10 mm long; styles 3-6 mm long; petals white to yellow, 10-13 mm long; [of Lawrence and Morgan counties, AL] ..... ***[L. crassa var. crassa]***
9 Siliques 8-12 mm long; styles 1.5-3.5 mm long; petals yellow, 9-11 mm long; [of Morgan County, AL] ..... ***[L. crassa var. elongata]***

Leavenworthia exigua Rollins *var.* ***exigua***, Gladecress. Mt (GA): limestone glades; rare (GA Threatened). Endemic to the Central Basin of c. TN (8 counties) (Chester, Wofford, & Kral 1997), western Highland Rim (Decatur and Perry counties), and the Ridge and Valley of nw. GA (Walker and Catoosa counties). [= K, Y, Z]

Leavenworthia uniflora (Michaux) Britton, Gladecress. Mt (GA): limestone glades; rare (GA Special Concern). Endemic to the Central Basin of c. TN (8 counties), the Ridge and Valley of e. TN (Hamilton, Meigs, Bledsoe, and Knox counties), nw. GA (Walker and Murray counties), and c. KY (15 counties). [= C, F, G, K, S, Y, Z]

Leavenworthia alabamica Rollins var. *alabamica*. Endemic to n. AL (Colbert, Franklin, and Lawrence counties). [= K, Y, Z]
Leavenworthia alabamica Rollins var. *brachystyla* Rollins. Endemic to n. AL (Morgan County). [= K, Y, Z]
Leavenworthia crassa Rollins var. *crassa*. Endemic to n. AL (Lawrence and Morgan counties). [= K, Y, Z]
Leavenworthia crassa Rollins var. *elongata* Rollins. Endemic to n. AL (Morgan County). [= K, Y, Z]
Leavenworthia exigua Rollins var. *laciniata* Rollins. Endemic to the Western Highland Rim and w. Knobs of c. KY (Bullitt and Jefferson counties). [= C, K, Y, Z]
Leavenworthia exigua Rollins var. *lutea* Rollins. Endemic to the Central Basin of n. AL (Jefferson County) and c. TN (Bedford and Maury counties) (Chester, Wofford, & Kral 1997). [= K, Y, Z]
Leavenworthia stylosa A. Gray. Endemic to the Central Basin of c. TN (Sumner, Smith, Wilson, Davidson, Rutherford, Bedford, and Maury counties) (Chester, Wofford, & Kral 1997). [= K, S, Y, Z]
Leavenworthia torulosa A. Gray. Endemic to the Central Basin of c. TN (10 counties), the Ridge and Valley of e. TN (Bradley and Meigs counties), and the Western Highland Rim of KY (Logan, Simpson, Todd, and Warren counties). [= C, F, G, K, S, Y, Z]

Lepidium Linnaeus 1753 (Pepperwort, Peppergrass, Pepperweed)

A genus of ca. 220 species, herbs, cosmopolitan. Al-Shehbaz, Mummenhof, & Appel (2002) discuss the inclusion of *Cardaria* and *Coronopus* in *Lepidium*. References: Rollins (1993)=Z; Al-Shehbaz (1986a, 1986b)=Y; Al-Shehbaz, Mummenhof, & Appel (2002)=X. Key based closely on Al-Shehbaz (1986b).

section *Lepidium*: perfoliatum, graminifolium
section *Cardamon*: sativum
section *Lepia*: campestre
section *Dileptium*: austrinum, densiflorum var. densiflorum, oblongum var. oblongum, virginicum var. virginicum
??: didymum, draba ssp. draba, ruderale, africanum, bonariense, lasiocarpum, schinzii

1Upper cauline leaves perfoliate or sagittate.
1

* ***Lepidium campestre*** (Linnaeus) R. Brown, Field Pepperwort, Cow Cress, Field Cress. Pd, Mt (GA, NC, VA), Cp (NC, SC, VA): disturbed areas; common, native of Europe. March-June. [= RAB, C, F, G, K, W, S, Y, Z; = *Neolepia campestre* (Linnaeus) W.A. Weber]
* ***Lepidium densiflorum*** Schrader *var.* ***densiflorum***, Prairie Pepperweed, Green-flowered Peppergrass. {provinces unknown} (NC, SC, VA): disturbed areas; rare, native of further west. May-June. [= K, Y, Z; < *L. densiflorum* – C, F, G, S]
* ***Lepidium didymum*** Linnaeus, Wart-cress, Lesser Swine-cress. Cp, Pd (GA, NC, SC, VA), Mt (VA): fields, roadsides, disturbed areas; common (rare in VA Mountains), native of South America. [= X; = *Coronopus didymus* (Linnaeus) Smith – RAB, C, F, G, K, Y, Z; = *Carara didyma* (Linnaeus) Britton – S]
* ***Lepidium draba*** Linnaeus *ssp.* ***draba***, Hoary Cress. Cp (VA): disturbed areas; rare, native of Eurasia. April-August. Reported for VA by Harvill et al. (1992). Al-Shehbaz (1986) discusses 2 subspecies of *L. draba* (as *Cardaria draba*). [= X; < *Cardaria draba* (Linnaeus) Desvaux – C, F, G, Z; = *Cardaria draba* ssp. *draba* – K, Y; *? Lepidium draba* Linnaeus]
* ***Lepidium perfoliatum*** Linnaeus, Perfoliate Pepperwort, Clasping Pepperweed, Shieldcress. Cp (NC), Pd (GA, NC) {SC, VA}: disturbed areas; rare, native of Europe. April-May. [= RAB, C, F, G, K, Y, Z]
* ***Lepidium ruderale*** Linnaeus, Narrowleaf Pepperwort, Stinking Pepperweed. Cp (NC, VA), Pd (VA): disturbed areas; rare, native of Europe. April-June. [= RAB, C, F, G, K, S, Y, Z]
Lepidium virginicum Linnaeus *var.* ***virginicum***, Poor Man's Pepper. Cp, Pd, Mt (GA, NC, SC, VA): disturbed areas; common. April-June (and sporadically later). *L. virginicum* var. *virginicum* is widespread in e. and c. North America; also introduced in various places elsewhere in the world. Rollins (1993) interprets *L. virginicum* as having seven additional varieties, all in western North America, Central America. [= C, G, K, Y, Z; < *L. virginicum* – RAB, F, S, W]

* *Lepidium africanum* (Burmann f.) A.P. de Candolle, African Pepperwort. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= K, Y, Z]
* *Lepidium austrinum* Small, Southern Pepperwort. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our primary area. March-June. Also reported from MS (Bryson 1991). For further information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= K, Y, Z]
* *Lepidium bonariense* Linnaeus, Argentinian Pepperwort. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= K, Y, Z]
* *Lepidium graminifolium* Linnaeus, Grassleaf Pepperwort. Introduced, especially on ballast, south to MD, PA. April-June. [= K, Y, Z]
* *Lepidium lasiocarpum* Nuttall var. *lasiocarpum*. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. March-June. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= K, Z; < *L. lasiocarpum* – Y].
* *Lepidium oblongum* Small var. *oblongum*. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= K, Z; < *L. oblongum* – Y]
* ***Lepidium sativum*** Linnaeus, Garden Cress, is reported for scattered locations in sc. and se. PA (Rhoads & Klein 1993) and VA (K based on Massey 1961). May-August. [= C, F, G, K, Z]
* *Lepidium schinzii* Thellung. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= Y, Z]
* *Lepidium squamatum* Forsskål, introduced at scattered locations in se. PA (Rhoads & Klein 1993), TN, AL, and FL (K). [= X; = *Coronopus squamatus* (Forsskål) Ascherson – C, K; *? Coronopus procumbens* Gilibert – F, G; = *Carara coronopus* (Linnaeus) Medikus – S]

Lobularia Desvaux 1815 (Sweet Alyssum)

A genus of 4 species, herbs, of Eurasia and Macaronesia. References: Rollins (1993)=Z; Al-Shehbaz (1987)=Y.

* ***Lobularia maritima*** (Linnaeus) Desvaux, Sweet Alyssum. Pd (VA), Cp (NC, VA): disturbed areas, lawns; rare, native of Europe. June-November. The NC occurrences are doubtfully established, from gardens and a "lawn." [= C, F, G, K, Y, Z]

Lunaria Linnaeus 1753 (Honesty)

A genus of 3 species, biennial herbs, of Europe. References: Rollins (1993)=Z; Al-Shehbaz (1987)=Y. Key based on Z.

1 Upper cauline leaves coarsely and irregularly dentate, the teeth acute to obtuse, sometimes with a mucro or short linear tip < 0.5 mm long; siliques broadly rounded at both ends (when mature – young siliques may be cuneate and acute); plant annual or biennial..... ***L. annua***
1 Upper cauline leaves spinulose-dentate, the teeth acuminate and usually with a linear tip > 0.5 mm long; siliques cuneate at the base, acute at the tip; plant perennial..... ***[L. rediviva]***

* ***Lunaria annua*** Linnaeus, Annual Honesty, Silver-dollar. Cp, Pd (VA), Mt (NC, VA) {GA}: escaped from cultivation around gardens, not usually persistent; rare, native of se. Europe. April-June. [= C, F, G, K, Z]

* *Lunaria rediviva* Linnaeus, Perennial Honesty. Mt (VA): cultivated ornamental, perhaps persistent around gardens; rare, native of Europe. Reported for VA by Kartesz (1999), on the basis of a specimen at VPI. April-June. [= C, F, G, K, Z]

Matthiola R. Brown 1812 (Stock)

A genus of about 50 species, herbs, mainly of Eurasia and Africa. References: Rollins (1993)=Z.

* ***Matthiola incana*** (Linnaeus) R. Brown, Stock. Cp (NC): disturbed dunes, sandy fields, vacant lots; rare, native of Europe. Reported for the Buxton area, Dare County, NC, by Burk (1961). [= K, Z]

Microthlaspi F.K. Meyer 1973 (Penny-cress)

Mummenhoff & Koch (1994) and Meyer (1973, 1979) discuss the reasons for separating *Microthlaspi* from *Thlaspi*. References: Rollins (1993)=Z; Thieret & Baird (1985)=Y; Mummenhoff & Koch (1994)=X; Al-Shehbaz (1986)=V.

* ***Microthlaspi perfoliatum*** (Linnaeus) F.K. Meyer, Perfoliate Penny-cress, Thoroughwort Penny-cress. Pd, Mt (NC, VA), Cp (VA): fields, disturbed areas; common (rare south of VA and in VA Coastal Plain), native of Europe. March-April; April-May. [= K, X; = *Thlaspi perfoliatum* Linnaeus – RAB, C, F, G, V, W, Y, Z]

Nasturtium R. Brown 1812 (Watercress)

A genus of 5 species, perennial herbs, of Eurasia, n. Africa, and North America. Al-Shehbaz & Price (1998) summarize the reasons for separating *Nasturtium* from *Rorippa*; Franzke et al. (1998) provide corroboration based on molecular analysis. References: Rollins (1993)=Z; Stuckey (1972)=Y; Green (1962)=X; Al-Shehbaz & Price (1998)=V; Al-Shehbaz (1988a)=Q; Franzke et al. (1998).

1 Petioles of emergent leaves lacking auricles toward the base; seeds yellowish-brown, finely reticulate, with 400-500 polygonal depressions on each side..... ***[N. floridanum]***
1 Petioles of emergent leaves auriculate toward the base; seeds reddish-brown, rather coarsely reticulate, with 25-150 (-175) polygonal depressions on each side.
  2 Mature siliques 1-1.5 mm wide, terete or subterete; seeds in 1 row in each locule of the silique; seeds with (75-) 100-150 (-175) polygonal depressions on each side..... ***N. microphyllum***
  2 Mature siliques (1.8-) 2-3 mm wide, flattened; seeds in 2 rows in each locule of the silique; seeds with 25-50 (-60) polygonal depressions on each side..... ***N. officinale***

* ***Nasturtium microphyllum*** Boenninghausen ex Reichenbach, Narrow-fruited Watercress. Mt (NC, VA): streams, springs; rare, native of Europe. See Green (1962) for additional information. [= V; = *Rorippa microphylla* (Boenninghausen ex Reichenbach) Hylander ex Löve & Löve – C, K, Q, X, Z; < *Nasturtium officinale* – RAB, G, W; = *Nasturtium officinale* R. Brown var. *microphyllum* (Boenninghausen ex Reichenbach) Thellung – F]

* ***Nasturtium officinale*** R. Brown, Watercress. Mt, Pd, Cp (GA, NC, SC, VA): streams, springs, seepages; common (uncommon or rare south of VA), native of Eurasia. April-July. [= GW, V; = *Rorippa nasturtium-aquaticum* (Linnaeus) Hayek

– C, K, Q, X, Z; < *Nasturtium officinale* – RAB, G, W (also see *N. microphyllum*); > *Nasturtium officinale* var. *officinale* – F; > *Nasturtium officinale* var. *siifolium* (Reichenbach) W.D.J. Koch – F; = *Sisymbrium nasturtium-aquaticum* Linnaeus – S]

Nasturtium floridanum (Al-Shehbaz & Rollins) Al-Shehbaz & R.A. Price, Florida Watercress. Endemic to FL, but north to counties adjacent to se. GA. [= V; = *Rorippa floridana* Al-Shehbaz & Rollins – K, Z; < *Nasturtium microphyllum* Boenninghausen ex Reichenbach – GW, misapplied; *Nasturtium stylosum* Shuttleworth ex O.E. Schulz] {synonymy incomplete}

Neobeckia Greene 1896 (Lake Cress)

A monotypic genus, an aquatic herb, of e. North America. References: Rollins (1993)=Z; Al-Shehbaz & Bates (1987)=Y; Les, Anderson, & Cleland (1995)=X; Al-Shehbaz (1988a)=Q.

Neobeckia aquatica (Eaton) Greene, Lake Cress. Cp (GA, VA): shallow water of swamps and lake margins; rare. VT west to MN, south to s. GA, FL, and e. TX, widely scattered and probably dispersed by waterfowl. See Al-Shehbaz & Bates (1987) and Les, Anderson, & Cleland (1995) for additional information on this interesting plant. Apparently most closely related to *Rorippa*. [= K, S, X; = *Armoracia lacustris* (A. Gray) Al-Shehbaz & V. Bates – C, Q, Y, Z; = *Armoracia aquatica* (Eaton) Wiegand – F, G, GW; = *Rorippa aquatica* (Eaton) Palmer & Steyermark; = *Rorippa americana* (A. Gray) Britton]

Orychophragmus Bunge 1833

A genus of 7 species, herbs, of s. Europe and n. Africa. References: Rollins (1993)=Z.

* ***Orychophragmus violaceus*** (Linnaeus) O.E. Schulz, Purple-mistress. Pd (VA): disturbed areas; rare, native of Mediterranean Europe. March-May. Introduced and apparently well established in and around Richmond, VA, as *Moricandia arvensis* (Rollins 1993). [>< *Moricandia arvensis* (Linnaeus) A.P. de Candolle – K, Z, misidentification]

Paysonia O'Kane & Al-Shehbaz 2002 (Bladderpod)

A genus of 8-9 species, herbs, endemic to southeastern United States. O'Kane & Al-Shehbaz (2002) clearly show that *Paysonia* is not a part of *Lesquerella*, which itself is included within *Physaria*. References: Rollins (1993)=Z; Rollins & Shaw (1973)=Y; O'Kane & Al-Shehbaz (2002)=X; Al-Shehbaz (1987)=V. Key adapted from X and Z.

1 Cauline leaves cuneate or petiolate at the base, not auriculate; flowers yellow ..... *[see **Physaria**]*
1 Cauline leaves expanded at the base, usually auriculate; flowers yellow or white.
  2 Siliques strongly compressed parallel to the plane of the septum, orbicular; valves pubescent with a mixture of large, simple, bulbous-based trichomes and smaller branched trichomes; flowers yellow ..... ***[Paysonia lescurii]***
  2 Siliques not compressed, nearly globose, subglobose, pyriform, or slightly bilobed; valves glabrous or pubescent with only a single type of trichome; flowers white or yellow.
    3 Flowers white; siliques pyriform, depressed globose, or slightly bilobed; septum (of the silique) perforate or nearly absent.
      4 Siliques glabrous or very sparsely pubescent, subpyriform; valves (of the silique) papery, densely pubescent on the interior; styles glabrous ..... ***[Paysonia perforata]***
      4 Siliques densely pubescent, depressed globose or slightly bilobed; valves (of the silique) glabrous on the interior; styles hirsute ..... ***[Paysonia stonensis]***
    3 Flowers yellow; siliques globose to subglobose; septum (of the silique) complete.
      5 Siliques densely pubescent; styles pubescent (at least near base) ..... ***[Paysonia densipila]***
      5 Siliques glabrous; styles glabrous ..... ***[Paysonia lyrata]***

Paysonia densipila (Rollins) O'Kane & Al-Shehbaz. Endemic to an area from c. TN south to n. AL. [= X; = *Lesquerella densipila* Rollins – K, V, Y, Z]

Paysonia lescurii (A. Gray) O'Kane & Al-Shehbaz. Endemic to an area from sc. KY south through c. TN to n. AL. [= X; = *Lesquerella lescurii* (A. Gray) S. Watson – K, S, V, Y, Z]

Paysonia lyrata (Rollins) O'Kane & Al-Shehbaz. Endemic to Colbert, Franklin, and Lawrence counties, AL. [= X; = *Lesquerella lyrata* Rollins – K, V, Y, Z]

Paysonia perforata (Rollins) O'Kane & Al-Shehbaz . Endemic to Rutherford and Wilson counties, TN (Chester, Wofford, & Kral 1997). [= X; = *Lesquerella perforata* Rollins – K, V, Y, Z]

Paysonia stonensis (Rollins) O'Kane & Al-Shehbaz . Endemic to Rutherford County, TN (Chester, Wofford, & Kral 1997). [= X; = *Lesquerella stonensis* Rollins – K, V, Y, Z]

Physaria (Nuttall ex Torrey & A. Gray) A. Gray

A genus of about 98 herbs, of temperate North America and South America (Al-Shehbaz & O'Kane 2002). The genus is most diverse in sw. North America. Key adapted from Rollins (1993). References: Rollins (1993)=Z; Rollins & Shaw (1973)=Y; Al-Shehbaz & O'Kane (2002)=X; Al-Shehbaz (1987)=V. Key adapted from Rollins (1993).

1 Cauline leaves expanded at the base, usually auriculate; flowers yellow or white ..... *[see **Paysonia**]*

1 Cauline leaves cuneate or petiolate at the base, not auriculate; flowers yellow.
2 Siliques (1-) 2-2.8 mm long, sparsely pubescent on the exterior; petals 3.5-6.5 (-7.5) mm long ..... *[Physaria globosa]*
2 Siliques (3.5-) 4-8 mm long, glabrous on the exterior; petals 5-8 mm long ..... ***Physaria gordonii** ssp. **gordonii***

* ***Physaria gordonii*** (A. Gray) O'Kane & Al-Shehbaz *ssp.* ***gordonii***, Gordon's Bladderpod. Mt (VA): shaly roadside; rare, native of further west. Rollins (1993) reports this species (identification unconfirmed) as a waif along the Blue Ridge Parkway, VA; it may not be established. [= X; = *Lesquerella gordonii* (A. Gray) S. Watson var. *gordonii* – Z; < *L. gordonii* – K, Y]

Physaria globosa (Desvaux) O'Kane & Al-Shehbaz. Endemic to an area from Posey County, IN and allegedly also s. OH south through c. KY to c. TN. [= X; = *Lesquerella globosa* (Desvaux) S. Watson – C, F, G, K, S, V, Y, Z] {not yet keyed}

Physaria gracilis (Hooker) S. Watson *ssp. gracilis*. TN, IL, MO, and OK south to AL, MS, LA, and TX. [= X; < *Lesquerella gracilis* – F, G; = *Lesquerella gracilis* (Hooker) S. Watson ssp. *gracilis* – K, V, Z] {not yet keyed}

Raphanus Linnaeus 1753 (Radish)

A genus of 3 species, herbs, of the Old World. References: Rollins (1993)=Z; Al-Shehbaz (1985b)=Y.

1 Siliques moniliform (contricted between the seeds), the silique body about the same diameter for most of its length, longitudinally grooved; petals usually yellow, fading white (rarely purple); seeds 4-12 per silique ..... ***R. raphanistrum***
1 Siliques not moniliform, the silique body tapered from its widest point below the middle to the apex, smooth or slightly longitudinally grooved; petals usually purple (rarely white); seeds 1-3 (-5) per silique ..... ***R. sativus***

* ***Raphanus raphanistrum*** Linnaeus, Wild Radish, Jointed Charlock, White Charlock. Cp, Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common (rare in Mountains), native of Mediterranean Europe. March-June (and sporadically later). Many European authors (such as Stace 1997) recognize several infraspecific taxa in *R. raphanistrum*; their validity (and applicability in North America) is poorly known. [= RAB, C, F, G, K, W, Y, Z]

* ***Raphanus sativus*** Linnaeus, Radish, Garden Radish. Cp, Pd, Mt (GA, NC, SC, VA): persistent after cultivation or as a "throwout"; rare, native of Mediterranean Europe. April-June. Cultivated for at least 5000 years. [= RAB, C, F, G, K, S, W, Y, Z]

Rapistrum Crantz 1769 (Bastard-cabbage)

A genus of 2 species, herbs, of Europe. References: Rollins (1993)=Z; Al-Shehbaz (1985b)=Y.

* ***Rapistrum rugosum*** (Linnaeus) Allioni *var.* ***rugosum***, Annual Bastard-cabbage. Cp (SC): waste areas around wool-combing mills; rare, native of Mediterranean Europe. Also naturalized at scattered sites in e. TN (Chester, Wofford, & Kral 1997), PA (Rhoads & Klein 1993), and elsewhere. [= G; = *R. rugosum* ssp. *rugosum* – K, Y; < *R. rugosum* – C, F, Z]

Rorippa Scopoli (Yellow Cress, Marshcress)

A genus of about 75 species, herbs, cosmopolitan. The separation of *Nasturtium* from *Rorippa* is warranted (Al-Shehbaz & Price 1998); Franzke et al. (1998) provide corroboration based on molecular analysis. References: Al-Shehbaz (1988a)=X; Rollins (1993)=Z; Stuckey (1972)=Y. [also see *Nasturtium*]

1 Plant a rhizomatous, colony-forming perennial; petals (2.0-) 2.8-6.0 mm long.
2 Stems branched at the base, decumbent to ascending; leaf sinuses not reaching the midrib, the lateral segments entire to weakly toothed; siliques 3-6× as long as wide; [section *Sinuatae*] ..... *[R. sinuata]*
2 Stems branched in the upper portions, erect; leaf sinuses reaching the midrib, the lateral segments often sharply toothed; siliques 6-15× as long as wide; [section *Rorippa*] ..... ***R. sylvestris***
1 Plant a taprooted annual or biennial; petals 1-3.5 mm long; siliques 1-9 (-10)× as long as wide; [section *Rorippa*].
3 Flowers nearly sessile; petals absent; lower fruiting pedicels 0.5-1.5 mm long; siliques (3-) 5.4-8.5 (-10.2) mm long, (1.4-) 1.8-2.6 (-3.3) mm wide, mostly 3-5× as long as wide ..... ***R. sessiliflora***
3 Flowers clearly pedicellate; petals present; lower fruiting pedicels > 4 mm long; siliques 4-20 mm long, 1-15× as long as wide.
4 Siliques (5.2-) 8.5-12.5 (-20.4) mm long, (4-) 6-9 (-10)× as long as wide; leaves deeply pinnatifid, the pinnae themselves toothed, lobed or dissected; seeds 0.4-0.5 mm long, 100-150 per silique ..... ***R. teres** var. **teres***
4 Siliques 2.5-9 mm long, 2-5× as long as wide; leaves serrate, lobed, or pinnately dissected, the pinnae (when present) merely toothed; seeds 0.5-0.9 mm long, 20-80 per silique.
5 Leaves hirsute on the lower surface; stems hirsute usually up to the terminal raceme ..... ***R. palustris** var. **hispida***
5 Leaves glabrous on the lower surface; stems glabrous or sparsely hirsute.
6 Plants mostly 4-10 dm tall, often reddish; stems thick, mostly > 3 mm in diameter; leaves thick-textured; siliques 2.5-5 mm long... ..... ***R. palustris** var. **fernaldiana***
6 Plants mostly 1-4 dm tall, often purplish; stems slender, mostly < 3 mm in diameter; leaves thin-textured; siliques 4-9 mm long..... ..... *[R. palustris var. palustris]*

Rorippa palustris (Linnaeus) Besser *var.* ***fernaldiana*** (Butters & Abbe) R. Stuckey, American Marshcress. Pd, Cp, Mt (GA, NC, SC, VA): marshes, bogs, seeps; common. May-October. ME and New Brunswick west to Saskatchewan, south to FL,

TX, ID, and n. South America. [= C, Z; < *Rorippa islandica* (Oeder) Bolbás – RAB, misapplied; = *Rorippa islandica* var. *fernaldiana* Butters & Abbe – F, G, misapplied; < *Rorippa palustris* – GW, W; = *Rorippa palustris* ssp. *fernaldiana* (Butters & Abbe) Jonsell – K, X; ? *Radicula palustris* (Linnaeus) Moench – S (in part?); = *Rorippa palustris* ssp. *glabra* (O.E. Schulz) R. Stuckey var. *fernaldiana* (Butters & Abbe) R. Stuckey – Y]

Rorippa palustris (Linnaeus) Besser *var.* ***hispida*** (Desvaux) Rydberg. Pd (VA): moist soils; rare. Labrador to AK, south to c. VA (Amelia County), IL, NE, NM, and n. CA. Al-Shehbaz (1988a) considers reports of this taxon in the Southeast to be misidentifications of var. *fernaldiana*. [= C, Z; *Rorippa islandica* (Oeder) Bolbás var. *hispida* (Desvaux) Butters & Abbe – F, G; = *Rorippa palustris* ssp. *hispida* (Desv.) Jonsell – K; = *Radicula hispida* (Desvaux) Heller – S; = *Rorippa palustris* ssp. *hispida* (Desvaux) Jonsell var. *hispida* – Y]

Rorippa sessiliflora (Nuttall ex Torrey & A. Gray) A.S. Hitchcock, Stalkless Marshcress. Cp, Pd (NC, SC, VA): wet places, marshes, swamps; rare. April-July. MD, WV (Cusick 1994), OH, IN, IL, MN, and NE south to Panhandle FL, s. AL, LA, and c. TX. [= RAB, C, F, G, GW, K, W, X, Y, Z; = *Radicula sessiliflora* (Nuttall ex Torrey & A. Gray) E.L. Greene – S]

* ***Rorippa sylvestris*** (Linnaeus) Besser, Creeping Yellow Cress. Pd (NC, VA), Mt, Cp (VA): lawns, disturbed moist to wet soils; rare, native of Eurasia. May-August. [= RAB, C, F, G, GW, K, W, X, Y, Z; = *Radicula sylvestris* (Linnaeus) Druce – S]

Rorippa teres (Michaux) R. Stuckey *var.* ***teres***. Cp (GA, NC, SC): cypress-gum ponds, marshes, swamps, ditches, disturbed wet areas; rare. March-May. Var. *teres* occurs from se. NC south to s. FL, west to se. OK, sw. TX, and s. Mexico; var. *rollinsii* R. Stuckey occurs in w. Mexico (Sinaloa). [= GW, X, Y, Z; = *Rorippa walteri* – RAB; < *Rorippa teres* – C, K; = *Radicula walteri* (Elliott) E.L. Greene – S]

* *Rorippa palustris* (Linnaeus) Besser var. *palustris*, European Marshcress. May-October. South in ne. North America to MD and DC. Var. *palustris* may be native further north (in ne. and nw. North America), but appears to be introduced in our area. [= C, Z; = *Rorippa islandica* var. *islandica* – F, G, misapplied; < *Rorippa palustris* – GW, W; = *Rorippa palustris* ssp. *palustris* – K, X; < *Radicula palustris* (Linnaeus) Moench – S; = *Rorippa palustris* ssp. *palustris* var. *palustris* – Y]

Rorippa sinuata (Nuttall) A.S. Hitchcock. Native, east to w. KY. [= C, F, G, GW, K, X, Y, Z]

Sibara E.L. Greene 1896 (Sibara)

A genus of 6 species, of North America and Mexico. References: Al-Shehbaz (1988a)=Y; Rollins (1993)=Z.

Sibara virginica (Linnaeus) Rollins, Sibara. Cp, Pd (GA, NC, SC, VA), Mt (NC): disturbed areas, fields, roadsides; common. February-June. VA west to IN and KS, south to FL and TX. A native weed, presumably much more common now than formerly. [= RAB, C, F, G, K, W, Y, Z; = *Arabis virginica* (Linnaeus) Poiret – S; = ***Planodes virginicum*** (Linnaeus) Greene]

Sinapis Linnaeus 1753 (Mustard)

A genus of 7 species, herbs, of s. Europe. References: Rollins (1993)=Z; Al-Shehbaz (1985b)=Y. Key adapted from Z and C.

1 Beak of silique strongly compressed; silique densely covered with long, stiff trichomes, ca. 4 mm in diameter; pedicels slender, mostly at right angles to the rachis; seeds 4-8 per silique; [section *Sinapis*] ..... ***S. alba***
1 Beak of silique conical; silique glabrous or nearly so, ca. 2 mm in diameter; pedicels thick, erect to spreading; seeds 7-13 per silique; [section *Ceratosinapis*] ..... ***S. arvensis***

* ***Sinapis alba*** Linnaeus, White Mustard, Yellow Mustard. Mt, Pd (NC): disturbed areas; rare, native of Mediterranean Europe. April-June. The seeds of this species are one source of table mustard; other species used include *Brassica juncea* and *B. nigra*. [= C, K, S, Y, Z; ? *Brassica hirta* – RAB, F, G]

* ***Sinapis arvensis*** Linnaeus, Charlock, Crunchweed, Wild Mustard. Pd (GA, NC, VA), Mt (NC, VA), Cp (GA, NC, SC): disturbed areas; rare, native of Mediterranean Europe. April-July. [= C, K, S, Y, Z; ? *Brassica kaber* (A.P. de Candolle) L.C. Wheeler – RAB, G; > *Brassica kaber* var. *pinnatifida* (Stokes) L.C. Wheeler – F]

Sisymbrium Linnaeus (Jim Hill Mustard)

References: Rollins (1993)=Z; Al-Shehbaz (1986b, 1988)=Y.

1 Silique linear, 5-10 cm long; spreading from the rachis; pedicels 5-20 mm long; petals 6-8 mm long ..... ***S. altissimum***
1 Silique subulate, 0.8-1.5 cm long, appressed to the rachis; pedicels 1-3 mm long; petals 3-4 mm long ..... ***S. officinale***

* ***Sisymbrium altissimum*** Linnaeus, Tumble Mustard, Jim Hill Mustard. Pd (GA, NC, SC, VA), Mt, Cp (NC, SC, VA): fields, disturbed areas; uncommon, native of Eurasia. May-June. [= RAB, C, F, G, W, Y, Z; = *Norta altissima* (Linnaeus) Britton – S]

* ***Sisymbrium officinale*** (Linnaeus) Scopoli, Hedge Mustard. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): fields, pastures, barnyards, disturbed areas; common, native of Europe. [= C, K, Y, Z; > *S. officinale* var. *leiocarpum* A.P. de Candolle – RAB, F, G, W; > *S. officinale* var. *officinale* – RAB, F, G, W; = *Erysimum officinale* Linnaeus – S]

* ***Sisymbrium irio*** Linnaeus, London-rocket. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986b). [= C, F, G, K, Y, Z]
* ***Sisymbrium loeselii*** Linnaeus. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986b). [= C, F, G, K, Y, Z]
* ***Sisymbrium turczaninowii*** Sonderegger, Russian Rocket. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986b). [= K, Y, Z]

Teesdalia Aiton f. 1812 (Shepherd's Cress)

A genus of 3 species, herbs, of Europe, n. Africa, and the Middle East. References: Rollins (1993)=Z; Appel (1998); Al-Shehbaz (1986)=Y.

* ***Teesdalia nudicaulis*** (Linnaeus) Aiton f., Shepherd's Cress, Hedge Mustard, Bank Cress. Pd, Cp (NC) {SC, VA}: lawns, fields, roadsides, disturbed areas; uncommon, native of Europe. March-April; April-June. [= RAB, C, F, G, K, Y, Z]

Thlaspi Linnaeus 1753 (Penny-cress)

A genus of about 5 species, as much more narrowly circumscribed, annual herbs native to Eurasia. Mummenhoff & Koch (1994), Meyer (1973, 1979), and Koch & Al-Shehbaz (2004) discuss the reasons for separating *Microthlaspi* from *Thlaspi*. References: Rollins (1993)=Z; Al-Shehbaz (1986)=Y. [also see *Microthlaspi*]

1 Siliques 5-8 mm long, 2-4 mm wide; seeds brown, alveolate; lower stem with scattered long hairs; fresh plant smelling of garlic when crushed; [section *Pterotropis*] ..... ***T. alliaceum***
1 Siliques (8-) 10-17 mm long, 7-12 mm wide; seeds brown, concentrically ridged; lower stem glabrous; fresh plant not smelling of garlic when crushed; [section *Thlaspi*] ..... ***T. arvense***

* ***Thlaspi alliaceum*** Linnaeus, Garlic Penny-cress. Pd (NC, VA): fields, disturbed areas, roadsides; rare, native of Europe. March-April; April-May. [= RAB, K, Y, Z]
* ***Thlaspi arvense*** Linnaeus, Field Penny-cress, Frenchweed. Pd, Mt, Cp (GA, NC, SC, VA): fields, disturbed areas; common (rare south of NC), native of Europe. March-May; April-June. [= RAB, C, F, G, K, S, W, Y, Z]

Turritis Linnaeus 1753 (Tower Mustard)

A monotypic genus, an annual or biennial herb, circumboreal. References: Rollins (1993)=Z; Al-Shehbaz (1988a)=Y; Koch, Bishop, & Mitchell-Olds (1999); Koch & Al-Shehbaz (2002).

Turritis glabra Linnaeus, Tower Mustard. Mt (NC, VA): open disturbed areas, forest edges; rare (NC Rare, VA Rare). May-June; July-August. Circumboreal, south in North America to NC, sc. TN (Chester, Wofford, & Kral 1997), AR, KS, NM, and CA. Possibly only an introduction in our area. [= *Arabis glabra* (Linnaeus) Bernhardi – RAB, C, F, G, W; > *A. glabra* var. *glabra* – Y, Z]

Warea Nuttall 1834 (Warea, Pineland-cress)

A genus of 4 annual herbs, of se. North America. The genus is endemic to se. United States, consisting of our species and two others of peninsular FL. This is the only genus of tribe *Thelypodieae* in our area. References: Rollins (1993)=Z; Al-Shehbaz (1985a)=Y; Channell & James (1964).

Identification notes: *Warea* (Brassicaceae) and *Polanisia* (Cleomaceae) are superficially similar. The genus is quite showy and conspicuous, reminiscent of a small *Cleome* because of its white to pink, clawed petals and silique borne on a long gynophore.

1 Leaves cuneate at the base; petals white to pink ..... ***W. cuneifolia***
1 Leaves rounded or slightly auriculate at the base; petals deep purple ..... ***W. sessilifolia***

Warea cuneifolia (Muhlenberg ex Nuttall) Nuttall, Carolina Warea, Carolina Pineland-cress. Cp (FL, GA, NC, SC): xeric white sands of sandhills, primarily in Sandhill Region; rare. July-September; August-September. Sc. NC south to Panhandle FL and se. AL. [= RAB, K, S, WH, Y, Z]
Warea sessilifolia Nash, Sessile-leaf Warea, Sessile-leaf Pineland-cress. Cp (FL, GA): sandhills; uncommon (rare in GA). August-September. Panhandle FL and adjacent AL and wc. GA (Stewart County) (Sorrie 1998b). [= K, S, WH, Y, Z]

BUXACEAE Dumortier 1822 (Boxwood Family)

BRASSICACEAE

A family of 5 genera and about 100 species, mainly shrubs, mainly of the Northern Hemisphere. References: von Balthazar, Endress, & Qiu (2000); Channell & Wood (1987); Köhler in Kubitzki, Bayer, & Stevens (2007).

1 Plant a woody shrub; leaves opposite, < 1 cm wide ..... ***Buxus***
1 Plant a suffrutescent herb; leaves alternate, 1.5-7 cm wide ..... ***Pachysandra***

Buxus Linnaeus 1753 (Boxwood)

A genus of about 50-90 species, shrubs, of tropical to temperate areas of Europe, Africa, West Indies, Central America, and e. Asia; Köhler in Kubitzki, Bayer, & Stevens (2007).

* ***Buxus sempervirens*** Linnaeus, Boxwood. Mt (NC, VA): persistent for decades at abandoned homesites; rare, native of Europe. Popular for hedges and landscaping; also cultivated in the Mountains for wreathing. [= K]

Pachysandra Michaux 1803 (Pachysandra)

A genus of 4-5 species, 1 of e. North America, the others of e. Asia, suffruticose herbs and shrubs. References: Robbins (1968)=Z; Köhler in Kubitzki, Bayer, & Stevens (2007).

1 Leaves subcoriaceous, semi-evergreen, pubescent, mottled (more apparently so at some seasons than others); [native plant of rich forests] ..... ***P. procumbens***
1 Leaves coriaceous, evergreen, glabrous, dark green; [cultivated alien plant, rarely persistent] ..... ***P. terminalis***

Pachysandra procumbens Michaux, Mountain Pachysandra, Allegheny-spurge. Pd (GA, NC, SC), Mt (GA): moist rich woods; rare. March-April; July-August. C. KY south to w. NC, nw. SC, w. GA, panhandle FL (Jackson County only), AL, MS, and e. LA (on loess in the Tunica Hills). The only locations for this species in NC are in Polk County, NC, which has other notable disjunctions of species which normally occur west of the Blue Ridge (*Veratrum woodii*, *Smilax lasioneura*). Channell & Wood (1987) refer to *P. procumbens* as a "nonagressive if not 'senile' species with a very low evolutionary potential." Its distribution (and, for that matter, that of the genus as a whole) appears to be relictual and to reflect a poor ability to disperse itself and colonize new territory. [= RAB, C, F, G, K, S, W, Z]

* ***Pachysandra terminalis*** Siebold & Zuccarini, Pachysandra, Japanese-spurge. Pd (NC, VA): persistent after cultivation, and spreading vegetatively to adjacent forests; commonly cultivated, rarely persistent to naturalized, native of China and Japan. This species is a popular ground-cover, difficult to eradicate once well-established. [= RAB, C, F, G, K, Z]

CABOMBACEAE A. Richard 1828 (Water-shield Family)

A family of 2 genera and about 6 species, aquatic herbs, nearly cosmopolitan. This family is closely related to the Nymphaeaceae and may be best combined with it (Angiosperm Phylogeny Group 2003). References: Wiersema in FNA (1997); Williamson & Schneider in Kubitzki, Rohwer, & Bittrich (1993); Les et al. (1999).

1 Plants with all leaves floating and peltate; plants coated with a layer of transparent, mucilaginous jelly; floating peltate leaves 3.5-11 cm long, 2-6.5 cm wide; [subfamily *Hydropeltoideae*] ..... ***Brasenia***
1 Plants with submersed leaves dichotomously divided into linear segments; plants not coated with mucilaginous material; floating peltate leaves (when present) 0.6-3.0 cm long, 0.1-0.4 wide; [subfamily *Cabomboideae*] ..... ***Cabomba***

Brasenia Schreber 1789 (Water-shield)

A monotypic genus, an aquatic herb, widely distributed in tropical and temperate regions of the Old and New World. References: Williamson & Schneider in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: The elliptic peltate leaves and mucilaginous petioles make *Brasenia* unmistakable.

Brasenia schreberi J.F. Gmelin, Water-shield, Purple Wen-dock. Cp (GA, NC, SC, VA), Pd, Mt (NC, VA): lakes, ponds, sluggish streams, floodplain oxbow ponds; common (rare in Piedmont and Mountains). June-October. Nova Scotia west to MN, south to s. FL and TX; also from British Columbia south to CA; also in tropical America and the Old World. [= RAB, C, F, FNA, G, GW, K, S, W]

Cabomba Aublet 1775 (Fanwort)

A genus of about 5 species, aquatic herbs, tropical and temperate regions of America. References: Williamson & Schneider in Kubitzki, Rohwer, & Bittrich (1993).

CABOMBACEAE

Identification notes: *Cabomba* is sometimes mistaken for other, superficially somewhat similar aquatics, such as *Ceratophyllum* (Ceratophyllaceae), *Utricularia* (Lentibulariaceae), and *Myriophyllum* (Haloragaceae). *Cabomba* has the leaves opposite (rather than whorled), dichotomously divided (like *Ceratophyllum*), but the divisions lacking the marginal denticles of *Ceratophyllum*, and on a 1-3 cm long petiole (vs. sessile or on a petiole 0-2 mm long). *Utricularia* has the leaves sometimes dichotomously divided, but the divisions are usually irregular, the leaves are alternate (in most species), and bladder traps are present. *Myriophyllum* has the leaves pectinately rather than dichotomously divided.

Cabomba caroliniana A. Gray, Fanwort. Cp (GA, NC, SC, VA), Pd (GA, NC, VA): millponds, lakes, slow-moving streams; uncommon (rare and probably only introduced in the Piedmont). May-September. NJ west to OH, s. MI, and MO, south to FL and TX; sporadically introduced elsewhere from aquarium "throw-outs." *C. caroliniana* var. *pulcherrima* R.M. Harper, with purplish flowers and vegetative parts, occurs in the southeastern Coastal Plain; it needs further evaluation. GW imply that the purple pigmentation may be merely an environmental response to warm waters, and is not correlated with morphologic characters. [= RAB, C, F, FNA, G, GW, S; > *C. caroliniana* var. *caroliniana* – K; > *C. caroliniana* var. *pulcherrima* R.M. Harper – K; > *C. pulcherrima* (R.M. Harper) Fassett]

CACTACEAE A.L. de Jussieu 1789 (Cactus Family)

A family of about 100 genera and 1500 species, herbs, shrubs, vines, and trees, of tropical, subtropical, and temperate America (a single species occurring as well in Africa, Madagascar, and Ceylon), with centers of diversity in sw. United States-Mexico, s. South America, and West Indies. References: Parfitt & Gibson in FNA (2003b); Barthlott & Hunt in Kubitzki, Rohwer, & Bittrich (1993); Anderson (2001).

Opuntia P. Miller 1754 (Prickly-pear Cactus)

A genus of about 200 species, widespread in America, from s. Canada to Patagonia. References: Pinkava in FNA (2003b); Doyle (1990)=Z; Benson (1982)=Y; Barthlott & Hunt in Kubitzki, Rohwer, & Bittrich (1993). Key based on Y and Z.

Identification notes: new joints sometimes bear reduced leaves and have not yet developed spines; look for spines 1 or 2 joints back from the growing tip.

1 Spines absent.
  2 Joints narrowly obovate, narrowly elliptic, or oblong, mostly 12-25 (-35) cm long, 7.5-10 (-20) cm broad; [of the Coastal Plain]..... ***O. stricta var. stricta***
  2 Joints orbiculate to obovate, 5-7.5 (12.5) cm long, 4-6 (-7.5) cm broad; [widespread in our area].
    3 Joints mostly 7.5-10 (-15) cm long, 5-9 (-12.5) cm broad; hypanthium with 7 or more areoles; style diameter < 3.5 mm; petals > 3 cm long; [of the Coastal Plain] ..... ***O. humifusa var. austrina***
    3 Joints mostly 5-7.5 (-12.5) cm long, 4-6.2 (-7.5) cm broad; hypanthium with 6 or fewer areoles; style diameter > 3.5 mm; petals < 3 cm long; [widespread in our area]..... ***O. humifusa var. humifusa***
1 Spines present.
  4 Spines strongly and retrorsely barbed; joints slender, (2-) 3-6 (-13) cm long, 2-5 (-7) cm broad, easily detached from the plant; spines to 3.7 cm long, 0-2 per areole (usually some areoles on a plant with 2 well-developed spines); [of coastal dunes]..... ***O. pusilla***
  4 Spines not strongly and retrorsely barbed; joints broad, 10-30 cm long, 7.5-12.5 cm broad, not easily detached from the plant; spines to 7.5 cm long, 0-2 (-12) per areole; [of various habitats, including coastal dunes].
    5 Spines (at least the larger) flattened throughout or basally, narrowly elliptic in cross-section, 0-11 per areole.
      6 Spines 1-11 per areole, 1.2-4 (-6) cm long; pads 20-30 cm long, 5-12 cm broad..... ***O. stricta var. dillenii***
      6 Spines 0 (-1 per areole only in marginal areoles), usually < 2 cm long; pads 10-30 cm long, 7-15 (-25) cm broad..... ***O. stricta var. stricta***
    5 Spines needle-like, not flattened, elliptic to circular in cross-section, 1-6 (-12) per areole.
      7 Plants not mat-forming or prostrate, rising the height of several joints, commonly 3-20 dm tall; largest joints (7.5-) 10-30 cm long, (5-) 7.5-12.5 cm broad; spines gray, reddish-brown, or yellowish-brown; fruit 5-7.5 cm long, 4-5 cm in diameter; [introduced, rarely spread or persistent from cultivation]..... ***O. monacantha***
      7 Plants low and mat-forming, usually prostrate and < 3 dm tall, the joints usually in series of 3-5; largest joints 3.8-10 cm long, 4-6 cm broad; spines white, gray, or brown; fruit 2.5-4 cm long, 2-3 cm in diameter; [native].
        8 Joints mostly 7.5-10 (-15) cm long, 5-9 (-12.5) cm broad; spines to 8 cm long; hypanthium with 7 or more areoles; style diameter < 3.5 mm; petals > 3 cm long; [of the Coastal Plain]..... ***O. humifusa var. austrina***
        8 Joints mostly 5-7.5 (-12.5) cm long, 4-6.2 (-7.5) cm broad; spines to 3 cm long; hypanthium with 6 or fewer areoles; style diameter > 3.5 mm; petals < 3 cm long; [widespread in our area]..... ***O. humifusa var. humifusa***

Opuntia humifusa (Rafinesque) Rafinesque ***var. austrina*** (Small) Dress, Southern Prickly-pear. Cp (GA, SC): dunes, shell middens, and other dry sandy soils, mostly but not entirely on barrier islands; rare. Var. *austrina* (Small) Linnaeus Benson occurs throughout FL, and at scattered locations north to se. SC and west to se. TX. A third variety, var. *ammophila* (Small) L. Benson, is apparently endemic to FL, occurring in most of the state; it might occur in the southern portion of our area. It has more elongate joints than the other two varieties, the joints with a length-to-width ratio of 2-4 (vs. 1-2) and is a more erect plant, often 3-4 joints high. [= K, Y, Z; < *O. humifusa* var. *humifusa* – FNA; = *O. cumulicola* Small – S; = *O. compressa* (Salisbury) J.F. Macbride var. *austrina* (Small) L. Benson]

Opuntia humifusa (Rafinesque) Rafinesque ***var. humifusa***, Eastern Prickly-pear. Cp, Pd, Mt (GA, NC, SC, VA): dry open places, such as in thin soil around rock outcrops, sandhill forests and woodlands, dry barrens and woodlands, barrier island dunes, dry pastures; common (uncommon in Piedmont and Mountains). May-June; August-October. The only cactus widespread in e.

North America, var. *humifusa* ranges from MA, MI, and e. IA, south to s. FL and c. TX, with some outlying stations farther west. Where growing in proximity to *O. pusilla*, the two species hybridize rather freely, sometimes producing hybrid swarms. See Doyle (1990) for discussion of the correct nomenclature for this taxon (*O. compressa* vs. *O. humifusa*). [= K, Y, Z; < *O. humifusa* var. *humifusa* – FNA; > *O. compressa* (Salisbury) J.F. Macbride var. *compressa* – G; < *O. compressa* – RAB; < *O. humifusa* (Rafinesque) Rafinesque – C, F, W; > *O. pollardii* Britton & Rose – G, S; > *O. impedita* Small – S; > *O. macrarthra* Gibbes – S; > *O. opuntia* (Linnaeus) Karten – S]

* ***Opuntia monacantha*** (Willdenow) Haworth, Common Prickly-pear. Cp (NC): frequently cultivated, rarely escaped or persistent; rare, native of n. South America. May-June; August-October. [= FNA, K; *? O. vulgaris* P. Miller – RAB, Y]

Opuntia pusilla (Haworth) Nuttall, Dune Prickly-pear, Sand-bur Prickly-pear, Little Prickly-pear, Creeping Cactus. Cp (GA, NC, SC): dunes on barrier islands; uncommon. May-June; August-October. A Southeastern Coastal Plain endemic: NC (Dare County) south to FL and west to se. TX, nearly always within a few hundred meters of the sea. As mentioned by Small (1933) and RAB, this little coastal cactus is inconspicuous and often becomes attached by its retrorsely barbed-spines to the pants or shoes of people walking through the dunes. It can inflict painful wounds, the spines not easily removed from flesh or clothing because of the retrorse barbs. *O. pusilla* sometimes forms hybrid swarms with *O. humifusa* on coastal dunes (see Y for additional discussion). [= FNA, K, Z; = *O. drummondii* Graham – RAB, S]

Opuntia stricta (Haworth) Haworth *var. **dillenii*** (Ker-Gawler) L. Benson. Cp (GA, NC?, SC): dunes on barrier islands; rare. Se. SC south to s. peninsular FL. This taxon was reported from NC by Small (1933), as *O. tunoidea* Gibbes. Benson (1982) and Doyle (1990) do not verify this distribution, showing var. *dillenii* reaching its northern limit along the coast in se. SC. [= K, Y, Z; < *O. stricta* – FNA; > *O. tunoidea* Gibbes – S]

Opuntia stricta (Haworth) Haworth *var. **stricta***. Cp (GA, NC, SC, VA?): dunes, shell middens, sandhills, dry woodlands; rare. Sc. NC (Robeson County) and c. SC south to s. peninsular FL, with a single collection from Isle of Wight County, VA, mostly near the coast. Small (1933) describes the habitat of *O. stricta* as "shell mounds, kitchenmiddens, and aboriginal village sites" and identifies it as the "the prickly-pears the early Spanish records tell us the aborigines feasted on for three months of each year and also cured, like figs, for food when out of season." [= K, Y, Z; < *O. stricta* – FNA; > *O. stricta* – S (in the narrow sense)]

Small (1933) also reports *O. cantabrigiensis* Lynch from dunes near Beaufort, NC, based on a fragmentary 1930 collection accompanied by a photograph. Similar plants were apparently seen near Beaufort by Engelmann, prior to 1856. Benson (1982) refers the collection tentatively to *O. lindheimeri* Engelmann var. *cuija* (Griffiths & Hare) L. Benson, treated in K as *O. engelmannii* Salm-Dyck var. *cuija* Griffiths & Hare, a native of Mexico. Benson (1982) also states, however, that it could also be var. *lindheimeri* (primarily of TX and Mexico), or, indeed, *O. tuna* (Linnaeus) P. Miller (native to the West Indies). Benson (1982) failed to relocate the plant in the field in 1956, but stated there was "insufficient time for a thorough search." Unless relocated (and hope is fading for that, with the extensive destruction of maritime vegetation in the vicinity of Beaufort by construction), the identity of the plant will probably remain a mystery, as well as whether it represents a native species, an established population from aboriginal use, or a more recent introduction or adventive.

CALLITRICHACEAE (Water-starwort Family) [see *PLANTAGINACEAE*]

CALYCANTHACEAE Lindley 1819 (Sweet-shrub Family)

A family of 4 genera and about 8 species, shrubs and trees, of temperate e. China, temperate e. North America, temperate w. North America, and tropical ne. Australia. References: Nicely (1965); Wood (1958); Li et al. (2004); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Calycanthus Linnaeus 1759 (Sweet-shrub, Strawberry-shrub, Carolina Allspice, Sweet Bubby-bush)

A genus of 3-4 species, 1 (or 2) of e. North America, 1 of w. North America, and 1 of China (the latter sometimes segregated as a separate genus, *Sinocalycanthus*). References: Johnson in FNA (1997); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Nicely (1965)=Z; Ferry & Ferry (1987)=Y.

1 Tepals pale yellowish-green; seeds ca. 6 mm in diameter, with short, curved hairs..... ***C. brockianus***
1 Tepals reddish brown; seeds ca. 10 mm in diameter, with long, straighter hairs.
  2 Twigs, petioles, and leaf undersurfaces pubescent..... ***C. floridus var. floridus***
  2 Twigs, petioles, and leaf undersurfaces glabrous or very sparsely pubescent..... ***C. floridus var. glaucus***

Calycanthus brockianus Ferry & Ferry, Brock Sweetshrub. Mt (GA): moist slopes; rare. Endemic to mesic hardwood forests in GA (GA Special Concern). Its taxonomic validity is uncertain and controversial. [= *C. brockiana* – K, Y, orthographic variant]

Calycanthus floridus Linnaeus *var. **floridus***, Hairy Sweet-shrub. Mt (GA, NC, SC, VA), Pd (GA, NC, SC), Cp (GA, SC, VA): forested slopes and streambanks; uncommon (rare in NC and VA) (NC Watch List, VA Rare). April-May; August-September. MD and VA south and west to GA, nw. FL, AL, and s. MS, overall more southern and at lower elevations than var. *glaucus* (though with great overlap). [= RAB, FNA, GW, K, Y, Z; = *C. floridus* – F; > *C. floridus* – S; > *C. mohrii* Small – S]

Calycanthus floridus Linnaeus *var. **glaucus*** (Willdenow) Torrey & A. Gray, Smooth Sweet-shrub. Mt, Pd (GA, NC, SC, VA), Cp (GA, NC, SC): forested slopes and streambanks; common (rare in VA) (VA Rare). March-June; July-September. PA, WV, and KY, south to GA, nw. FL, ne. AL, overall more northern and montane than var. *floridus* (though with great overlap). [=

C, FNA, K, Y; = *C. floridus* var. *laevigatus* (Willdenow) Torrey & A. Gray – RAB, GW, Z; = *C. fertilis* Walter – F, G; > *C. fertilis* – S; > *C. nanus* Loiseleur – S; > *C. floridus* var. *oblongifolius* (Nuttall) Boufford & Spongberg]

CALYCERACEAE R. Brown ex Richard 1820 (Calycera Family)

Acicarpha Antoine Laurent de Jussieu

A genus of 5 species, of tropical America. References: DeVore (1991)=Z.

* ***Acicarpha tribuloides*** Antoine Laurent de Jussieu, Madam Gorgon. Cp (FL, NC, SC): on ship's ballast near old port-cities; rare (probably no longer present), native of South America (Brazil, Uruguay, Paraguay, and Argentina). The NC and SC records were both collected by Gerald McCarthy in 1888; though the localities are not specified, the likely sites (based on his itinerary and what is known of the species) are Wilmington (New Hanover County, NC) and Charleston (Charleston County, SC). DeVore (1991) discusses ballast plants and the apparent failure of *Acicarpha* to naturalize in North America. This species has not been collected in our area (or North America) since 1888; it is here treated for historical interest and to increase the likelihood that it will be relocated, if it is, indeed, actually naturalized. [= K, S, WH, Z]

CAMPANULACEAE A.L. de Jussieu 1789 (Bellflower Family)
[also see *SPHENOCLEACEAE*]

A family of about 82 genera and 2000 species, mostly herbs, cosmopolitan. There is controversy about the circumscription of the family, specifically whether subfamily Lobelioideae should be recognized at the family level. References: Rosatti (1986)=Z; Eddie et al. (2003); Shulkina, Gaskin, & Eddie (2003).

1 Corollas bilaterally symmetrical (zygomorphic); carpels 2; [subfamily *Lobelioideae*] ..... ***Lobelia***
1 Corollas radially symmetrical (actinomorphic); carpels (2-) 3-5; [subfamily *Campanuloideae*].
  2 Capsule dehiscent laterally (the pores nearly apical in *Campanulastrum*); flowers in spikes, racemes, or panicles; [mostly native species of various habitats (some of them weedy)]; [tribe *Campanuleae*].
    3 Inflorescence spicate, the flowers sessile, mostly in the axils of well-developed leaves; corollas rotate and style straight ..... ***Triodanis***
    3 Inflorescence racemose or paniculate, the flowers pedicelled, sometimes axillary to well-developed leaves; corollas campanulate or funnelform, with a straight or curved style (*Campanula*) or rotate with a curved style (*Campanulastrum*).
      4 Corolla campanulate or funnelform; style straight or curved; small to fairly coarse perennials ..... ***Campanula***
      4 Corolla rotate; style curved; coarse annual or biennial ..... ***Campanulastrum***
  2 Capsule dehiscent apically; flowers solitary or in very diffuse panicles (*Platycodon, Wahlenbergia*), or in compact involucrate umbels (*Jasione*); [aliens, generally in weedy or disturbed situations].
    5 Flowers and fruits borne in an involucrate umbel ..... ***Jasione***
    5 Flowers and fruits solitary or in a diffuse inflorescence.
      6 Flowers large, 1 to few, solitary or nearly so; leaves large, ovate to elliptic ..... ***Platycodon***
      6 Flowers small, several to many, borne in a diffuse inflorescence; leaves small, linear to narrowly elliptic ..... ***Wahlenbergia***

Campanula Linnaeus (Bellflower)

A genus of about 300 species, herbs (rarely shrubby), north tempearte, most diverse in s. Europe. References: Rosatti (1986)=Z; Shetler & Morin (1986); Shetler (1982)=Y. [also see *Campanulastrum*]

1 Stems weak and slender, reclining, 3-angled.
  2 Corolla 4-10 mm long; pedicels divergent, the bractless portion 0.4-4 cm long; corolla white to very pale blue ..... ***C. aparinoides var. aparinoides***
  2 Corolla 5-13 mm long; pedicels ascending, the bractless portion 1-8 cm long; corolla pale blue ..... ***[C. aparinoides var. grandiflora]***
1 Stems more robust, erect, terete or nearly so.
  3 Flowers on long pedicels (generally longer than 40 mm long), the inflorescence a diffuse panicle; [native species of rock outcrops or rocky woodlands].
    4 Corolla 6-8 mm long; leaves lanceolate, averaging about 1 cm wide, generally with prominent, often somewhat divergent teeth; [section *Rapunculus*] ..... ***C. divaricata***
    4 Corolla 12-20 mm long; leaves (of the stem) linear, averaging < 5 mm wide, generally lacking teeth (or the teeth minute and obscure); [section *Campanula*, subsection *Heterophylla*] ..... ***C. rotundifolia***
  3 Flowers mostly on short pedicels (the upper < 5 mm long), the inflorescence a raceme; [alien species usually of disturbed areas].
    5 Capsules with pores in the apical half; [section *Rapunculus*, subsection *Campanulastrum*] ..... ***C. persicifolia***
    5 Capsules with pores at or near the base ..... ***C. rapunculoides***

Campanula aparinoides Pursh *var.* ***aparinoides***, Marsh Bellflower. Mt (GA, NC, VA), Pd, Cp (VA): bogs, marshes, wet meadows, seepage slopes over mafic or calcareous rocks; uncommon (rare in GA, in NC and VA Piedmont, and in VA Coastal Plain). Late June-August; August-September. Widespread in ne. North America, south to nc. GA (Jones & Coile 1988), KY, MO, and NE. [= C, G; < *C. aparinoides* – RAB, K, W, Z; = *C. aparinoides* – F, S]

Campanula divaricata Michaux, Southern Harebell, Appalachian Bellflower. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (NC): rock outcrops, cliffs, rocky summits, talus, up to at least 1850m; common (uncommon in Piedmont, rare in

Coastal Plain). July-October; September-December. A broad endemic of the Southern and Central Appalachians: MD and KY south to AL and GA. [= RAB, C, F, G, K, W, Z; = *C. flexuosa* Michaux – S]

* ***Campanula persicifolia*** Linnaeus, Peachleaf Bellflower. Mt (NC): naturalized from gardens; rare, native of Eurasia. This species was reported by Small (1933) as "escaping from gardens" in w. NC; no specimens have been seen to document this occurrence. Additional documentation is needed to confirm this record. [= RAB, K, S; = *Rapunculus persicifolius* (Linnaeus) Fournier; = *Neocodon persicifolius* (L.) A.A.Kolakovskiĭ & L.B.Serdyukova]

* ***Campanula rapunculoides*** Linnaeus, Rampion Bellflower, Rover Bellflower. Mt (NC, VA), Pd, Cp (VA): disturbed areas; rare, native of Eurasia. June-August (-October). [= RAB, C, F, G, K, S, Z]

Campanula rotundifolia Linnaeus, Bluebell, Harebell, Bluebell-of-Scotland. Mt (NC, VA): limestone outcrops, high elevation rocky summits (in thin soil over amphibolite); rare (NC Rare, NC Rare). July-August; August-September. A circumboreal species, widespread and common in n. North America and n. Eurasia, southward becoming rare, and generally limited to limestone in its occurrences in the Central Appalachians of WV and VA. It was added to the flora of NC in 1991. See Shetler (1982) for a detailed study of the species. [= C, F, G, K, Y, Z]

Campanula aparinoides var. *grandiflora* Holzinger ranges south to PA. It should be sought in our area. It has been variously treated at a species, variety, geographic phase, or form; its taxonomic status is uncertain. [= C, G; < *C. aparinoides* – K; = *C. uliginosa* Rydberg – F]

Campanula floridana S. Watson ex A. Gray, Florida Bellflower. N. FL south to s. peninsular FL. [= K, WH] {add to synonymy; add to key}

Campanulastrum Small (Tall Bellflower)

A monotypic genus, a biennial herb, distinct from *Campanula* (Shulkina, Gaskin, & Eddie 2003). As stated by Shetler & Morin (1986), "Small's view [segregating *Campanula americana* into the monotypic genus *Campanulastrum*] appears to have increasing justification from palynological, cytological, and now seed evidence." References: Rosatti (1986)=Z; Shetler & Morin (1986); Shulkina, Gaskin, & Eddie (2003).

Campanulastrum americanum (Linnaeus) Small, Tall Bellflower. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, VA): moist to fairly dry forests, especially over mafic or calcareous rocks; common (uncommon in Piedmont, rare in Coastal Plain, rare in SC). Late June-September; August-October. This coarse annual or biennial is distributed nearly throughout e. North America. [= K, S; = *Campanula americana* Linnaeus – RAB, C, F, G, W, WH, Z]

Jasione Linnaeus (Sheep's-bit)

References: Rosatti (1986)=Z.

* ***Jasione montana*** Linnaeus, Sheep's-bit. Cp (NC): disturbed areas in sandy soils; rare, native of Europe. June-September. [= C, F, G, K; > *J. montana* var. *montana* – Z]

Lobelia Linnaeus 1753 (Lobelia)

References: Rosatti (1986)=Z; McVaugh (1936)=Y; Thompson & Lammers (1997). Key based in part on Y, GW, and C.

1 Corolla bright red (faded in dried specimens) or very rarely white, 30-45 mm long ..... ***L. cardinalis***
1 Corolla blue, purple, or white, 10-33 mm long.
  2 Larger leaves in a basal rosette, elongate, either linear or linear-oblanceolate with an elongate petiole; [plants of wetlands, often growing in shallow water].
    3 Leaves linear, fleshy, and hollow; [of the northern United States, rarely south to MD, PA, and NJ]..... ***[L. dortmanna]***
    3 Leaves linear-oblanceolate, not hollow; [of the Southeastern Coastal Plain from NC (?) or GA southward and westward].
      4 Calyx segments with small auricles at the base; pedicels with very small bracteoles at the base; filament tube (6-) 7-9 (-11) mm long; corolla tube not fenestrate; larger leaves 10-30 cm long; plants (5-) 8-10 (-15) dm tall..... ***L. floridana***
      4 Calyx segments not auriculate; pedicels lacking bracteoles; filemant tube 3-4.5 mm long; corolla tube fenestrate; larger leaves 5-12 cm long; plants (4-) 5-6 (-13) dm tall..... ***L. paludosa***
  2 Larger leaves cauline; [collectively of a range of habitats].
    5 Flowers relatively large, the corolla (including the hypanthium) 18-33 mm long, fenestrate.
      6 Calyx with prominent leafy auricles; pedicels with bracteoles near the middle ..... ***L. siphilitica var. siphilitica***
      6 Calyx not auriculate; pedicels with bracteoles near the base (or sometimes near the middle in *L. puberula*).

L. amoena
L. elongata
L. georgiana

[L. brevifolia]

L. glandulosa
L. sp. 1

[L. puberula var. mineolana]
L. puberula var. puberula
L. puberula var. simulans

5 Flowers relatively small, the corolla (including the hypanthium) 7-22 mm long, not fenestrate (except XX).
15 Stem leaves very narrow, the largest on a plant 1-5 mm wide.
16 Pedicels lacking bracteoles (but with subtending bracts); plant perennial from rhizomes, the stem often spongy-thickened toward the base ..... ***L. boykinii***
16 Pedicels bearing bracteoles near the base or middle (and also with subtending bracts); stems not spongy-thickened.
17 Bracteoles borne near the middle of the pedicel; [of northern wetlands, south to WV and PA] ..... ***[L. kalmii]***
17 Bracteoles borne at the base of the pedicel; [collectively widespread in our area].
18 Lower lip of corolla pubescent inside at the base; corolla blue, lacking a white eye ..... ***L. canbyi***
18 Lower lip of the corolla glabrous; corolla blue, with a white eye ..... ***L. nuttallii***
15 Stem leaves broader, the largest on a plant > 10 mm wide.
19 Bracteoles borne near the middle of the pedicel ..... ***L. flaccidifolia***
19 Bracteoles borne at the base of the pedicel.
[L. appendiculata var. appendiculata]
[L. appendiculata var. gattingeri]
L. inflata
L. spicata var. leptostachys
L. spicata var. scaposa
L. spicata var. spicata
[L. spicata var. campanulata]

Lobelia amoena Michaux. Mt (GA, NC, SC), Pd (GA): marshes, streambanks, seeps; common. Late July-October. W. NC and e. TN south to c. GA and ec. AL. Reported for VA by Kartesz (1999), supposedly on the basis of McVaugh (1936), but McVaugh does not record *L. amoena* for VA. [= RAB, C, GW, S, Y; = *L. amoena* var. *amoena* – K; < *L. amoena* – W]

Lobelia boykinii Torrey & A. Gray ex Alphonse de Candolle. Cp (GA, NC, SC): cypress ponds and depression meadows; rare (GA Special Concern). May-July (-August). NJ south to w. Panhandle FL, s. AL, and s. MS (Sorrie & Leonard 1999). [= RAB, C, F, G, GW, K, S, Y]

Lobelia canbyi A. Gray. Cp (GA, NC, SC): pine savannas; uncommon. July-November. NJ to GA in the Coastal Plain; disjunct in Coffee County, TN, with other Coastal Plain plants. [= RAB, C, F, G, GW, K, S, Y]

Lobelia cardinalis Linnaeus, Cardinal Flower. Cp, Pd, Mt (GA, NC, SC, VA): streambanks, riverbanks, marshes, swamp forests; common. July-October. New Brunswick, Québec, Ontario, MN, CO, UT, and s. CA south to c. peninsular FL, TX, and south through Mexico and Central America to Colombia. See Thompson & Lammers (1997). [= RAB, F, G, K, S, W, Y; > *L. cardinalis* var. *cardinalis* – C; > L. *cardinalis* ssp. *cardinalis* – GW; > *L. cardinalis* ssp. *cardinalis* var. *cardinalis*]

Lobelia elongata Small. Cp (GA, NC, SC, VA): marshes, bogs, pine savannas; common. August-October. A Southeastern Coastal Plain endemic: DE to se. GA. [= C, F, G, GW, K, S, Y; < *L. elongata* – RAB]

Lobelia flaccidifolia Small. Cp (GA): depression ponds, swampy woods along rivers and streams; common. June-September. E. GA south into FL. [= GW, K, S; *? L. halei* Small – Y]

Lobelia floridana Chapman. Cp (GA, NC?): wet pine savannas and flatwoods, depression ponds; rare. Se. GA (Jones & Coile 1988), Panhandle FL west to LA; disjunct in se. NC? McVaugh (1936) reports this species for Wilmington, New Hanover County, NC, based on a collection by MacFarlane in 1909 (PENN). This record seems unlikely and needs confirmation; mislabeling is a possibility. [= GW, K, S, Y]

Lobelia georgiana McVaugh. Cp, Pd (GA, NC, SC, VA), Mt (NC): swamps, wet places; common. August-October. See McVaugh (1940) for an explanation of the need to replace the name *L. glandulifera* with *L. georgiana*. [= C, F, G, GW; < *L. elongata* – RAB; = *L. amoena* Michaux var. *glandulifera* A. Gray – K; = *L. glandulifera* (A. Gray) Small – S, Y; < *L. amoena* – W]

Lobelia glandulosa Walter. Cp (GA, NC, SC, VA?), Pd (GA, NC, SC): pine savannas, flatwoods, depression ponds; common. September-October. [= RAB, C, F, G, GW, K, S, W, Y]

Lobelia inflata Linnaeus. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): July-November. [= RAB, C, F, G, GW, K, S, W, Y]

Lobelia nuttallii J.A. Schultes. Cp (GA, NC, SC, VA), Mt (GA, NC, SC), Pd (NC, SC): May-November. [= RAB, C, F, G, GW, K, S, W, Y]

Lobelia paludosa Nuttall. Cp (GA): FL and se. GA (Jones & Coile 1988). [= F, GW, K, S, Y]

Lobelia puberula Michaux *var. **puberula***. Cp (GA, NC, SC, VA), Pd (NC, SC, VA): Late July-October. [= F, K; < *L. puberula* – RAB, C, G, GW, S, W, Y]

Lobelia puberula Michaux *var. **simulans*** Fernald. Mt, Pd (GA, NC, SC, VA), Cp (GA, VA): Late July-October. [= F, K; < *L. puberula* – RAB, C, G, GW, S, W; *L. puberula* "form a" – Y]

Lobelia siphilitica Linnaeus *var. **siphilitica***, Great Blue Lobelia. Mt (GA, NC, VA), Pd, Cp (VA): Late July-October. [= C, F, G, GW, K, Y; < *L. siphilitica* – RAB, S, W]

Lobelia sp. 1. Cp (NC, SC): seepages; rare. Endemic to the Sandhills Region of NC and SC. Under study by A. Bert Pittman. ["*L. batsonii*" in prep.]

Lobelia spicata Lamarck *var. **leptostachys*** (Alphonse de Candolle) Mackenzie & Bush. (GA, NC, SC, VA) Late May-August. [= C, F, G, K, Y; < *L. spicata* – RAB, GW, W; = *L. leptostachys* Alphonse de Candolle – S]

Lobelia spicata Lamarck *var. **scaposa*** McVaugh. (NC, SC, VA): Late May-August. [= C, F, G, K, Y; < *L. spicata* – RAB, GW, S, W]

Lobelia spicata Lamarck *var.* ***spicata***. (GA, NC, SC, VA): Late May-August. [= F, G, K; < *L. spicata* var. *spicata* – C; < *L. spicata* – RAB, GW, W; > *L. spicata* – S; > *L. bracteata* Small – S; = *L. spicata* var. *originalis* – Y]

Lobelia appendiculata Alphonse de Candolle var. *appendiculata*. AL westward to KS, OK, and TX. [= K; = *L. appendiculata* – GW, S, Y]

Lobelia appendiculata Alphonse de Candolle var. *gattingeri* (A. Gray) McVaugh. Endemic to sc. KY south through c. TN to n. AL. [= K; = *L. gattingeri* A. Gray – GW, S, Y]

Lobelia brevifolia Nuttall ex Alphonse de Candolle Savannas, flatwoods, and bogs, endemic to the East Gulf Coastal Plain of FL, AL, MS, and LA. [= GW, K, S, Y]

Lobelia dortmanna Linnaeus, Water Lobelia, south to NJ, MD, and PA (Kartesz 1999). [= C, F, G, K, Y]

Lobelia kalmii Linnaeus, south to WV and PA. [= C, F, G, K, Y]

Lobelia puberula Michaux var. *mineolana* F. Wimmer. East to AL and KY. [= K; < *L. puberula* – C, G, GW, S; = *L. puberula* "form d" – Y]

Lobelia spicata Lamarck var. *campanulata* McVaugh. South to MD, WV, PA. [= F, G, K, Y; < *L. spicata* var. *spicata* – C; < *L. spicata* – W]

Platycodon Alphonse de Candolle (Japanese Bellflower, Balloonflower)

A monotypic genus, an herb, of ne. Asia. References: Rosatti (1986)=Z.

* ***Platycodon grandiflorum*** (Jacquin) Alphonse de Candolle, Japanese Bellflower, Balloonflower. Cp, Pd (NC): ditches, disturbed areas, spread from horticultural cultivation; rare, native of e. Asia. [= RAB, K, Z]

Triodanis Rafinesque ex Greene (Venus's Looking-glass)

A genus of 8 species, annual herbs, American and s. Europe. References: McVaugh (1945)=Z; McVaugh (1948). Key based on Z.

1 Openings of the capsule linear, 0.2-0.4 mm wide; seeds minutely tuberculate in longitudinal lines ..... ***[T. holzingeri]***
1 Openings of the capsule broadly elliptic, oval, or rounded, 0.5-1.5 mm wide; seeds either muriculate over the entire surface or nearly to quite smooth.
2 Pores at or very near the apex of the capsule; seeds smooth and highly polished; open (chasmogamous) corolla usually 1 (the terminal), the others usually closed (cleistogamous) ..... ***T. biflora***
2 Pores well below the apex of the capsule (usually 1-1.5 mm below), usually about midway between apex and base; seeds muriculate or smooth and lustrous; open (chasmogamous) corollas usually several ..... ***T. perfoliata***

Triodanis biflora (Ruiz & Pavón) Greene. Cp, Pd (GA, NC, SC, VA), Mt (GA, NC, SC): roadsides, gardens, glades, disturbed areas; common (rare in Mountains). April-June. E. VA, KY, KS, AZ, and OR south to Mexico; South America. [= C, K, Z; = *Specularia biflora* (Ruiz & Pavón) Fischer & C.A. Meyer – RAB, F, G; = *T. perfoliata* var. *biflora* (Ruiz & Pavón) Bradley – W]

Triodanis perfoliata (Linnaeus) Nieuwland. Cp, Pd, Mt (GA, NC, SC, VA): roadsides, gardens, glades, disturbed areas; common. April-June. ME and British Columbia south to FL and Mexico; West Indies; Ecuador. [= C, K, Z; = *Specularia perfoliata* (Linnaeus) Alphonse de Candolle – RAB, F, G; = *T. perfoliata* var. *perfoliata* – W]

Triodanis holzingeri McVaugh, east to TN. [= K, Z; = *Specularia holzingeri* (McVaugh) Fernald – F]

Wahlenbergia Schrader ex Roth (Wahlenbergia)

References: Rosatti (1986)=Z.

* ***Wahlenbergia marginata*** (Thunberg) Alphonse de Candolle. Cp (GA, NC, SC), Pd (GA): sandy soils along roadsides and in fields; common, native of e. Asia and Oceania. Apparently only recently introduced in se. United States, the earliest recorded date 1937 in Alachua County, FL (Rosatti 1986), but now quite common on sandy roadsides. [= RAB, K, Z]

CANNABACEAE Endlicher 1827 (Hops Family)

As circumscribed to include the Celtidaceae, a family of 14 genera and about 120 species, trees, shrubs, woody vines, herbs, and herbaceous vines, of cosmopolitan distribution. Zavada & Kim (1996) discuss compelling reasons to recognize the Celtidaceae as a family distinct from the Ulmaceae. The distinctiveness of the Celtidaceae from the Cannabaceae and Moraceae is more questionable; and Sytsma et al. (2002) conclude that Celtidaceae should be considered a part of Cannabaceae. References: Small in FNA (1997); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Sherman-Broyles, Barker, & Schulz in FNA (1997); Zavada & Kim (1996); Todzia in Kubitzki, Rohwer, & Bittrich (1993); Sytsma et al. (2002).

1 Tree or shrub; leaves simple and unlobed ..... ***Celtis***
1 Herb or vine; leaves either compound or lobed.

2 Erect herb; leaves with 3-7 leaflets..... ***Cannabis***
2 Climbing or sprawling vine; leaves simple, with 1-9 lobes..... ***Humulus***

Cannabis Linnaeus 1753 (Hemp, Marijuana)

A genus of 1-3 species, herbs, originally native to c. Asia. *Cannabis* was formerly widely cultivated nearly worldwide for the fiber hemp; it is now better known as the source of the drug marijuana. References: Small in FNA (1997); Hillig & Mahlberg (2004); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

* ***Cannabis sativa*** Linnaeus, Hemp, Marijuana. Mt, Pd, Cp (GA, NC, SC, VA): disturbed areas and clandestinely cultivated plots; uncommon, native of Asia. June-October. Though perhaps not truly naturalized or persistent, *Cannabis* is treated here since clandestine cultivated plots will be encountered fairly regularly by the field biologist, especially in fairly remote areas in the mountainous parts of our area. [= F, FNA, G; > *C. sativa* Linnaeus ssp. *sativa* var. *sativa* – C, K]

Celtis Linnaeus 1753 (Hackberry)

A genus of about 100 species, trees, shrubs, and woody vines, widespread in tropical, subtropical, and temperate regions worldwide. References: Todzia in Kubitzki, Rohwer, & Bittrich (1993).

1 Branches armed with short spines..... ***[C. iguanaea]***
1 Branches unarmed.
2 Leaf blades mostly > 2× as long as wide, the tip attenuate and long-acute to long-acuminate, the base cuneate to rounded; leaf margins entire or with a few teeth on each margin; leaves glabrous or nearly so (except the margins often ciliate); [large trees, mostly of floodplains, but also in upland situations over calcareous substrates such as limestone, dolostone, and shell middens] ..... ***C. laevigata***
2 Leaf blades mostly < 2× as long as wide, the tip obtuse to short-acuminate, the base slightly to strongly cordate at least on one side; leaf margins entire or with a few teeth on each margin (the plant then a shrub or small tree of rocky places) or distinctly serrate with 10-35 teeth on each margin; leaves scabrous above, at least toward the tip; [shrubs to medium trees, of floodplains, moist slopes, and dry rocky woodlands, barrens, and glades].
3 Leaves 5-12 cm long, toothed well below the middle; fruit 7-14 mm long, ellipsoid or subglobose, dark orange, purple, or black, on a pedicel 7-25 mm long; [small to medium trees of dry to moist habitats]..... ***C. occidentalis***
3 Leaves 2-8 cm long, toothed only near the tip if at all; fruit 5-9 mm long, subglobose or essentially spherical, orange, red, or brown, on a pedicel 3-13 mm long; [shrubs or small twisted trees of dry, rocky habitats] ..... ***C. tenuifolia***

Celtis laevigata Willdenow, Southern Hackberry, Sugarberry. Cp, Pd, Mt (GA, NC, SC, VA): bottomland forests, especially on natural levees, upland calcareous forests and woodlands, shell middens; common (uncommon in the Mountains). April-May; August-October. MD, WV, IN, IL, MO and KS south to FL and TX. [= RAB, C, FNA, G, GW, W; > *C. laevigata* var. *laevigata* – F; > *C. laevigata* var. *smallii* (Beadle) Sargent – F; = *C. laevigata* var. *laevigata* – K; > *C. mississippiensis* Bosc – S; > *C. smallii* Beadle – S]

Celtis occidentalis Linnaeus, Northern Hackberry. Mt, Pd, Cp (GA, NC, VA): xeric to mesic glades, outcrops, barrens, woodlands, and bottomland forests, usually over calcareous substrate; common (rare in NC). April-May; August-October. NH, Québec, Manitoba, and MT south to FL, TX, and NM. [= C, FNA, G, K, S, W; = *C. occidentalis* var. *occidentalis* – RAB; > *C. occidentalis* var. *canina* (Rafinesque) Sargent – F; > *C. occidentalis* var. *occidentalis* – F; > *C. occidentalis* var. *pumila* (Pursh) A. Gray – F]

Celtis tenuifolia Nuttall, Dwarf Hackberry, Georgia Hackberry. Mt (GA, NC, VA), Pd, Cp (GA, NC, SC, VA): xeric to mesic glades, outcrops, barrens, woodlands, often over calcareous substrate; common (uncommon in Mountains of NC). April-May; August-October. NJ, PA, IN, IL, and KS south to FL and TX. [= C, FNA, G, K, W; = *C. occidentalis* var. *georgiana* (Small) Ahles – RAB; > *C. tenuifolia* var. *georgiana* (Small) Fernald & Schubert – F; > *C. tenuifolia* var. *tenuifolia* – F; = *C. georgiana* Small – S]

Celtis iguanaea (Jacquin) Sargent, Iguana Hackberry. Shell-middens and calcareous coastal sites. AL, Sw. peninsular FL, West Indies, American tropics. [= K; = *Momisia iguanaea* (Jacquin) Rose & Standley – S]

Humulus Linnaeus 1753 (Hops)

A genus of 2 species, herbaceous vines, of temperate regions of the Northern Hemisphere. References: Small (1978)=Z; Small in FNA (1997); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993). Key adapted from Z.

1 Veins on lower surface of leaves armed with rigid, spinulose hairs; bracts of pistillate flowers spinulose-ciliate; most leaves 5-9 lobed ..... ***H. japonicus***
1 Veins on lower surface of leaves more or less pubescent with lax, weak hairs, but lacking rigid, spinulose hairs; bracts of pistillate flowers smooth-margined; most leaves 1-3 lobed.
2 Lower surfaces of leaves (measured on middle lobe of 4-6 cm long leaves of flowering or fruiting branches) with usually with < 20 hairs per cm of length of midrib; glands (measured on leaves as above) < 25 per 10 square mm of intervein lower leaf surface; [introduced variety, sometimes showing introgression with native varieties] ..... ***H. lupulus var. lupulus***

2 Lower surfaces of leaves (measured on middle lobe of 4-6 cm long leaves of flowering or fruiting branches) usually with > 20 hairs per cm of length of midrib; glands (measured on leaves as above) > 25 per 10 square mm of intervein lower leaf surface; [native varieties, though often weedy and sometimes showing introgression with var. *lupulus*].
3 Lower surfaces of leaves (measured on middle lobe of 4-6 cm long leaves of flowering or fruiting branches) conspicuously pubescent between the veins and on the veins, with > 100 hairs per cm of length of midrib; smaller leaves unlobed (less commonly 3-lobed) ..... ***H. lupulus* var. *pubescens***
3 Lower surfaces of leaves (measured on middle lobe of 4-6 cm long leaves of flowering or fruiting branches) not conspicuously pubescent, the pubescence usually limited to the veins, usually with < 100 hairs per cm of length of midrib; smaller leaves generally 3-lobed ..... ***H. lupulus* var. *lupuloides***

* ***Humulus japonicus*** Siebold & Zuccarini, Japanese Hops. Mt (VA), Pd (GA, NC, SC, VA), Cp (NC, VA): disturbed areas, particularly in rich, alluvial soils, where it has become a serious weed along major VA rivers; common (rare in NC and SC), native of Asia, native to Japan, Taiwan, and China. June-October; July-October. [= RAB, C, F, FNA, G, K, W, Z]

Humulus lupulus Linnaeus *var.* ***lupuloides*** E. Small, Northeastern Hops. Pd, Mt (VA), Cp (NC, VA): disturbed areas, particularly in rich, alluvial soils; uncommon (rare in NC and in VA Coastal Plain) (NC Watch List). July-August; September-October. Nova Scotia and Newfoundland south to VA and NC, west to NE, MT, and Alberta. It is not clear whether its occurrence in NC is native or native of further north. The 3 varieties (two native and one introduced) in our area are subtly different, the differences apparently sometimes further obscured by introgressive hybridization. [= C, FNA, K, Z; < *H. lupulus* – RAB, F, G, S, W]

* ***Humulus lupulus*** Linnaeus *var.* ***lupulus***, Brewer's Hops, European Hops. Pd (VA): disturbed areas; rare, native of Europe. July-August; September-October. The European var. *lupulus* is (of course) one of the key ingredients of beer. [= C, FNA, K, Z; < *H. lupulus* – RAB, F, G, S, W]

Humulus lupulus Linnaeus *var.* ***pubescens*** E. Small, Midwestern Hops. Mt (GA, NC, VA), Pd (NC, VA), Cp (VA): disturbed areas, particularly in rich, alluvial soils; rare (NC Watch List). July-August; September-October. NY and PA south to NC and ne. GA and west to MN, NE, KA, and AR). It is not clear whether the few occurrences east of the Blue Ridge (including those in NC and VA) are native or adventive from further west. [= C, FNA, K, Z; < *H. lupulus* – RAB, F, G, S, W]

CAPRIFOLIACEAE A.L. de Jussieu 1789 (Honeysuckle Family)
[also see *ADOXACEAE, DIERVILLACEAE, and LINNAEACEAE*]

As here circumscribed, a family of about 5 genera and 220 species, shrubs, trees, and less typically herbs and vines, mainly north temperate and boreal. Circumscription of the family is controversial. Various segregate families (or reassignments) of taxa traditionally placed in the Caprifoliaceae have been proposed, including the transfer of *Sambucus* and *Viburnum* to the Adoxaceae, placement of *Diervilla* and *Weigela* in the Diervillaceae (Backlund & Pyck 1998), placement of *Abelia* and *Linnaea* in the Linnaeaceae (Backlund & Pyck (1998), and retention of *Lonicera, Symphoricarpos,* and *Triosteum* in a much more narrowly circumscribed Caprifoliaceae. Alternatively, all these taxa could be included in the Caprifoliaceae, along with Dipsacaceae and Valerianaceae, as a very broadly circumscribed Caprifoliaceae. References: Backlund & Pyck (1998); Ferguson (1966a).

Lonicera Linnaeus 1753 (Honeysuckle)

A genus of about 180 species, shrubs and vines, mainly north temperate. References: Ferguson (1966a)=Z; Rehder (1903)=Y; Green (1966).

1 Flowers in opposite 3-flowered cymules, borne in terminal clusters subtended by connate leaves; corolla red and yellow (or yellowish-orange only); twining vine or shrub with vining tendencies (in *L. flava* the "vininess' sometimes not apparent).
2 Corolla tube (20-) 30-50 mm long; corolla lobes 4-8 mm long, more or less radially symmetrical; [of a wide variety of habitats, primarily in the Piedmont and Coastal Plain].
3 Leaves ciliate, pubescent on the upper surface; hypanthium glandular or glabrous; stems glandular or glabrous ..... ***L. sempervirens* var. *hirsutula***
3 Leaves entire, glabrous on the upper surface; hypanthium glabrous; stems glabrous ..... ***L. sempervirens* var. *sempervirens***
2 Corolla tube 10-30 mm long; corolla lobes 8-15 mm long, unequally divided into 2 lips (4 lobes on the upper side and one lobe on the lower side); [of ridgetops, rocky slopes, granite domes, and bogs of the Mountains, or of areas to the north or west of the primary area].
4 Leaves pubescent on the upper surface; [of moist forests, south to PA] ..... ***[L. hirsuta]***
4 Leaves glabrous on the upper surface.
5 Fused leaves immediately below the inflorescence glaucous on the upper surface, rounded or emarginate; [of c. TN and other areas west and north of our primary area] ..... ***[L. reticulata]***
5 Fused leaves immediately below the inflorescence green on the upper surface, pointed to mucronate.
6 Corolla tube 30-35 mm long; leaves gray beneath; [of soil mats on dome outcrops of s. NC, SC, and GA and westward] .... ***L. flava***
6 Corolla tube 15-25 mm long; leaves strongly white-glaucous beneath; [of rocky forests, ridgetops, and bogs of n. NC, VA, and northward].
7 Hypanthium glabrous; leaves glabrous beneath; style glabrous to sparsely hairy ..... ***L. dioica* var. *dioica***
7 Hypanthium densely glandular; leaves sparsely to densely villous beneath; style hirsute ..... ***L. dioica* var. *orientalis***
1 Flowers in peduncled pairs in the axils of leaves, not subtended by connate leaves; corolla white to pastel pink or yellow; plant an erect shrub or (*L. japonica*) a trailing or climbing vine.
8 Trailing or climbing vine; corolla 30-50 mm long; fruit black at maturity; leaves of vigorous shoots often pinnately lobed ..... ***L. japonica***
8 Upright shrub; corolla 7-25 mm long; fruit red or yellow at maturity; leaves unlobed.

9 Branches with solid and continuous, white pith; [native and exotic species].
10 Corolla lobes 5, nearly equal; ovaries separate, divergent; [native species of cool moist forests and bogs]..... ***L. canadensis***
10 Corolla lobes fused into a 4-lobed lip and a 1-lobed lip; ovaries fused; [exotic species].
11 Branches glabrous; corolla glabrous on the exterior ..... ***L. fragrantissima***
11 Branches retrorsely hispid with reddish-brown hairs; corolla pilose on the exterior..... ***L. standishii***
9 Branches hollow between the nodes; with tannish pith; [exotic species, many of them seriously invasive and likely to be encountered in natural areas].
12 Peduncles shorter than or equal to the subtending petiole; leaves ovate (broadest near the base) and distinctly long-acuminate..... ***L. maackii***
12 Peduncles longer than the subtending petiole; leaves elongate (broadest near the middle) and obtuse to acute (rarely short-acuminate).
13 Leaves glabrous; peduncles 15-25 mm long..... ***L. tatarica***
13 Leaves pubescent, at least on the lower surface; peduncles 5-15 mm long.
14 Corolla pink (aging to yellow), nearly glabrous on the exterior, barely bulging on one side at the base; leaves thinly pubescent beneath..... ***L. ×bella***
14 Corolla white (aging to yellow), pubescent on the exterior, distinctly bulging on one side at the base; leaves rather densely grayish-pubescent beneath.
15 Bracts and sepals ciliate, not glandular; ovary lacking glands; leaf blades broadest at or below the middle ..... ***L. morrowii***
15 Bracts and sepals glandular; ovary glandular; leaf blades broadest beyond the middle..... ***L. xylosteum***

* ***Lonicera ×bella*** Zabel [*L. morrowii* × *tatarica*], Pretty Honeysuckle. Pd (NC, SC): forests, woodlands, fencerows, suburban woodlands; uncommon, native of Eurasia. April-May. [= RAB, C, F, K, Z; = *L. bella* – G; = *L. tatarica* × *morrowii* – Y]

Lonicera canadensis Bartram ex Marshall, American Fly-honeysuckle. Mt (GA, NC, VA): shrubby mountain bogs at high elevations, bouldery northern hardwood forests, hemlock and spruce swamps; rare (GA Special Concern). May-June; June-July. South Nova Scotia to Saskatchewan, south to PA, w. NC, n. GA, OH, IN, and MN. [= RAB, C, F, G, K, W, Y, Z; = *Xylosteon ciliatum* Pursh – S]

Lonicera dioica Linnaeus *var.* ***dioica***. Mt (GA, NC, VA): shrubby mountain bogs at high elevations; rare (GA Special Concern}. June-August; August-September. MA and Québec west to WI, south to NJ, NC, and IN. [= C, F, G, Z; < *L. dioica* – RAB, K, W; = *L. dioica* – S, Y]

Lonicera dioica Linnaeus *var.* ***orientalis*** Gleason. Mt (NC, VA): seepages; rare. June-August; August-September. S. Ontario west to s. MI, south to w. VA and w. NC. [= C, G; < *L. dioica* – RAB, K, W; < *L. dioica* var. *glaucescens* (Rydberg) Butters – F, Z; = *L. glaucescens* (Rydberg) Rydberg – S, Y]

Lonicera flava Sims, Yellow Honeysuckle. Mt (GA, NC, SC), Pd (GA): in soil mats around granitic domes; uncommon. April-May; July-August. W. NC, KY, and MO, south to GA and AR. [= RAB, C, G, K, W, Y; > *L. flava* – F, S, in a narrower sense; > *L. flavida* Cockerell ex Rehder – F, S; > *L. flava* var. *flava* – Z; > *L. flava* var. *flavescens* Gleason – Z]

* ***Lonicera fragrantissima*** Lindley & Paxton, Sweet-breath-of-spring. Pd (GA, NC, VA), Cp, Mt (VA), {SC}: forests, woodlands, old house sites; common and invasive, native of China. February-early April; April-May. [= RAB, K, Y, Z; = *Xylosteon fragrantissimum* (Lindley & Paxton) Small – S]

* ***Lonicera japonica*** Thunberg, Japanese Honeysuckle. Cp, Pd, Mt (GA, NC, SC, VA): nearly ubiquitous, especially common in the Piedmont and Coastal Plain and in mesic habitats; common, native of e. Asia. April-June; August-October. Schweitzer & Larson (1999) report on physiological characteristics that make *L. japonica* a successful invasive species. [= RAB, C, G, GW, K, W, Z; > *L. japonica* var. *chinensis* (P.W. Watson) Baker – F, Y; > *L. japonica* var. *japonica* – F, Y; = *Nintooa japonica* (Thunberg) Sweet – S]

* ***Lonicera maackii*** (Ruprecht) Maximowicz, Amur Honeysuckle. Pd (GA, NC, SC, VA), Cp (NC, VA), Mt (GA, VA): suburban woodlands, moist forests, fencerows; locally common, native of e. Asia (Korea, China, Japan). May-June. Aggressively invasive in the vicinity of DC. [= C, K, Y, Z]

* ***Lonicera morrowii*** A. Gray, Morrow's Honeysuckle. Mt (NC, SC, VA), Pd, Cp (VA): forests, woodlands, old house sites, suburban woodlands; common, native of Japan. April. Seriously invasive in WV, MD, DC, and northward; first reported for NC by Leonard (1971b) and for SC by Hill & Horn (1997). [= C, K, W, Y; = *L. morrowi* – F, G, orthographic variant]

Lonicera sempervirens Linnaeus *var.* ***hirsutula*** Rehder, Coral Honeysuckle. Pd (NC, VA), Mt (NC): {habitat}; rare. VA and NC southwest to AL. [= C, F, G, K, Y; < *L. sempervirens* – RAB, GW, W, Z; < *Phenianthus sempervirens* (Linnaeus) Rafinesque – S]

Lonicera sempervirens Linnaeus *var.* ***sempervirens***, Coral Honeysuckle. Cp, Pd, Mt (GA, NC, SC, VA): dry forests and woodlands, maritime forests; common. March-July (and sporadically to November); July-September. CT to OK, south to FL and TX; and more widely distributed as an escape from cultivation. [= C, G, K, Y; < *L. sempervirens* – RAB, GW, W, Z; > *L. sempervirens* var. *sempervirens* – F; > *L. sempervirens* var. *minor* Aiton – F; < *Phenianthus sempervirens* (Linnaeus) Rafinesque – S]

* ***Lonicera standishii*** Jacques, Standish's Honeysuckle. Pd (NC): forests, woodlands, old home sites; rare but locally abundant, native of China. Invasive in c. NC (Uwharrie National Forest, Montgomery County, NC). Also reported from KY (Jones 2005), se. PA (Rhoads & Klein 1993), and MD (Kartesz 1999). [= F, K, Y]

* ***Lonicera tatarica*** Linnaeus, Tartarian Honeysuckle. Pd, Cp, Mt (VA): disturbed forests; uncommon, native of Central Asia. [= C, F, G, K; > *L. tatarica* var. *tatarica* – Y]

* ***Lonicera xylosteum*** Linnaeus, European Fly-honeysuckle. Mt (VA): disturbed forests; uncommon, native of Europe and Asia. Establishing mainly in ne. United States, south to VA, MD (Kartesz 1999), and KY (Clark et al. 2005). [= C, F, G, K; > *L. xylosteum* var. *xylosteum* – Y]

Lonicera hirsuta Eaton, Hairy Honeysuckle. Québec west to Manitoba, south to c. PA (Rhoads & Klein 1993) and MN. [= F, K, Y; > *L. hirsuta* var. *interior* Gleason – C]

* *Lonicera* ×*minutiflora* Zabel [of complex hybrid origin, apparently involving *L. morrowii, L. tatarica,* and *L. xylosteum*]. Suburban areas, disturbed areas. Known from KY and other states in e. North America (Clark et al. 2005). [= K] {not keyed}

Lonicera reticulata Rafinesque. NY west to WI, south to TN and AR. In nc. TN (Davidson County) (Chester, Wofford, & Kral 1997; Wofford & Chester 2002). [= K; > *L. prolifera* (G. Kirchner) Booth ex Rehder var. *prolifera* – C, G; = *L. sullivantii* A. Gray – Y; = *L. prolifera* – F, Z]

Symphoricarpos Duhamel (Snowberry, Coralberry)

A genus of about 17 species, shrubs, of North America and e. Asia. References: Jones (1940); Ferguson (1966a)=Z.

1 Corolla 2-4 mm long; fruits pink to purple ..... ***S. orbiculatus***
1 Corolla 5-9 mm long; fruits white.
  2 Fruit 6-10 (-12) mm in diameter; young twigs puberulent; leaves usually pubescent beneath; shrub usually < 1 m tall; [native] ..... ***S. albus var. albus***
  2 Fruit 12-20 mm in diameter; young twigs glabrous; leaves usually glabrous beneath; shrub usually 1-2 m tall; [introduced] ..... ***S. albus var. laevigatus***

Symphoricarpos albus (Linnaeus) Blake *var.* ***albus***, Common Snowberry. Mt (VA): limestone woodlands; rare (VA Rare). Québec west to s. AK, south to w. VA, WV, MI, MN, and CA. Var. *albus* is the more eastern variety. [= C, F, G, K, Z; < *S. albus* – RAB, S, W]

* ***Symphoricarpos albus*** (Linnaeus) Blake *var.* ***laevigatus*** (Fernald) Blake, Pacific Snowberry. Pd (NC, VA?): disturbed areas; rare, native of w. North America. [= C, F, G, K, Z; < *S. albus* – RAB, S, W; *? S. rivularis* Suksdorf]

Symphoricarpos orbiculatus Moench, Coralberry. Mt, Pd (GA, NC, SC, VA), Cp (NC, VA): moist to dry forests, woodlands, thickets, pastures, and old fields, especially over mafic or calcareous rocks; common. Late July-September; September-November (and often persisting well into winter). CT west to IN, MN, and CO, south to FL, TX, and Mexico. Seemingly increasing in VA and behaving aggressively in dry woodlands and barrens over greenstone and diabase. [= RAB, C, F, G, K, W, Z; = *S. symphoricarpos* (Linnaeus) MacM. – S]

Symphoricarpos occidentalis Hooker, Western Snowberry, in PA, MD, KY. {investigate} [= K] {not yet keyed}

Triosteum Linnaeus (Horse-gentian, Feverwort)

A genus of 6 species, rather woody herbs, of e. Asia (3 species) and e. North America (3 species); the 3 North American species form one clade, the 3 Asian species another (Gould & Donoghue 2000). References: Gould & Donoghue (2000); Ferguson (1966a)=Z.

1 Longer (nonglandular) hairs of the stem 1.5-3 mm long; corolla greenish-yellow; leaves 1.5-6 cm wide.
  2 Lower leaf surface glabrous or pubescent only along the main veins; leaves averaging 4× as long as wide ..... ***T. angustifolium var. angustifolium***
  2 Lower leaf surface densely puberulent; leaves averaging 2× as long as wide ..... ***T. angustifolium var. eamesii***
1 Longer (nonglandular) hairs of the stem 0-1.5 mm long (or with a very few longer hairs); leaves 4-15 cm wide; corolla greenish-yellow to purple.
  3 Most the stem hairs 1-2 mm long, mostly not gland-tipped; leaves predominantly not connate (or if 1-3 pairs connate, then only 1-2 cm wide at the joined base); style equalling or slightly shorter than the corolla (rarely exserted) ..... ***T. aurantiacum var. aurantiacum***
  3 Most the stem hairs 0-0.5 mm long (sometimes with a few scattered longer hairs), gland-tipped; leaves predominantly connate-perfoliate, the joined base 3-9 cm wide); style exserted beyond the corolla ..... ***T. perfoliatum***

Triosteum angustifolium Linnaeus *var.* ***angustifolium***, Smooth Lesser Horse-gentian. {Pd (NC, VA), Mt (GA, VA): distributional and habitat information needed for two varieties} (GA Rare). April-May; July-August. CT west to Ontario and MO, south to NC, nw. GA (Jones & Coile 1988), AL, and LA. [= C, F, G; < *T. angustifolium* – RAB, K, S, W, Z]

Triosteum angustifolium Linnaeus *var.* ***eamesii*** Wiegand, Hairy Lesser Horse-gentian. {Pd (NC, VA), Mt (VA): distributional and habitat information needed for two varieties}. April-May; July-August. CT and NJ south to NC. [= C, F, G; < *T. angustifolium* – RAB, K, S, W, Z]

Triosteum aurantiacum Bicknell *var.* ***aurantiacum***. Mt (GA?, NC, SC, VA), Pd (NC, VA): woodlands and forests in circumneutral soils, particularly those over mafic or calcareous rocks; uncommon (GA Rare, NC Watch List). Late May-early June; August-October. Québec west to MN, south to GA, KY, and OK; other varieties are more restricted and midwestern or northern in distribution. [= C, F, K; < *T. aurantiacum* – RAB, S, W, Z; < *T. perfoliatum* Linnaeus var. *aurantiacum* (Bicknell) Wiegand – G]

Triosteum perfoliatum Linnaeus, Perfoliate Horse-gentian. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): woodlands and forests in circumneutral soils, particularly those over mafic or calcareous rocks; uncommon. Late May-early June; August-October. MA west to MN, south to n. SC, n. GA (Jones & Coile 1988), and OK. [= RAB, C, F, K, S, W, Z; = *T. perfoliatum* var. *perfoliatum* – G]

MONOCOTYLEDONS

CARYOPHYLLACEAE A.L. de Jussieu 1789 (Pink Family)

A family of about 86 genera and 2200-3000 species, herbs, shrubs, and trees, nearly cosmopolitan, but mostly Northern Hemisphere. References: Rabeler & Hartman in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

1 Stipules present and readily apparent, scarious or hyaline.
  2 Fruit a utricle; seed 1 per fruit; petals absent; [subfamily *Paronychioideae*] ..... **Key A**
  2 Fruit a capsule; seeds 3-many per fruit; petals present; [subfamily *Polycarpoideae*] ..... **Key B**
1 Stipules absent.
  3 Sepals fused into a toothed or lobed tube; [subfamily *Caryophylloideae*] ..... **Key C**
  3 Sepals distinct, or slightly fused at their bases; [subfamily *Alsinoideae*] ..... **Key D**

Key A – *Paronychioideae*

1 Leaves alternate; staminodes petaloid, ovate to oblong ..... *[Corrigiola]*
1 Leaves opposite (or the uppermost alternate in *Herniaria*); staminodes not petaloid, subulate.
  2 Stipules inconspicuous; sepals green-margined, obtuse, lacking awns ..... *[Herniaria]*
  2 Stipules usually conspicuous; sepals white-scarious-margined, hooded or awned ..... *Paronychia*

Key B – *Polycarpoideae*

1 Stem leaves subulate, 1-2 mm long, pectinate-fringed at the base; basal rosette leaves spatulate (usually withering quickly after overwintering; stems wiry, stiff, subdichotomously branched; [of xeric sands on the Coastal Plain from se. VA southward] ..... *Stipulicida*
1 Stem leaves larger, mostly both longer and broader, not pectinate-fringed at the base; basal rosette present or absent; stems either thicker, more flexuous, or not subdichotomously branched; [collectively more widespread].
  2 Leaves appearing verticillate, 10-16 per node, filiform to linear ..... *Spergula*
  2 Leaves opposite or in whorls of 4, linear to ovate or spatulate.
    3 Leaves mostly in whorls of 4, obovate-spatulate, 2-8 mm long ..... *Polycarpon*
    3 Leaves opposite, linear or orbicular, 5-40 mm long.
      4 Leaves orbicular-ovate; styles partly united ..... *Drymaria*
      4 Leaves linear; styles separate ..... *Spergularia*

Key C – *Caryophylloideae*

1 Calyx immediately subtended by 1-3 pairs of bracts.
  2 Calyx 20-40-nerved ..... *Dianthus*
  2 Calyx 15-nerved ..... *Petrorhagia*
1 Calyx lacking subtending bracts.
  3 Sepals 25-62 mm long; calyx lobes longer than the calyx tube, the lobes as long as or longer than the corolla lobes ..... *Agrostemma*
  3 Sepals (1-) 10-28 (-40) mm long; calyx lobes shorter than the calyx tube, the lobes much shorter than the corolla lobes (except *Gypsophila*).
    4 Styles 3-5 (or 0 in staminate plants); fruit valves 3, 4, 5, 6, 8, or 10; petals generally appendaged ..... *Silene*
    4 Styles 2; fruit valves 4; petals appendaged or not.
      5 Sepals 1-5 mm long, the commissures between the sepals scarious ..... *Gypsophila*
      5 Sepals 7-25 mm long, lacking commissures.
        6 Calyx tubular, 20-nerved; petals appendaged; perennial ..... *Saponaria*
        6 Calyx ovoid, 5-nerved; petals not appendaged; annual ..... *Vaccaria*

Key D – *Alsinoideae*

1 Petals absent; fruit a 1-seeded, indehiscent utricle; styles 2 ..... *Scleranthus*
1 Petals present (rarely obsolete or essentially absent); fruit a few-many seeded capsule; styles 3-5.
  2 Leaves fleshy; seeds > 3 mm long; [of seabeaches and dunes] ..... *Honckenya*
  2 Leaves membranaceous or stiff; seeds < 2 mm long; [of various habitats].
    3 Styles 4-5.
      4 Leaves linear-subulate, < 2 mm wide; styles 4-5.
        5 Valves or teeth of the capsule twice as many as the styles ..... *Moenchia*
        5 Valves or teeth of the capsule as many as the styles ..... *Sagina*
      4 Leaves ovate, obovate, > 4 mm wide; styles 5.
        6 Capsule cylindric, dehiscent by 10 apical teeth ..... *Cerastium*
        6 Capsule ovoid, dehiscent by 5 valves, each apically 2-cleft ..... *Myosoton*
    3 Styles 3.
      7 Inflorescence umbelliform; petals irregularly denticulate at apex ..... *Holosteum*
      7 Inflorescence cymose or racemiform; petals entire, notched, or deeply cleft.
        8 Petals shallowly to deeply 2-cleft, notched at least 1/4 of the length, often divided nearly to the base and then appearing almost as 10 petals.
          9 Capsule cylindrical, twice as long as the sepals ..... *Cerastium*

9 Capsule spherical or ellipsoid, as long as or slightly longer than the sepals ..... ***Stellaria***
8 Petals entire, or emarginate.
10 Valves or teeth of the capsule as many as the styles ..... ***Minuartia***
10 Valves or teeth of the capsule twice as many as the styles.
11 Seeds with an aril ..... ***Moehringia***
11 Seeds lacking an aril.
12 Capsule straight; petals entire or barely emarginated ..... ***Arenaria***
12 Capsule cylindrical, and often somewhat curved; petals emarginate to bifid ..... ***Cerastium***

Agrostemma Linnaeus 1753 (Corncockle)

A genus of 2 species, herbs, of temperate Eurasia. References: Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Agrostemma githago*** Linnaeus *var.* ***githago***, Corncockle, Purple Cockle, Corn-campion. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, disturbed areas; common (rare in FL), native of Europe. May-July. [= FNA; < *A. githago* – RAB, C, F, G, K, S, W, WH]

Arenaria Linnaeus 1753 (Sandwort)

A genus of about 150-210 species, herbs, of temperate and subarctic regions of the Northern Hemisphere, extending southward to the montane tropics of South America and Africa. References: Hartman, Rabeler, & Utech in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993). [also see *Minuartia*]

1 Leaves lanceolate to oblanceolate, (7-) 15-32 mm long, 2-8 (-14) mm wide; perennial, stems to 8 dm long ..... ***A. lanuginosa*** *var.* ***lanuginosa***
1 Leaves ovate, 3-8 mm long, 1-4 mm wide; annual, stems to 3 dm long.
2 Seeds 0.4-0.5 mm long; fruiting calyx 2-3 mm long ..... ***A. leptoclados***
2 Seeds ca. 0.6 mm long; fruiting calyx 3-4 mm long ..... ***A. serpyllifolia***

Arenaria lanuginosa (Michaux) Rohrbach *var.* ***lanuginosa***, Spreading Sandwort. Cp (FL, GA, NC, SC, VA): dunes, maritime forests, coquina limestone outcrops; common (uncommon in GA and SC, rare in NC and VA). May-July. Se. VA south to c. peninsular FL, west to TX, AR, and Mexico, and north in the interior to sc. TN (Chester, Wofford, & Kral 1997). [= C, FNA; < *A. lanuginosa* – RAB, F, S, WH; = *A. lanuginosa* ssp. *lanuginosa* – G; > *A. lanuginosa* ssp. *lanuginosa* var. *lanuginosa* – K; > *A. lanuginosa* ssp. *lanuginosa* var. *longepedunculata* Duncan – K; *Spergulastrum lanuginosum* Michaux ssp. *lanuginosum*]

* ***Arenaria leptoclados*** (Reichenbach) Gussone, Small Thyme-leaved Sandwort, Slender Sandwort. Cp (FL), {GA, NC, SC, VA}; rare in FL, native of Eurasia. The relative ranges, habitats, and abundance of the *A. leptoclados* and *A. serpyllifolia* are poorly known {additional herbarium work}. March-June. [= S; < *A. serpyllifolia* – RAB, K, W; = *A. serpyllifolia* Linnaeus var. *tenuior* Mertens & W.D. J. Koch – C, F, FNA, G; = *A. serpyllifolia* Linnaeus ssp. *leptoclados* (Reichenbach) Nyman – WH]

* ***Arenaria serpyllifolia*** Linnaeus, Large Thyme-leaved Sandwort. Cp (FL), {GA, NC, SC, VA}; uncommon in FL. The relative ranges, habitats, and abundance of this and *A. leptoclados* are poorly known. March-June. [= S; < *A. serpyllifolia* – RAB, K, W; = *A. serpyllifolia* var. *serpyllifolia* – C, F, FNA, G; = *A. serpyllifolia* ssp. *serpyllifolia* – WH]

Cerastium Linnaeus 1753 (Mouse-ear Chickweed, Mouse-ear)

A genus of about 100 species, herbs, especially north temperate but nearly cosmopolitan. References: Morton in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993); Rabeler & Thieret (1988); Scheen et al. (2004). Key based in part on FNA.

1 Petals 10-18 mm long, 2-3× as long as the sepals; leaves 2-7 cm long; plants perennial, typically with some shoots not flowering.
2 Leaf blades narrowly to broadly linear, acute or short-acuminate at tip, tapered to base; stems erect nearly whole length
3 Plants strongly rhizomatous with long-creeping shoots, lacking taproot; flowering stems usually 25-30 cm long; stem pubescence eglandular (glandular hairs present in the inflorescence only); sepals 5-7 mm long; anthers 1.0-1.1 mm long; petals often turning brown when dry; [alien] ..... ***[C. arvense ssp. arvense]***
3 Plants clumped, with taproots or shortly rhizomatous; flowering stems usually 5-20 cm long; stem pubescence glandular; sepals 3.5-6 (-7) mm long; anthers 0.8-0.9 mm long; petals usually remaining white when dried; [native] ..... ***[C. arvense ssp. strictum]***
2 Leaf blades narrowly lanceolate to narrowly ovate, obtuse to acute at tip, more-or-less rounded at base; stems spreading or decumbent basally, ascending-erect distally.
4 Leaf blades narrowly lanceolate, obtuse to acute, well-spaced on stem, moderately to densely pubescent with dull hairs but may be glabrate in age; plants forming small clumps ..... ***C. velutinum*** *var.* ***velutinum***
4 Leaf blades narrowly ovate, obtuse and blunt at tip, tightly spaced on stem, very densely pubescent with silvery or translucent-white permanent hairs; plants form clumps to several dm wide; [endemic to serpentine in PA and MD] ..... ***[C. velutinum*** *var.* ***villosissimum]***
1 Petals 3-8 mm long, shorter than, equalling, or up to 1.5× as long as the sepals; leaves 0.5-3.0 cm long (to 8 cm long in *C. nutans* and *C. brachypodum*); plants annual, with all shoots producing flowers (except *C. fontanum* ssp. *vulgare*).
5 Perennial, matted at the base and rooting at the nodes ..... ***C. fontanum ssp. vulgare***
5 Annual, taprooted.
6 Sepals with long, appressed, eglandular hairs extending beyond the tip of the sepal.
7 Inflorescence an open cyme, most of the pedicels longer than the sepals ..... ***C. brachypetalum***

7 Inflorescence a compact, cymose cluster, most of the pedicels shorter than the sepals ..... ***C. glomeratum***
6 Sepals lacking long, appressed, eglandular hairs.
8 Styles, sepals, and petals 3-4 (-5); capsule teeth 6-8 (-10).
9 Styles, sepals, and petals 4 (-5); capsule teeth 8 (-10); capsules ca. 1.5 × as long as the sepals; cauline leaves 2-3 × as long as wide ..... ***[C. diffusum]***
9 Styles, sepals, and petals 3 (-4); capsule teeth 6 (-8); capsules ca. 2 × as long as the sepals; cauline leaves 8-10 × as long as wide... ..... ***C. dubium***
8 Styles, sepals, and petals 5; capsule teeth 10.
10 Bracts of the inflorescence with distinctly scarious margins; leaves mostly 0.5-1.0- (-1.5) cm long.
11 Petals equalling or surpassing the sepals; cleft in petal apex 1.0-1.5 mm deep ..... ***C. pumilum***
11 Petals shorter than the sepals; cleft in petal apex 0.2-0.5 (-0.9) mm deep ..... ***C. semidecandrum***
10 Bracts of the inflorescence with green margins; leaves mostly (1.0-) 1.5-8 cm long.
12 Pedicels 3-10 (-15) mm long; leaves to 3.5 cm long ..... ***C. brachypodum***
12 Pedicels (10-) 15-40 (-55) mm long; leaves to 8 cm long ..... ***C. nutans***

* ***Cerastium brachypetalum*** Desportes, Gray Mouse-ear. Mt (NC, SC), Pd (NC, SC, VA), Cp (NC, VA): roadsides, disturbed areas; common (rare in SC), native of Europe. April-June. The reports of *C. tetrandrum* for e. VA in F and G are actually this species. [= RAB, C, F, FNA, G, W; > *C. brachypetalum* ssp. *brachypetalum* – K; >< *C. tetrandrum* W. Curtis – F, G, misidentified]

Cerastium brachypodum (Engelmann ex A. Gray) B.L. Robinson. Mt (NC, VA), Pd (SC, VA), Cp (VA): disturbed areas, roadsides; rare. April-May. IL west to Alberta and OR, south to NC, nc. GA (Jones & Coile 1988), and AZ. This taxon is perhaps only introduced in our area from further west. [= F, FNA, K, S; = *C. nutans* Rafinesque var. *brachypodum* Engelmann ex A. Gray – RAB, G, W; < *C. nutans* – C]

* ***Cerastium dubium*** (Bastard) Guépin. Cp (VA): disturbed areas; rare, native of s. Europe and Asia. Introduced in scattered states in the United States, including VA, KY, TN, MS (FNA). First reported for VA by Belden et al. (2004). [= C, FNA, K]

* ***Cerastium fontanum*** Baumgartner *ssp.* ***vulgare*** (Hartman) Greuter & Burdet; Common Mouse-ear. Mt, Pd (NC, SC, VA), Cp (FL, NC, SC, VA): fields, disturbed areas; common (rare in FL), native of Europe. March-June. [= FNA, K, WH; = *C. holosteoides* Fries var. *vulgare* (Hartman) Hylander – RAB; = *C. vulgatum* Linnaeus – C, S; > *C. vulgatum* var. *vulgatum* – F, G; > *C. vulgatum* var. *holosteoides* (Fries) Wahlenberg – F, G; > *C. vulgatum* var. *hirsutum* Fries – G; *?* *C. fontanum* ssp. *triviale* (Link) Jalas – W]

* ***Cerastium glomeratum*** Thuillier, Sticky Mouse-ear. Cp (FL, NC, SC, VA), Pd, Mt (NC, SC, VA): fields, disturbed areas; common, native of Europe. March-May. [= RAB, FNA, K, W, WH; = *C. viscosum* Linnaeus – C, F, G, S, an ambiguous name, of uncertain application]

Cerastium nutans Rafinesque. Mt, Pd (NC, SC, VA), Cp (VA): alluvial forests, bottomlands, moist forests; common. April-May. Nova Scotia west to Mackenzie, south to SC, GA, AZ, and OR. [= F; = *C. nutans* var. *nutans* – RAB, G, K, W; < *C. nutans* – C; > *C. nutans* var. *nutans* – FNA; > *C. longepedunculatum* Willdenow ex Britton – S]

* ***Cerastium pumilum*** W. Curtis, Dwarf Mouse-ear. Cp (NC, VA), Pd (NC, SC, VA), Mt (NC): disturbed areas; rare, native of Europe. April-May. See Rabeler & Thieret (1988) for discussions and reports. [= C, F, FNA, G, K; > *C. glutinosum* Fries]

* ***Cerastium semidecandrum*** Linnaeus, Little Mouse-ear. Cp (FL, NC, SC, VA), Mt, Pd (NC, VA): disturbed areas; uncommon (rare in FL and NC), native of Europe. April-June. Reported for SC by Nelson & Kelly (1997). [= RAB, C, F, FNA, G, K, S, W, WH]

* ***Cerastium tomentosum*** Linnaeus, Snow-in-summer. Mt (NC, VA): disturbed areas; rare. This species is "cultivated and sometimes escaped" in scattered locations in PA (Rhoads & Klein 1993). First reported for NC by Pittillo & Brown (1988). [= C, F, FNA, G, K]

Cerastium velutinum Rafinesque *var.* ***velutinum***, Field Mouse-ear, Starry Grasswort. Pd, Mt (VA): rocky river-scour areas, other open situations; rare. April-August. [= FNA; < *C. arvense* – C, G, S, W; < *C. arvense* Linnaeus var. *villosum* (Muhlenberg ex Darlington) Hollick & Britton – F; = *C. arvense* Linnaeus ssp. *velutinum* (Rafinesque) Ugborogho var. *velutinum* (Rafinesque) Britton – K; = *Cerastium arvense* Linnaeus var. *velutinum* (Rafinesque) Britton]

* *Cerastium arvense* Linnaeus ssp. *arvense*. Introduced at scattered locations in ne. North America, including MD and NJ (FNA). [= FNA, K; < *C. arvense* – C, G; < *C. arvense* var. *arvense* – F]

Cerastium arvense Linnaeus ssp. *strictum* (Linnaeus) Ugborogho. Reported for GA, TN, KY, WV, MD, DE, and NJ, among other states (Kartesz 1999), the GA record not validated in FNA. [= FNA, K; < *C. arvense* – C, G; < *C. arvense* var. *arvense* – F]

Cerastium diffusum Persoon, Sea Mouse-ear. East to KY and TN (K), though not shown for those states in FNA. March-April. [= FNA, K; *?* *C. diffusum* var. *diffusum* – C]

Cerastium velutinum Rafinesque var. *villosissimum* (Pennell) J.K. Morton. This taxon is highly restricted, found only at a few stations in the serpentine barrens of Chester County, PA, and Cecil County, MD (Gustafson et al. 2003). [= FNA; = *C. arvense* var. *villosissimum* Pennell – F; < *C. arvense* – C, G, S, W; < *C. arvense* Linnaeus ssp. *velutinum* (Rafinesque) Ugborogho var. *villosum* (Muhlenberg ex Darlington) Hollick & Britton – K]

Corrigiola Linnaeus (Strapwort)

A genus of ca. 10 species, of Eurasia, Africa, and South aqmerica. References: Thieret & Rabeler in FNA (2005).

* *Corrigiola litoralis* Linnaeus ssp. *litoralis*, Strapwort. Introduced south to MD and PA. [= FNA; < *C. littoralis* – C, F, G, orthographic variant; < *C. litoralis* – K]

Dianthus Linnaeus 1753 (Pink, Carnation)

A genus of about 300-320 species, herbs, of Eurasia and Africa. Species other than those treated here are grown in gardens and may escape or persist. References: Rabeler & Hartman in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

1 Flowers clustered in crowded cymes, short-pedicelled; [subgenus *Carthusianastrum*].
  2 Leaves 2-5 (-8) mm wide; annual or biennial; inflorescence pubescent ..... ***D. armeria***
  2 Leaves mostly (8-) 10-20 mm wide; perennial; inflorescence glabrous ..... ***D. barbatus***
1 Flowers solitary, or few, long-pedicelled; [subgenus *Dianthus*].
  3 Petal blade 5-9 (-10) mm long, toothed ..... ***D. deltoides***
  3 Petal blade (8-) 12-18 mm long, fringed ..... ***D. plumarius***

* ***Dianthus armeria*** Linnaeus *ssp.* ***armeria***, Deptford Pink. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): fields, roadsides, pastures; common (rare in FL), native of Europe. May-September. [= FNA; < *D. armeria* – RAB, C, F, G, K, S, W, WH]

* ***Dianthus barbatus*** Linnaeus *ssp.* ***barbatus***, Sweet William. Pd (NC, SC), Mt (VA), {GA}: cultivated as an ornamental, rarely escaped to disturbed areas; rare, native of Europe. June-August. [= FNA; < *D. barbatus* – RAB, C, F, G, K]

* ***Dianthus deltoides*** Linnaeus *ssp.* ***deltoides***, Maiden Pink, Meadow Pink. Pd (NC, VA), Mt (NC): cultivated as an ornamental, rarely escaped to adjacent areas; rare, native of Europe. May. See Rabeler & Thieret (1988) for additional information. [= FNA; < *D. deltoides* – C, F, G, K]

* ***Dianthus plumarius*** Linnaeus *ssp.* ***plumarius***, Garden Pink, Grass Pink. Cp (NC), Pd (NC, SC), Mt (VA): cultivated as an ornamental, rarely escaped to disturbed areas; rare, native of e. Europe. June-August. [= FNA; < *D. plumarius* – RAB, C, F, G, K]

Drymaria Willdenow ex J.A. Schultes 1819 (Drymary)

A genus of about 48 species, herbs, mostly New World (tropical to temperate), but 1 species pantropical. References: Duke (1961)=Z; Hartman in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

Drymaria cordata (Linnaeus) Willdenow ex Schultes *var.* ***cordata***, Drymary, West Indian Chickweed. Cp (FL, GA): moist hammocks, moist disturbed areas; uncommon (rare in GA). Sc. GA south to s. FL south into the New World tropics; also old World tropics. Var. *diandra* Blume is restricted to the Old World. [= FNA; = *D. cordata* ssp. *cordata* – K, Z; < *D. cordata* – S, WH]

Gypsophila Linnaeus 1754 (Baby's-breath)

A genus of about 150 species, annual and perennial herbs, of temperate Eurasia, Africa, and Australia. References: Pringle in FNA (2005).

1 Leaves 0.2-2 (-3) mm wide; stems diffusely and repeatedly branched near the base and upward ..... ***[G. muralis]***
1 Leaves (1-) 3-16 mm wide; stems simple, few-branched toward the top, **or** much-branched
  2 Annual; plants strict or few branched upwards; petals 6-15 mm long ..... ***G. elegans***
  2 Perennial; plants much-branched 1-4 (-8) mm long ..... ***G. paniculata***

* ***Gypsophila elegans*** Bieberstein, Annual Baby's-breath. Cp, Pd (NC): disturbed areas, persistent from cultivation, doubtfully established; rare, native of Eurasia. See Rabeler & Thieret (1988) for additional information. [= C, FNA, K]

* ***Gypsophila paniculata*** Linnaeus, Tall Baby's-breath. Cp (FL): disturbed areas; rare, native of Eurasia. [= FNA, K, WH] {add to synonymy}

* *Gypsophila muralis* Linnaeus, Cushion Baby's-breath. Disturbed areas, roadsides, yards, cemeteries; native of Europe, reported for various eastern states, including KY, TN, PA, NJ (FNA, Kartesz 1999). [= C, FNA, K]

Herniaria Linnaeus (Rupture-wort)

A genus of about 45 species, herbs, of Eurasia, Africa, and South America. References: Thieret, Hartman, & Rabeler in FNA (2005).

* *Herniaria glabra* Linnaeus, Smooth Rupture-wort, introduced south to MD, NJ, and PA (Kartesz 1999). [= FNA, C, F, G, K]

Holosteum Linnaeus 1753 (Jagged Chickweed)

A genus of 3-4 species, herbs, of temperate Eurasia. References: Rabeler & Hartman in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Holosteum umbellatum*** Linnaeus *ssp.* ***umbellatum***, Jagged Chickweed. Mt, Pd (GA, NC, SC, VA), Cp (VA): fields, roadsides, lawns, other disturbed areas; common, native of Europe. March-May. Four additional subspecies are not known to be present in North America. [= FNA; < *H. umbellatum* – RAB, C, F, G, K, S, W]

Honckenya Ehrhart 1788 (Seabeach-chickweed, Sea-sandwort)

A monotypic genus, an herb, with circumboreal distribution. References: Wagner in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

Honckenya peploides (Linnaeus) Ehrhart *ssp.* ***robusta*** (Fernald) Hultén, Southern Seabeach-chickweed, Southern Sea-sandwort. Cp (VA): seabeaches and dunes; rare. June-July. The species is circumboreal, in North America ranging south to e. VA. Ssp. *robusta* ranges from Newfoundland south to e. VA; 3 other subspecies do not occur south of Newfoundland. [= FNA, K; = *Honckenya peploides* var. *robusta* (Fernald) House – C; = *Arenaria peploides* Linnaeus var. *robusta* Fernald – F; = *Honkenya peploides* ssp. *robusta* – G (apparently misspelled)]

Minuartia Linnaeus 1753 (Sandwort)

A genus of about 120-175 species, herbs, of the northern hemisphere (and rarely South America). References: Rabeler, Hartman, & Utech in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

1 Sepals acute, with prominent nerves; [of calcareous or mafic barrens of VA, and westward or northward].
  2 Primary leaves with axillary fascicles of secondary leaves ..... ***M. michauxii** var. **michauxii***
  2 Primary leaves lacking axillary fascicles of secondary leaves.
    3 Sepals 3-nerved; seeds 0.7-0.9 mm long ..... ***[M. muscorum]***
    3 Sepals 5-nerved; seeds 0.5-0.7 mm long ..... ***M. patula***
1 Sepals obtuse (rarely sub-acute), nerveless or with very obscure nerves; [of various habitats].
  4 Lower stem leaves closely imbricated; [of xeric sands of the Coastal Plain of NC and SC] ..... ***M. caroliniana***
  4 Lower stem leaves not imbricate; [**either** of rock outcrops of the Piedmont and Mountains **or** of moist habitats of the Coastal Plain].
    5 Stems prostrate or decumbent, leafy throughout; pedicels and sepals stipitate-glandular; [of moist habitats of the Coastal Plain] ..... ***M. godfreyi***
    5 Stems erect, leafy mostly near the base, the stem leaves few in number and reduced in size upward; pedicels and sepals glabrous; [of rock outcrops of the Piedmont and Mountains].
      6 Larger stem leaves 2-5 (-7) mm long; petals 1-7 mm long ..... ***M. uniflora***
      6 Larger stem leaves (7-) 10-30 mm long; petals 4-10 mm long.
        7 Leaves distinctly oblanceolate, very thin in texture, prominently veined; flowers 1-3 per stem ..... ***[M. cumberlandensis]***
        7 Leaves linear-lanceolate, herbaceous bu not notably thin, not prominently veined; flowers 3-many per stem.
          8 Plants 10-20 cm tall, annual, not mat-forming; cymes 9-15-flowered; sepals 3-4 mm long; petals 4-6 (-8) mm long; [of Piedmont and low mountain granitic flatrocks and other outcrops] ..... ***M. glabra***
          8 Plants 5-10 (-15) cm tall, perennial, mat-forming; cymes 3-7-flowered; sepals 3.5-5.5 mm long; petals 6-10 mm long; [of mountain peaks and Piedmont monadnocks] ..... ***M. groenlandica***

Minuartia caroliniana (Walter) Mattfeld, Carolina Sandwort, Longroot. Cp (FL, GA, NC, SC, VA): deep white sands of barren sandhills; uncommon (VA Rare). April-June. NY (and formerly RI) to Panhandle FL, on the Coastal Plain. [= FNA, K, WH; = *Arenaria caroliniana* Walter – RAB, C, F, G; = *Sabulina caroliniana* (Walter) Small – S; = *Alsinopsis caroliniana* (Walter) Small; = *Minuopsis caroliniana* (Walter) W.A. Weber]

Minuartia glabra (Michaux) Mattfeld, Appalachian Sandwort. Pd, Mt (GA, NC, SC, VA): granitic flatrocks, other outcrops of granite, granitic gneiss, or other felsic gneisses and schists, in the mountains restricted to low or medium elevations; uncommon. April-May. ME and NH south to w. GA (Jones & Coile 1988) and AL, primarily on the Piedmont and also in the Cumberlands (Chester, Wofford, & Kral 1997). [= FNA, K; = *Arenaria groenlandica* (Retzius) Sprengel var. *glabra* (Michaux) Fernald – RAB, C, F, G; = *A. glabra* Michaux – GW, W; *Sabulina glabra* (Michaux) Small – S; = *Porsildia groenlandica* (Retzius) Á. Löve & D. Löve ssp. *glabra* (Michaux) Á. Löve & D. Löve]

Minuartia godfreyi (Shinners) McNeill, Godfrey's Sandwort. Cp (FL, NC, SC), {GA}: tidal freshwater marshes, other wetlands; rare. April-June. Peculiarly and irregularly distributed, with isolated and scattered locations in the Coastal Plain and Mountains: wc. VA, ne. TN, e. NC; ne. SC, e. Panhandle FL, n. peninsular FL, wc. AL, and se. AR. [= FNA, K, WH; = *Arenaria godfreyi* Shinners – RAB, GW, W; *Sabulina uniflora* – S, misapplied; = *Stellaria paludicola* Fernald & Schubert]

Minuartia groenlandica (Retzius) Ostenfeld, Mountain Sandwort, Greenland Sandwort. Mt (NC, VA), Pd (NC): low elevation rock outcrops (such as sandstone pavements in the VA Ridge and Valley) to high elevation rock outcrops in the Mountains (ascending to nearly 2000m on Roan Mountain), also disjunct on the summits of quartzite monadnocks in the upper Piedmont (such as Pilot Mountain, Surry County, NC and Hanging Rock, Stokes County, NC); rare. May-October. Greenland, Nova Scotia, and Québec south to the higher mountains of New England and NY; disjunct in the Southern Appalachians of VA, w. NC, and e. TN. [= FNA, K; = *Arenaria groenlandica* (Retzius) Sprengel var. *groenlandica* – RAB, C, F, G; = *Sabulina groenlandica* (Retzius) Small – S; = *A. groenlandica* (Retzius) Sprengel – W; = *Porsildia groenlandica* (Retzius) Á. Löve & D. Löve ssp. *groenlandica*]

Minuartia michauxii (Fenzl) Farwell *var.* ***michauxii***, Rock Sandwort. Mt (VA): limestone, dolostone, calcareous sandstone, and calcareous shale outcrops and barrens; uncommon. June-July. Var. *michauxii* ranges from NY west to MN, south to sw. VA and AR. Var. *texana* (B.L. Robinson) Mattfeld occurs from MO and NE south to TX. [= K; = *Arenaria stricta* Michaux var. *stricta* – C, F; < *M. michauxii* – FNA; = *A. stricta* Michaux ssp. *stricta* – G; < *Sabulina stricta* (Michaux) Small – S; < *A. stricta* Michaux – W]

Minuartia patula (Michaux) Mattfeld, Lime-barren Sandwort. Mt (GA, VA), Pd (VA), Cp (GA): on rocky barrens of calcareous or mafic rocks, locally common in Lee County, VA; rare (VA Watch List). April-June. Ec. PA and w. VA west to IN and MN, south to AL and TX. [= FNA, K; = *Arenaria patula* Michaux var. *patula* – C, G; < *A. patula* Michaux – F; < *Sabulina patula* (Michaux) Small – S]

Minuartia uniflora (Walter) Mattfeld. Pd (GA, NC, SC), Cp (GA): granitic flatrocks, outcrops of Altamaha grit; uncommon (rare in NC and SC). April-May. S. NC south to c. GA, west to ec. AL, on the Piedmont and extending into the Coastal Plain of Georgia on Altamaha grit. *M. alabamensis*, named on the basis of its tiny flowers, has been shown to be a self-pollinating form of *M. uniflora* which has arisen repeatedly and independently at various sites in the range of *M. uniflora*. [= FNA, K; = *Arenaria uniflora* (Walter) Muhlenberg – RAB; > *A. uniflora* (Walter) Muhlenberg – GW, W; > *A. alabamensis* McCormick, Bozeman, & Spongberg – GW, W; = *Sabulina brevifolia* (Nuttall ex Torrey & A. Gray) Small – S; > *M. alabamensis* (McCormick, Bozeman, & Spongberg) Wyatt]

Minuartia cumberlandensis (B.E. Wofford & Kral) McNeill, Cumberland Sandwort. Endemic to sandstone outcrops in the Cumberland Plateau of ne. TN; it might be expected in extreme sw. VA. [= FNA, K; = *Arenaria cumberlandensis* B.E. Wofford & Kral – C]

Minuartia muscorum (Fassett) Rabeler. KY and TN west to MO. [= FNA, K; = *Arenaria patula* Michaux var. *robusta* (Steyermark) Maguire – C, G; < *A. patula* – F; < *Sabulina patula* (Michaux) Small – S; = *M. patula* (Michaux) Mattfeld var. *robusta* (Steyermark) McNeill]

Moehringia Linnaeus 1753 (Grove-sandwort)

A genus of about 25 species, of temperate regions of the Northern Hemisphere. References: Rabeler & Hartman in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

Moehringia lateriflora (Linnaeus) Fenzl, Grove-sandwort, Blunt-leaved Sandwort. Pd (VA): rocky, disturbed areas (powerline) over mafic rocks (diabase); rare. May-July. Circumboreal, ranging south in North America to n. VA (Fairfax County), e. WV (Morton et al. 2004), MO, and CA. [= FNA, K; = *Arenaria lateriflora* Linnaeus – C, F, G]

Moenchia Ehrhart 1788

A genus of 3 species, herbs, native of Europe. References: Rabeler & Hartman in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Moenchia erecta*** (Linnaeus) P.G. Gaertner, B. Meyer, & Scherbius *ssp.* ***erecta***, Upright Chickweed. Cp (SC): disturbed areas; rare, introduced. This species was collected as a "wool alien" in Berkeley County, SC in 1958 (Rabeler 1991). [= FNA; < *M. erecta* – K; = *Sagina erecta* Linnaeus]

Myosoton Moench 1794 (Water-chickweed)

A monotypic genus, an herb, of temperate Eurasia. References: Rabeler in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Myosoton aquaticum*** (Linnaeus) Moench, Water-chickweed, Giant Chickweed, Water Mouse-ear. Mt (NC, VA), Pd, Cp (VA): marshes, streambeds; uncommon, though locally abundant (rare south of VA), native of Europe. June-October. [= F, FNA, K; = *Stellaria aquatica* (Linnaeus) Scopoli – RAB, C, G, GW, W; = *Alsine aquatica* (Linnaeus) Britton – S]

Paronychia P. Miller 1754 (Whitlow-wort, Nailwort)

A genus of about 110 species, herbs and shrubs, nearly cosmopolitan in distribution. This genus consists mostly of plants of dry rocky or sandy habitats. References: Hartman, Thieret, & Rabeler in FNA (2005); Chaudhri (1968)=Z, Ward (1977a, 1977b)=Y; Shinners (1962h)=X; Bittrich in Kubitzki, Rohwer, & Bittrich (1993). Key adapted from Y and Z.

Identification notes: Magnification of at least 10× is necessary for the identification of many of the taxa.

1 Leaf surfaces with silky, appressed pubescence (usually densely so, but sometimes sparse), giving the plant a silvery appearance; flowers 3.5-6 mm long, largely concealed by scarious bracts; [subgenus *Paronychia*] ..... ***P. argyrocoma***

1 Leaf surfaces glabrous or with very short pubescence (neither appressed nor silky), the plant green; flowers 1-4 mm long, not concealed by scarious bracts.

2 Sepals petaloid, the tip, margins, or entire sepal whitish; perigynous zone very well developed (mostly equalling or somewhat longer than the sepals); [of the Coastal Plain, from SC southward and westward]; [subgenus *Siphonychia*].

3 Sepals glabrous to the base; plant a cespitose perennial with ascending annual stems.
4 Stems minutely gray-puberulent ..... *[P. erecta var. corymbosa]*
4 Stems glabrous and often also glaucous ..... *[P. erecta var. erecta]*
3 Sepals densely pubescent on the basal portion (glabrous above); plant a sprawling, ascending or erect annual.
5 Pubescent portion of the sepal nearly ½ its length; sepals broadly rounded and hooded; stem glabrous or one side with curly hairs ..... ***P. americana***
5 Pubescent portion of the sepal <1/3 its length; sepals narrowed toward the apex, with a short tooth or awn; stem uniformly pubescent with retrorse hairs.
6 Stem spreading or ascending, the branching unevenly dichotomously, the flowers therefore in diffuse cymes; glabrous portion of the sepal 0.8 mm long ..... ***P. patula***
6 Stem erect, the branching symmetrical and dichotomous, the flowers therefore in weirdly geometric, tight square cymes; glabrous portion of the sepal > 1.1 mm long ..... ***P. rugelii***
2 Sepals not petaloid, green, sometimes scarious-margined; perigynous zone somewhat shorter than the sepals; [of various provinces, collectively widespread in our area]; [subgenus *Paronychia*].
7 Sepals tipped with a distinct awn, 0.35-0.75 mm long; flowers 2-4 mm long.
8 Suffrutescent perennial, at least the flowering stems ascending or erect; leaves linear-subulate, 15-25 (-30) mm long, 0.5-1 mm wide, acute; [of Mountain and Piedmont rocky areas] ..... ***P. virginica var. virginica***
8 Prostrate annual; leaves oblong-elliptic or spatulate, 3-12 (-16) mm long, 1.5-3.5 (-5) mm wide, obtuse; [of Coastal Plain sands from sc. NC southward] ..... ***P. herniarioides***
7 Sepals tipped with a short cusp or mucro; flowers 1-1.6 mm long.
9 Leaves with a distinctly ciliate margin; plants prostrate, the branching below the inflorescence not pseudo-dichotomous.
10 Plant an annual (-biennial); stems 1-4 dm long, uniformly and minutely recurved-puberulent; flowers 1.25-1.4 mm long, shortly ciliate to nearly glabrous; sepals ca. 1 mm long, oval-oblong, the margin ciliolate; style 0.4-0.5 mm long, bifid; fruit rounded at the top ..... ***P. baldwinii ssp. baldwinii***
10 Plant a perennial; stems 2-12 dm long, glabrous or minutely puberulent in longitudinal bands; flowers 1.45-1.55 mm long, more or less glabrous; sepals 1-1.2 mm long, oblong, with a brownish margin; style 0.35-0.4 mm long, the 2 lobes divergent-recurved at maturity; fruit narrowed to the top ..... ***P. baldwinii ssp. riparia***
9 Leaves entirely glabrous or with a slightly ciliate-serrulate margin; plants erect, suberect, or somewhat prostrate, pseudo-dichotomously branched.
11 Style elongate, 0.6-0.75 mm long; anthers 0.25-0.3 mm in diameter; stipular bracts subtending the flowers narrowly lanceolate, ca. 0.5× as long as the flowers ..... ***P. montana***
11 Style short, 0.3-0.35 mm long; anthers ca. 0.15 mm in diameter; stipular bracts subtending the flowers lanceolate, from much shorter than to exceeding the flowers.
12 Stems glabrous; leaves oval-elliptic, 5-25 mm long, 2-8 (-10) mm wide, obtuse (rarely sub-obtuse or acute), very thin in texture, deep-green; sepals oblong-ovate, 1-nerved, planar, the apiculate hood very short ..... ***P. canadensis***
12 Stems retrorsely puberulent (sometimes sparsely so); leaves oblanceolate, 5-15 mm long, 2-5 mm wide, acute (rarely sub-obtuse to obtuse), firm in texture, dull brownish-green; calyx 2-3 mm long.
13 Stipular bracts subtending the flowers exceeding the flowers (calyx) ..... ***P. fastigiata var. paleacea***
13 Stipular bracts subtending the flowers somewhat shorter than the flowers (calyx).
14 Sepals with a minute cusp or mucro ..... ***P. fastigiata var. fastigiata***
14 Sepals with a distinct white awn to 0.2 mm long ..... ***P. fastigiata var. nuttallii***

Paronychia americana (Nuttall) Fenzl ex Walpers, American Whitlow-wort. Cp (FL, GA, SC): sandhills; rare. June-September. S. SC south to GA and s. FL. Two taxa have been questionably distinguished. Ssp. *americana*, with the cymes many-flowered and forming spheroidal glomerules, has the range of the species; ssp. *pauciflora* (Small) Chaudhri, differing in its laxer, more open cymes, is restricted to s. GA and n. FL. [= FNA, WH, X, Y; > *Paronychia americana* (Nuttall) Fenzl ex Walpers ssp. *americana* – K, Z; > *Paronychia americana* (Nuttall) Fenzl ex Walpers ssp. *pauciflora* (Small) Chaudhri – K, Z; > *P. americana* – RAB; > *Siphonychia americana* (Nuttall) Torrey & Gray – S; > *Siphonychia pauciflora* Small – S]

Paronychia argyrocoma (Michaux) Nuttall, Silverling, Silver Whitlow-wort. Mt (GA, NC, VA), Pd (NC, VA): thin soils of rock outcrops, especially on mountain summits at medium to high elevations, disjunct to a few Piedmont monadnocks; uncommon (GA Special Concern). July-September. A characteristic component of the summit flora of Southern Appalachian peaks, *P. argyrocoma* occurs in the mountains of New England (ME, NH, VT, and MA), and in the Southern Appalachians of WV, VA, NC, TN, and n. GA (Jones & Coile 1988). [= RAB, C, FNA, K, S, W; > *P. argyrocoma* var. *argyrocoma* – F, G; > *P. argyrocoma* var. *albimontana* Fernald – F, G, Z]

Paronychia baldwinii (Torrey & A. Gray) Fenzl ex Walpers *ssp.* ***baldwinii***, Annual Dune Whitlow-wort. Cp (FL, GA, NC, SC): dry sandy sites, woodlands or dunes; uncommon. June-October. E. NC south to c. peninsular FL and west to AL (and LA?), on the Coastal Plain. [= K, Y, Z; < *P. baldwinii* – RAB, FNA, WH; = *Anychiastrum baldwinii* (Torrey & Gray) Small – S]

Paronychia baldwinii (Torrey & A. Gray) Fenzl ex Walpers *ssp.* ***riparia*** (Chapman) Chaudhri, Perennial Dune Whitlow-wort. Cp (FL, GA, NC, SC, VA): dry sandy sites, woodlands or dunes; uncommon (VA Watch List). June-October. Se. VA south to n. FL (and AL?), on the Coastal Plain. Though Chaudhri (1968) and Ward (1977a and 1977b) independently reached the conclusion to reduce *P. riparia* to a subspecies of *P. baldwinii*, neither stated any reasons for their choice of subspecific status. I here follow the independent conclusions of Chaudhri and Ward, but the appropriate taxonomic rank remains unclear. [= K, Y; < *P. baldwinii* – RAB, FNA, WH; = *P. riparia* Chapman – C, F; = *Anychiastrum riparium* (Chapman) Small – S; > *P. baldwinii* ssp. *riparia* var. *riparia* – Z; > *P. baldwinii* ssp. *riparia* var. *ciliata* Chaudhri – Z]

Paronychia canadensis (Linnaeus) Wood, Canada Whitlow-wort, Forked Chickweed. Mt (GA, NC, SC, VA), Pd, Cp (NC, SC, VA): dry rocky woods, shale barrens; uncommon (rare on the Coastal Plain). June-October. NH and s. Ontario west to MN, south to n. GA (Jones & Coile 1988), AL, MO, and KS. This species is somewhat taller on average than *P. fastigiata* or *P. montana*. [= RAB, C, F, FNA, G, K, W, Z; = *Anychia canadensis* (Linnaeus) Britton, Sterns, & Poggenburg – S]

Paronychia fastigiata (Rafinesque) Fernald *var.* ***fastigiata***, Common Forked Whitlow-wort. Mt, Pd, Cp (NC, SC, VA): dry, usually rocky, woodlands, often on thin soil around outcrop edges; uncommon. June-October. MA west to MN south to FL and TX. The three varieties of *P. fastigiata* (though accepted by Chaudhri and many recent floras) need additional investigation to confirm their taxonomic status, habitats, and geographic ranges. [= C, F, G, K, Z; < *P. fastigiata* – RAB, W; < *P. fastigiata* var. *fastigiata* – FNA; < *Anychia polygonoides* Rafinesque – S]

Paronychia fastigiata (Rafinesque) Fernald *var.* ***nuttallii*** (Small) Fernald, Pennsylvania Forked Whitlow-wort. Mt (NC, VA): habitat not known; rare. June-October. NY, sc. PA, n. VA, WV, e. TN, and w. NC. [= C, F, FNA, G, K, Z; < *P. fastigiata* – RAB, W; < *Anychia polygonoides* Rafinesque – S]

Paronychia fastigiata (Rafinesque) Fernald *var.* ***paleacea*** Fernald, Green Forked Whitlow-wort. Mt, Pd, Cp (NC, VA): dry, mostly rocky woodlands; uncommon. June-October. NJ, DE, and PA west to IL, south to VA, NC, KY, TN, MO, and TX. [= C, F, G, K, Z; < *P. fastigiata* – RAB, W; < *P. fastigiata* var. *fastigiata* – FNA; < *Anychia polygonoides* Rafinesque – S]

Paronychia herniarioides (Michaux) Nuttall, Michaux's Whitlow-wort. Cp (FL, GA, NC, SC): sandhills; rare. April-July. Sc. NC south to c. peninsular FL and e. Panhandle FL. The NC distribution ascribed by Small, Chaudhri, and FNA is based on the type specimen of André Michaux ("in arenosis aridis Carolinae septentrionalis"); the species has been relocated in NC (Scotland County) by Harry E. LeGrand, Jr, over two centuries later. [= RAB, FNA, K, WH, Y, Z; = *Gastronychia herniarioides* (Michaux) Small – S]

Paronychia montana (Small) Pax & K. Hoffmann, Shale-barren Whitlow-wort. Mt (NC, VA): dry rock outcrops and talus barrens, especially on shale barrens; uncommon. June-October. C. PA (and OH?) south through w. VA and e. WV to a few localities in NC, TN, GA, and AL. [= K, Z; < *P. fastigiata* – RAB, W; = *P. fastigiata* var. *pumila* (A. Wood) Fernald – C, F, FNA, G; = *Anychiastrum montanum* Small – S]

Paronychia patula Shinners, Pineland Nailwort. Cp (FL, GA): sandhills; uncommon (rare in GA). July-September. Sw. GA west to s. AL, south to c. peninsular FL. [= FNA, K, WH, X, Y, Z; = *Siphonychia diffusa* Chapman – S]

Paronychia rugelii (Chapman) Shuttleworth ex Chapman, Sand-squares, Rugel's Nailwort. Cp (FL, GA): sandhills; uncommon (rare in GA). July-October. S. GA south to c. peninsular FL. [= FNA, WH, X, Y; > *Paronychia rugelii* (Chapman) Shuttleworth ex Chapman var. *interior* (Small) Chaudhri – K, Z; > *Paronychia rugelii* (Chapman) Shuttleworth ex Chapman var. *rugelii* – K, Z; > *Odontonychia interior* Small – S; > *Gibbesia rugelii* (Chapman) Small – S]

Paronychia virginica Sprengel *var.* ***virginica***, Virginia Whitlow-wort. Mt (VA), Pd (GA, VA): shale barrens, rocky riversides, calcareous rock outcrops and talus, serpentine outcrops; rare (US Species of Concern, GA Special Concern, VA Rare). June-August. The ranges of the two varieties are variously stated; the distinguishing characteristics and distributions are not clear. Var. *virginica* occurs in w. MD, w. VA, WV, GA, and AL (or allegedly also in NC, AR, OK, and TX). Var. *parksii* (Cory) Chaudhri occurs in TX (or also in OK). [= C, Z; < *P. virginica* – F, FNA, K, W; = *P. virginica* ssp. *virginica* – G; = *P. dichotoma* (Linnaeus) Nuttall – S]

Paronychia chartacea Fernald *var.* ***minima*** (L.C. Anderson) R.L. Hartman, Paper Nailwort. Cp (FL): scrub; rare. (May-) July-October. Endemic to Panhandle FL. [= FNA; < *P. chartacea* – WH; < *Nyachia pulvinata* Small; = *P. chartacea* Fernald ssp. *minima* L.C. Anderson – K] {add to synonymy; add to key}

Paronychia erecta (Chapman) Shinners *var.* ***corymbosa*** (Small) Chaudhri, Hairy Squareflower. Cp (FL): coastal dunes; uncommon. Panhandle FL west to se. LA. March-November. [= K, Y, Z; = *Odontonychia corymbosa* Small – S; < *Paronychia erecta* – FNA, WH, X]

Paronychia erecta (Chapman) Shinners *var.* ***erecta***, Smooth Squareflower. Cp (FL): coastal dunes; uncommon. Panhandle FL west to s. MS. March-November. [= K, Y, Z; = *Odontonychia erecta* (Chapman) Small – S; < *Paronychia erecta* – FNA, WH, X]

Petrorhagia (Seringe) Link 1831 (Pink)

A genus of about 28-33 species, herbs, of Eurasia. References: Rabeler & Hartman in FNA (2005); Rabeler (1985)=Z; Bittrich in Kubitzki, Rohwer, & Bittrich (1993). Key based on Z.

1 Flowers in capitate inflorescences (solitary in impoverished or very young plants); bracts subtending the calyx broad and long, usually completely enclosing the calyx; [section *Kohlrauschia*] ..... ***P. prolifera***
1 Flowers solitary (or in fascicles of 2-3); bracts subtending the calyx narrow and short, enclosing about ½ of the calyx; [section *Petrorhagia*] .. .. ***[P. saxifraga]***

* ***Petrorhagia prolifera*** (Linnaeus) P.W. Ball & Heywood, Childing Pink, Proliferous Pink. Cp (SC, VA), Mt (NC, VA), Pd (GA, NC, VA): roadsides, disturbed areas; uncommon, native of Europe. May-September. Reported for GA by Duncan (1985). [= C, FNA, K, Z; = *Dianthus prolifer* Linnaeus – F; = *Tunica prolifera* (Linnaeus) Scopoli – G; = *P. prolifer* – W, orthographic variant]

* *Petrorhagia saxifraga* (Linnaeus) Link var. *saxifraga*, Saxifrage Pink, is "cultivated and occasionally escaped" south to se. PA (Rhoads & Klein 1993), s. NJ, and MD (Rabeler (1985). Rabeler (1985) reports a location from Page Co. VA, but it appears that this is persistent from cultivation. [= FNA; < *P. saxifraga* – C, K, Z; < *Tunica saxifraga* (Linnaeus) Scopoli]

Polycarpon Linnaeus 1759 (Allseed)

A genus of about 18 species, herbs, primarily of Europe, with several species in South America, and 1 cosmopolitan. References: Thieret & Rabeler in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Polycarpon tetraphyllum*** (Linnaeus) Linnaeus *ssp.* ***tetraphyllum***, Four-leaved Allseed. Cp (FL, GA, SC): disturbed areas; rare, native of Europe. April-October. [= FNA, K; < *Polycarpon tetraphyllum* – RAB, S, WH]

Sagina Linnaeus 1753 (Pearlwort)

A genus of about 25 species, herbs, mainly north temperate. References: Crow in FNA (2005); Crow (1978)=Z; Bittrich in Kubitzki, Rohwer, & Bittrich (1993). [also see *Moenchia*]

1 Annual, usually without a persistent rosette of leaves; flowers (4-) 5-merous; seeds 0.3-1.4 mm long; sepals erect-appressed in fruit ..... ***S. decumbens***
1 Perennial, usually with a persistent rosette; flowers 4 (-5)-merous; seeds (0.3-) 0.4 (0.5) mm long; sepals spreading in fruit ..... ***S. procumbens***

Sagina decumbens (Elliott) Torrey & A. Gray, Eastern Pearlwort. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): disturbed ground, fields, cracks in pavement or sidewalks; common (uncommon in Mountains). March-June. New Brunswick west to IL and MO, south to c. peninsular FL and TX, with adventive occurrences further west. Crow (1978) and Crow in FNA (2005) treat *S. decumbens* and *S. occidentalis* S. Watson of the Pacific Coast of North America as subspecies. They differ primarily in seed architecture. Though clearly closely related, they seem equally well (and more simply) regarded as sibling species. A report of *S. subulata* (Swartz) K. Presl for Bedford County, VA, is apparently actually *S. decumbens*. [= RAB, C, F, G, S, W; = *S. decumbens* ssp. *decumbens* – FNA, K, Z]

* ***Sagina procumbens*** Linnaeus, Northern Pearlwort, Bird's-eye. Mt (NC): gravel parking lot on summit of Roan Mountain; rare, native of Eurasia (or, at least, ne. North America). May-September. Crow (1978) questions whether *S. procumbens* is native at all in the Western Hemisphere. In North America, it is concentrated in 2 main regions, from Nova Scotia and Québec south to MD, and from sw. British Columbia south to c. CA, with scattered occurrences elsewhere, such as around the Great Lakes, CO, AR, s. OH, and w. NC. Whether or not the species is native in the New World, the occurrence in NC is almost certainly adventive. [= C, FNA, G, K, Z; > *S. procumbens* var. *procumbens* – F; > *S. procumbens* var. *compacta* Lange – F]

* *Sagina japonica* (Swartz) Ohwi, Japanese Pearlwort, native of e. Asia, is naturalized in se. PA (Rhoads & Klein (1993). [= FNA, K]

Saponaria Linnaeus 1753 (Soapwort)

A genus of about 40 species, herbs, of temperate regions of Eurasia. References: Thieret & Rabeler in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993). [also see *Vaccaria*]

* ***Saponaria officinalis*** Linnaeus, Soapwort, Bouncing Bet. Mt, Pd, Cp (GA, NC, SC, VA): disturbed areas, fields, roadsides; common, native of Europe. May-October. [= RAB, C, F, FNA, G, K, S, W]

Scleranthus Linnaeus 1753 (Knawel)

A genus of 10 species, herbs, mainly of temperate regions of the Northern Hemisphere. References: Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Scleranthus annuus*** Linnaeus, Knawel, Annual Knawel. Pd, Cp, Mt (GA, NC, SC, VA): fields, ditches, roadsides, other disturbed areas; common (uncommon in Mountains), native of Europe. April-October. [= RAB, C, F, G, K, W]

Silene Linnaeus 1753 (Catchfly, Campion, Fire-pink, Wild-pink)

A genus of about 700 species, of Eurasia and North America. References: Morton in FNA (2005); Clausen (1939)=Z; Wilbur (1970b)=Y; Bittrich in Kubitzki, Rohwer, & Bittrich (1993). [including *Lychnis*]

1 Styles mostly 5; capsule with 5 or 10 teeth; calyx tubular at anthesis, becoming strongly inflated later in *S. dioica* and *S. latifolia*.
  2 Petal limbs deeply divided into 4 linear segments ..... ***[S. flos-cuculi]***
  2 Petal limbs unlobed, emarginate, or shallowly 2-lobed.
    3 Leaf blades with dense silky white hairiness; flowers bisexual ..... ***S. coronaria***
    3 Leaf blades variously pubescent, but not with silky-appressed pubescence.
      4 Petals pink; capsule teeth revolute ..... ***[S. dioica]***
      4 Petals white; capsule teeth spreading to slightly reflexed ..... ***S. latifolia***
1 Styles mostly 3; capsule with 3 or 6 teeth; calyx tubular or campanulate at anthesis, not greatly inflated (except in *S. vulgaris*).
  5 Middle cauline leaves in whorls of 4; petals fimbriate ..... ***S. stellata***
  5 Middle cauline leaves opposite; petals entire, bilobed, 2-cleft, or 8-cleft.
    6 Flowers bright red.
      7 Petals entire or slightly erose at the tip; cauline leaves 10-20 pairs ..... ***S. regia***
      7 Petals deeply notched at the tip; cauline leaves 2-8 pairs.
        8 Cauline leaves 2.0-7.0 cm wide, elliptic, obovate, or orbicular, usually 1-2× as long as wide; entire plant sticky glandular-pubescent; [of sandstone cliffs and crevices, in our area only in sw. VA] ..... ***S. rotundifolia***

8 Cauline leaves 0.8-2.0 cm wide, mostly oblanceolate, usually at least 3× as long as wide; plant not covered with sticky glandular hairs; [of various, mostly rocky, habitats, widespread in our area]..... ***S. virginica***

6 Flowers white or pink.

9 Petals 8-cleft or more divided; plants perennial; [native].

10 Plants 2-6 dm tall; petals pink, the >8 ultimate segments of each dichotomously forked at nearly right angles; calyx ca. 2.5 cm long; stem with long, villous pubescence..... ***S. catesbaei***

10 Plants (5-) 7-15 dm tall; petals white, the 8 segments of each essentially parallel to one another; calyx ca. 1 cm long; stem with short rigid pubescence..... ***S. ovata***

9 Petals entire, bilobed, or 2-cleft; plants 0.5-8 dm tall, perennial or annual; [**either** alien weeds occurring mostly in disturbed sites, **or** native in forests, woodlands, or rock outcrops].

11 Plant < 2.5 dm tall; plant perennial, with a stout, carrot-like taproot; [native, of woodlands, rock outcrops, barrens, glades, and dry roadbanks].

12 Calyx pubescence of long, straight, nonglandular hairs; [of OH, WV, ?VA, and MO south to AL]..... ***[S. caroliniana var. wherryi]***

12 Calyx pubescence of glandular hairs; [of NC and ne. TN northward in and east of the Appalachians].

13 Leaves pubescent over the surface with appressed, white hairs, also ciliate on the margin; basal leaves mostly obtuse to rounded at the apex, to 12 cm long and 3 cm wide; [of NC south, mostly in sandy, acidic soils of the Coastal Plain and associated with granite in the lower Piedmont]..... ***S. caroliniana var. caroliniana***

13 Leaves glabrous on the surface, ciliate on the margin; basal leaves mostly acute to obtuse at the apex, to 15 cm long and 2 cm wide; [of NC north, often associated with calcareous or mafic rocks in the Piedmont and Mountains]..... ***S. caroliniana var. pensylvanica***

11 Plant usually 2-8 dm tall (depauperate individuals rarely smaller); plant annual or biennial (perennial from a creeping rhizome in *S. nivea* and *S. vulgaris*), lacking a carrot-like taproot; [alien, mostly of disturbed habitats (except *S. nivea* and *S. antirrhina*).

14 Plants rhizomatous perennials (biennial in *S. csereii*); petals white.

15 Fruiting calyx ovoid, contracted at the mouth to ca. ½ the diameter of the calyx at its widest point; stamens ca. 2× as long as the calyx; filaments purple..... ***S. csereii***

15 Fruiting calyx clavate or campanulate, not contracted at the mouth; stamens 1.0-1.5× as long as the calyx; filaments usually white.

16 Petal appendages 1.0-1.6 mm long; inflorescences leafy; [native]..... ***S. nivea***

16 Petal appendages absent or to 0.2 mm long; inflorescences with reduced leaves resembling bracts; [alien, mostly of disturbed habitats]..... ***S. vulgaris***

14 Plants annuals; petals white, pink, or lavender.

17 Stems glabrous or sparsely pubescent (if pubescent, puberulent).

18 Calyx 4-10 mm long; carpophore ca. 1 mm long..... ***S. antirrhina***

18 Calyx 13-17 mm long; carpophore 7-8 mm long..... ***S. armeria***

17 Stems densely pubescent (hirsute or glandular-hirsute).

19 Petals entire or emarginate; fruiting calyx 6-10 mm long..... ***S. gallica***

19 Petals deeply 2-lobed; calyx; fruiting calyx 10-30 mm long.

20 Fruiting calyx 10-15 mm long; petal appendages ca. 0.2 mm long..... ***S. dichotoma***

20 Fruiting calyx (15-) 25-30 mm long; petal appendages 0.5-1.5 mm long..... ***S. noctiflora***

Silene antirrhina Linnaeus, Sleepy Catchfly, Garter-pink. Mt, Pd, Cp (GA, NC, SC, VA): fields, disturbed areas; common. April-July. Nearly throughout North America, and in Mexico and South America; introduced in Europe. [= RAB, C, F, FNA, G, K, S, W]

* ***Silene armeria*** Linnaeus, Sweet William Catchfly, None-so-pretty, Garden Catchfly. Mt, Pd (NC, VA), Cp (NC, SC, VA): disturbed areas; rare, native of Europe. June-October. [= RAB, C, F, FNA, G, K, W]

Silene caroliniana Walter *var.* ***caroliniana***, South Carolina Wild-pink, Rock Catchfly. Pd, Cp (GA, NC, SC): in acidic, sandy, open woodlands, especially woodlands around granitic flatrocks and sandy Coastal Plain woodlands; common (rare in NC) (GA Special Concern, NC Watch List). April-July. Sc. NC south through the e. three-quarters of SC just into e. GA. See Wilbur (1970b) and Clausen (1939) for additional discussion of these infraspecific taxa in *S. caroliniana*. [= C, F; < *S. caroliniana* – RAB, S; = *S. caroliniana* ssp. *caroliniana* – FNA, G, K, Z; = *S. caroliniana* ssp. *caroliniana* var. *caroliniana* – Y]

Silene caroliniana Walter *var.* ***pensylvanica*** (Michaux) Fernald, Northern Wild-pink, Sticky Catchfly. Mt, Pd (NC, VA), Cp (NC, SC, VA): open woodlands, especially calcareous; common (rare in NC) (NC Watch List). April-July. NH west to e. OH, south to VA, e., nc., and w. NC, and ne. TN (Chester, Wofford, & Kral 1997). [= F, W; < *S. caroliniana* – RAB, S; > *S. caroliniana* var. *pensylvanica* – C; = *S. caroliniana* ssp. *pensylvanica* (Michaux) Clausen – FNA, G, K, Z; = *S. caroliniana* ssp. *caroliniana* var. *pensylvanica* – Y]

Silene catesbaei Walter, Eastern Fringed Catchfly, Fringed Campion. Cp (GA): mesic deciduous forests along streams or on lower- to mid-slopes; rare. Mid-March-early May. C. GA south to Panhandle FL, and possibly in AL based on a C.T. Mohr specimen (see FNA). Ward (2006) discusses the nomenclatural change. [= *Silene polypetala* (Walter) Fernald & Schubert – FNA, K; = *S. baldwinii* Nuttall – S]

* ***Silene coronaria*** (Linnaeus) Clairville, Mullein-pink, Rose Campion. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): disturbed areas; uncommon (rare south of VA), native of Europe. May-July. [= FNA; = *Lychnis coronaria* (Linnaeus) Desrousseaux – RAB, C, F, G, K]

* ***Silene csereii*** Baumgarten, Balkan Bladder-campion. Mt (NC): habitat not known; rare, native of Europe. Documented for w. NC (J.K. Morton, pers.comm.). Also reported in se. PA (Rhoads & Klein 1993) and e. WV. [= FNA, K; = *S. cserei* – C, F, G, orthographic variant]

* ***Silene dichotoma*** Ehrhart *ssp.* ***dichotoma***, Forked Catchfly. Mt (NC, VA), Pd (VA), {GA}: fields, disturbed areas; common, native of Europe. May-August. [= FNA; < *S. dichotoma* – RAB, C, F, G, K, S, W]

* ***Silene gallica*** Linnaeus, Small-flowered Catchfly. Cp (NC, SC, VA): sandy disturbed areas; rare, native of Europe. May-July. [= RAB, C, F, FNA, G, K; > *S. anglica* Linnaeus – S, misapplied]

* ***Silene latifolia*** Poiret, White Campion, White Cockle, Evening Lychnis. Mt, Pd, Cp (NC, SC, VA): fields, roadsides, disturbed areas; common (rare south of NC), native of Europe. May-July. [= C, FNA; > *S. latifolia* Poiret ssp. *alba* (P. Miller) Greuter & Burdet – K; = *Lychnis alba* P. Miller – RAB, F, G, S, W; ? *S. pratensis* (Rafinesque) Grenier & Godron; ? *Melandrium dioicum* (Linnaeus) Cosson & Germain]

Silene nivea (Nuttall) Muhlenberg ex Otth, Snowy Campion. Mt (GA, VA), Pd (VA): rocky or sandy flood-scoured riversides or creeksides; rare (VA Rare). June-July. NJ west to ND, south to n. VA, w. VA, s. WV, nw. GA (Jones & Coile 1988), TN, and MO. [= C, F, FNA, G, K, W; = *Silene alba* Muhlenberg – S, misapplied]

* ***Silene noctiflora*** Linnaeus, Sticky Cockle, Night-flowering Catchfly, Sticky Campion. Mt, Pd, Cp (NC, VA): fields, disturbed areas; rare, native of Europe. June-August. [= RAB, C, F, FNA, G, K, S, W; = *Melandrium noctiflorum* (Linnaeus) Fries]

Silene ovata Pursh, Mountain Catchfly. Mt (GA, NC, SC, VA), Cp (GA): circumneutral soils of woodlands and forests, especially over mafic or calcareous rocks, mostly at medium elevations in the mountains; rare. August-September. Sw. VA and KY west to AR, south to nw. GA, n. AL, and AR; disjunct in sc. and sw. GA. [= RAB, C, F, FNA, G, K, S, W]

Silene regia Sims, Royal Catchfly. Cp (GA): prairies and calcareous woodlands and forests; rare (GA Rare). OH and e. MO south to e. TN (Chester, Wofford, & Kral 1997), nw. and sw. GA (Jones & Coile 1988), FL Panhandle (Jackson County), and AL. [= C, F, FNA, G, K, S]

Silene rotundifolia Nuttall, Roundleaf Fire-pink, Sandstone Fire-pink. Mt (GA, VA): sandstones cliffs, ledges, and talus, and at bases of sandstone cliffs; rare. S. OH and WV south to nw. GA (Jones & Coile 1988) and n. AL, nearly restricted to the Cumberland Plateau. [= C, F, FNA, G, K, S]

Silene stellata (Linnaeus) Aiton f., Starry Campion, Widow's-frill. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): dry to mesic forests, rock outcrops; common (rare in Coastal Plain). July-September. CT west to SD, south to c. GA and TX. [= RAB, F, FNA, K, S, W; > *S. stellata* var. *stellata* – C, G; > *S. stellata* var. *scabrella* Palmer & Steyermark – C, G]

Silene virginica Linnaeus, Fire-pink. Mt, Pd, Cp (GA, NC, SC, VA): woodlands, rock outcrops, crevices in cliffs, roadbanks; common (rare in Coastal Plain). April-July. NJ and NY west to s. Ontario and se. MI, south to Panhandle FL (Bay County), GA and OK. Three varieties require additional investigation. Var. *robusta* Strausbaugh & Core, named from locations in e. WV, should be in our area, but the distinction stated in Strausbaugh & Core (1978) ("a more vigorous plant with leaves up to 15 cm. long") needs strengthening to warrant recognition. [= RAB, C, F, FNA, G, S, W; > *S. virginica* var. *virginica* – K; > *S. virginica* var. *robusta* Strausbaugh & Core – K]

* ***Silene vulgaris*** (Moench) Garcke, Bladder Campion, Maiden's-tears. Mt (NC, VA), Pd (GA, NC, VA), Cp (NC, SC, VA): disturbed areas; common (uncommon to rare south of VA and in VA Coastal Plain), native of Europe. May-August. [= C, FNA, K; = *S. cucubalus* Wibel – RAB, G, W; > *S. cucubalus* var. *cucubalus* – F; > *S. cucubalus* var. *latifolia* (Reichenbach) G. Beck – F; > *S. latifolia* (P. Miller) Britten & Rendle - S]

Silene caroliniana Walter var. *wherryi* (Small) Fernald. {VA}: {habitat}; rare? OH and WV (and VA according to FNA) south and west to AL, KY, MO, and KS. [= F; > *S. caroliniana* var. *pensylvanica* – C; = *S. caroliniana* ssp. *wherryi* (Small) Clausen – FNA, G, K, Y, Z; = *S. wherryi* Small]

* *Silene dioica* (Linnaeus) Clairville, Red Campion, Red Catchfly, is introduced south at least to scattered locations in s. PA (Rhoads & Klein 1993). Reported rather vaguely for VA (Maguire 1950) as "south to Virginia;" no additional documentation is known to me. [= C, F, FNA, K; = *Lychnis dioica* Linnaeus]

Silene flos-cuculi (Linnaeus) Clairville ssp. *flos-cuculi*, Ragged Robin. Native of Europe, introduced and established in ne. North America, as in MD, PA. [= FNA; < *Lychnis flos-cuculi* Linnaeus – C, F, G, K]

Spergula Linnaeus 1753 (Spurrey)

A genus of 6 species, herbs, of temperate Eurasia and n. Patagonia. References: Hartman & Rabeler in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

1 Wing of the seed narrower than the body of the fruit; leaf blades terete or nearly so, 1.5-3 (-5) cm long ..... ***Sp. arvensis***
1 Wing of the seed as wide as or wider than the body of the seed; leaf blades usually flat, 0.3-1.5 (-2.0) cm long.
  2 Seed wings light brown or darker, 0.2-0.3 mm wide; stamens usually 10 ..... ***[Sp. morisonii]***
  2 Seed wings white to tan, 0.4-0.6 mm wide; stamens usually 5 ..... ***Sp. pentandra***

* ***Spergula arvensis*** Linnaeus, Corn Spurrey. Cp (GA, NC, SC, VA), Pd (NC, SC, VA), Mt (VA): fields, roadsides; common, native of Europe. April-June. Two varieties are sometimes recognized; var. *arvensis*, with seeds ornamented with white, clavate papillae, the plants sparsely glandular, and var. *sativa*, with seeds reticulate and lacking papillae, the plants sparsely to densely glandular. Additional information is needed on the distinctiveness, range in our area, etc. of the two putative varieties. [= RAB, C, FNA, K, S; > *S. arvensis* Linnaeus var. *arvensis* – F, G; > *S. arvensis* Linnaeus var. *sativa* (Boenninghausen) Mertens & W.D.J. Koch – F, G]

* ***Spergula pentandra*** Linnaeus, Wingstem Spurrey. Cp (NC, VA): sandy fields; rare, native of Europe. April-June. [= RAB, C, F, FNA, G, K]

* *Spergula morisonii* Boreau, Morison's Spurrey. Fallow fields, disturbed areas. Native of Europe, known from MD (Prince Georges County) (Steury 2004a), MA, and NJ (FNA). [= C, FNA]

Spergularia (Persoon) J. & K. Presl 1819 (Sand-spurrey)

A genus of about 25 species, herbs, cosmopolitan. The genus is perhaps not distinct from *Spergula*. References: Hartman & Rabeler in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

1 Stamens 6-10; seeds **either** 0.4-0.6 **or** 0.8-1.1 mm long; axillary leaf clusters of 2-4 leaves (or sometimes absent in *Sp. media*).
  2 Seeds 0.8-1.1 mm long, smooth, without scupturing except for wings; leaf blades fleshy ..... *[Sp. media var. media]*
  2 Seeds 0.4-0.6 mm long, sculptured with wavy lines, not winged but with peglike papillae; leaf blades scarcely fleshy ..... ***Sp. rubra***
1 Stamens 1-5; seeds 0.5-0.7 (-0.8) mm long; axillary leaf clusters usually absent.
  3 Seeds shiny and silvery; stipules wider than long; styles 0.3-0.4 mm long ..... ***Sp. echinosperma***
  3 Seeds dull, not silvery; stipules longer than wide; styles 0.4-0.7 mm long ..... ***Sp. salina***

* ***Spergularia echinosperma*** Čelakovský. Cp (GA): disturbed soils; rare, native of Europe. Naturalized in GA and AL (FNA). [= FNA, K]

* ***Spergularia rubra*** (Linnaeus) J.& K. Presl, Purple Sand-spurrey, Roadside Sand-spurrey. Pd (VA): disturbed areas; rare, native of Eurasia. May-September. [= C, F, FNA, G, K; = *Tissa rubra* (Linnaeus) Britton – S]

Spergularia salina J. & K. Presl, Saltmarsh Sand-spurrey. Cp (GA, NC, SC, VA): brackish and salt marsh flats; uncommon. June-October. Widespread on coasts of North America (from Québec south to FL, from British Columbia south to Baja California), inland along salted highways, in South America, and Eurasia. Considered by some (C, G) to be introduced only in North America, by others native (F, FNA, S). [= FNA, K; = *S. marina* (Linnaeus) Grisebach – RAB, C, F, G, GW, misapplied; = *Tissa marina* (Linnaeus) Britton – S, misapplied]

* *Spergularia media* (Linnaeus) K. Presl var. *media*. Known from salted highways in NY, OH, MI, and IL and salt or brackish marsh habitats in coastal NY. [= FNA; < *S. media* – C, F, G; ? *Spergularia maritima* (Linnaeus) Chiovenda – K] {synonymy incomplete}

Stellaria Linnaeus 1753 (Chickweed, Stitchwort, Starwort)

A genus of about 120-200 species, cosmopolitan (centered in Asia). References: Morton in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves narrow, usually linear, lanceolate, oblanceolate, or narrowly elliptic, the blade 3-10× as long as wide, 0.8-10 mm wide; stems prominently 4-angled.
  2 Sepals 2.0-3.5 mm long; petals 0-3.0 mm long, shorter than the sepals or absent; seeds 0.3-0.9 mm long.
    3 Inflorescence a leafy terminal cyme of (1-) 5-50 flowers; seeds 0.7-0.9 mm long, smooth or slightly rugose .... *[S. borealis var. borealis]*
    3 Inflorescences axillary, soliray or in small cymes of 2-5 flowers; seeds 0.3-0.8 mm long, distinctly papillose.
      4 Flowers in axillary inflorescences of 1-5 flowers; sepals 5; petals 5; seeds 0.3-0.4 mm long, with small, rounded tubercles; [widespread] ..... ***S. alsine***
      4 Flowers solitary in leaf axils; sepals 4 (-5); petals absent; seeds 0.6-0.8 mm long, with stalked, knoblike tubercles; [of c. KY and TN] ..... *[S. fontinalis]*
  2 Sepals 3.5-9 mm long; petals 3.5-13 mm long, equalling or longer than the sepals; seeds 0.7-2.5 mm long.
    5 Seeds 2-2.5 mm long; bracts of the inflorescence herbaceous; petals notched < halfway to the base ..... ***S. holostea***
    5 Seeds 0.7-1.2 mm long; bracts of the inflorescence scarious; petals notched > halfway to the base.
      6 Sepals 4.5-5.5 mm long, strongly 3-nerved; seeds 0.8-1.2 mm long, coarsely tuberculate; inflorescence diffuse, many-flowered ..... ***S. graminea***
      6 Sepals 3.5-4.5 mm long, weakly 3-nerved; seeds 0.7-1.0 mm long, obscurely sculptured and appearing almost smooth; inflorescence more compact, fewer-flowered ..... ***S. longifolia***
1 Leaves broad, usually ovate, obovate, or broadly elliptic, the blade 1-2.5× (or to 4×) as long as wide, 4-30 mm wide (if > 2.5× as long as wide, then definitely > 10 mm wide); stems terete or 4-angled.
  7 Leaves long-petiolate, the petiole about as long as the blade, the blades cordate to truncate at the base; sepals 2.5-3.5 mm long, obtuse to broadly acute; seeds 0.6-0.8 mm long; stem glabrous or glandular-puberulent (the pubescence not in lines) ..... ***S. prostrata***
  7 Leaves sessile, short-petiolate, to long-petiolate (if long petiolate, the blades cuneate), the blades rounded to cuneate at the base; sepals 3.5-11 mm long, broadly acute to acuminate; seeds 0.4-2.0 mm long; stem puberulent to short-pilose (the pubescence in vertical lines or not).
    8 Leaves (1.0-) 2.5-10 cm long; seeds 1.7-2 mm long; sepals 4-11 mm long; stem pubescence in vertical lines or uniformly distributed; perennial, the stems strong and ascending to erect; [native].
      9 Sepals 7-11 (-12) mm long, acuminate, ciliate, but more-or-less glabrous on the back; [of the mountains] ..... ***S. corei***
      9 Sepals 3.5-7 mm long, acute, ciliate and more-or-less pubescent on the back; [widespread in our area] ..... ***S. pubera***
    8 Leaves 0.5-4.0 cm long; seeds 0.6-1.7 mm long; sepals 3.0-6.5 mm long; stem pubescence always in vertical lines; annual, the stems weak and in part prostrate, the tips or vigorous growth ascending; [alien].
      10 Sepals 5.0-6.5 mm long; stamens 8-10; seeds 1.1-1.7 mm long ..... ***S. neglecta***
      10 Sepals 3.0-5.2 (-6.0) mm long; stamens 1-5 (-8); seeds 0.4-1.3 mm long.
        11 Stamens 3-5 (-8); sepals 4.5-5.2 (-6.0) mm long; seeds 0.9-1.4 mm long; petals usually present ..... ***S. media***
        11 Stamens 0-3 (-5); sepals 3.0-4.0 mm long; seeds 0.4-0.9 mm long; petals usually absent ..... ***S. pallida***

Stellaria alsine Grimm, Bog Stitchwort, Longstalk Starwort, Bog Chickweed. Mt (NC), Pd (GA): seepages; rare (NC Rare). April-May. Circumboreal, in North America ranging south to DE, MD, w. NC, GA, FL, and LA (Rabeler & Thieret 1988). Possibly only introduced in parts at least of our area. [= RAB, C, F, FNA, G, K, W; ? *Stellaria uliginosa* Murray]

Stellaria corei Shinners, Tennessee Starwort. Mt (NC, VA): cove forests and seepages at moderate to high elevations; rare (NC Watch List, VA Rare). April-June. W. VA, WV, and sw. PA west to OH and IN, south to w. NC, e. and c. TN, and n. AL. Cronquist (1991) reports that *S. corei* has a chromosome number of 2n = 60, as opposed to 2n = 30 for *S. pubera*. In mountain

coves, *S. corei* and *S. pubera* sometimes grow intermixed; it seems best to treat these two related taxa as species. Both species have an interesting seasonal growth form, producing short and relatively small-leaved flowering shoots in the spring (which wither following fruiting), followed by taller, more vigorous summer shoots with larger and tougher leaves and lacking flowers, which persist until autumn. Some of the description in various manuals of differences in petiole length and leaf size and shape between the two species is obscured or complicated by these seasonal differences; more careful observation is needed. [= RAB, FNA, K, W; = *S. pubera* Michaux var. *silvatica* (Béguinot) Weatherby – C, F; = *S. silvatica* (Béguinot) Maguire – G, preoccupied; = *Alsine tennesseensis* (C. Mohr) Small – S, misapplied]

* ***Stellaria graminea*** Linnaeus, Common Stitchwort, Lesser Stitchwort. Mt, Pd, Cp (NC, SC, VA): fields, roadsides, pastures, disturbed areas; common, native of Europe. May-August. [= RAB, C, F, FNA, G, GW, K, W; = *Alsine longifolia* (Muhlenberg ex Willdenow) Britton – S, misapplied]

* ***Stellaria holostea*** Linnaeus, Easter-bell, Greater Stitchwort. Cp? (NC): escaped or persistent from cultivation; rare, native of Europe. [= C, F, FNA, G, K]

Stellaria longifolia Muhlenberg, Longleaf Stitchwort. Mt, Pd (VA), Cp (SC): meadows, floodplain forests, freshwater tidal marshes, moist disturbed areas; uncommon. Apparently circumboreal, in North America ranging south to e. SC, w. VA, e. TN, MO, KS, AZ, and CA. [= C, F, FNA, G, W; > *S. longifolia* var. *longifolia* – K]

* ***Stellaria media*** (Linnaeus) Villars, Common Chickweed. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): disturbed areas, gardens, fields; common, native of Europe. January-December. [= FNA; < *S. media* – RAB, C, G, W (also see *S. pallida*); < *S. media* var. *media* – F; = *S. media* ssp. *media* – K; < *Alsine media* Linnaeus – S]

* ***Stellaria neglecta*** Weihe. Mt (NC): disturbed areas; rare, native of Europe. Similar to *S. media* and *S. pallida*. It has been found at scattered localities in e. North America and will presumably eventually be found elsewhere in our area. [= FNA, G; < *S. media* (Linnaeus) Villars – RAB, C, W; < *S. media* var. *media* – F; = *S. media* ssp. *neglecta* (Weihe) Murbeck – K; = *Alsine neglecta* (Weihe) A. & D. Löve]

* ***Stellaria pallida*** (Dumortier) Piré, Lesser Chickweed. Cp (NC, SC, VA): disturbed areas, gardens, fields; common, native of Europe. January-December. Cronquist (1991) reports that *S. pallida* has a chromosome number of 2n = 22, as opposed to 2n = 40-44 for *S. media*. [= C, FNA; < *S. media* (Linnaeus) Villars – RAB, W; >< *S. media* var. *glaberrima* G. Beck – F, possibly misapplied; = *S. prostrata* – G, misidentified; *?* *S. apetala* Ucria ex Roemer – G, possibly misapplied; = *S. media* ssp. *pallida* (Dumortier) Ascherson & Graebner – K; < *Alsine media* – S; = *Alsine pallida* Dumortier]

Stellaria prostrata Baldwin. Cp (GA, SC): moist soil along streams; rare. March-April. Apparently ranging from SC south to c. peninsular FL, west to c. TX. This species has been reported repeatedly for SC and sometimes for VA as well; the VA reports are referable to *S. pallida*. More information is needed about its occurrence in our area. [= K; = *S. cuspidata* Willdenow ex Schlechtendahl ssp. *prostrata* (Baldwin) J.K. Morton – FNA; = *Alsine baldwinii* Small – S]

Stellaria pubera Michaux, Star Chickweed, Common Starwort, Giant Chickweed, Great Chickweed. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): bottomland forests, moist slopes, coves; common (uncommon in Coastal Plain). April-June. NJ west to IL, south to panhandle FL and AL. See *S. corei* for comments. [= RAB, FNA, G, K, W; = *S. pubera* var. *pubera* – C, F; = *Alsine pubera* (Michaux) Britton – S]

Stellaria borealis Bigelow var. *borealis* is a native species which ranges south to Canaan Valley (Tucker County, WV) and sc. PA; it might be sought in our area in cold swamps in w. VA. It will key most closely to *S. alsine* in the key above, but differs in having seeds smooth or weakly sculptured (vs. tuberculate) and in having the lower bracts of the inflorescence leaf-like rather than scarious. [= C; = *S. borealis* ssp. *borealis* – FNA, K; > *S. calycantha* (Ledebour) Bongard var. *floribunda* Fernald – F, G; > *S. calycantha* var. *isophylla* Fernald – F, G, misapplied]

Stellaria fontinalis (Short & Peter) B.L. Robinson is a native species of c. TN (Chester, Wofford, & Kral 1997) and c. KY, occurring in seepages and wet cliffs. Its generic placement has been controversial and uncertain (see synonymy). [= F, FNA, G, K; = *Sagina fontinalis* Short & Peter – C; = *Alsine fontinalis* (Short & Peter) Britton – S; = *Arenaria fontinalis* (Short & Peter) Shinners; = *Spergula fontinalis* (Short & Peter) Dietrich]

Stipulicida Michaux 1803 (Wire-plant)

A genus of a single species, herb, of se. North America. References: Judd (1983)=Z; Ward (2001)=Y; James (1957)=X; Swanson & Rabeler in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: *Stipulicida* is immediately recognizable by its very wiry, dichotomously branched stems, the stem leaves reduced to subulate scales 0.5-2 mm long. Often overlooked are the basal rosette of spatulate leaves, to 15 mm long and 4 mm wide.

1 Sepal margin lacerate; outer sepal tips mucronate; [of FL] ..... ***S. setacea* var. *lacerata***
1 Sepal margin entire or nearly so; outer sepal tips acute to obtuse; [of se. VA south to s. FL, west to LA] ..... ***S. setacea* var. *setacea***

Stipulicida setacea Michaux *var.* ***lacerata*** C.W. James. Cp (FL): xeric sands of sandhills, dry pine flatwoods, maritime forests; rare. May-August. Ne. FL south to s. FL; Cuba. [= FNA, K, WH, X, Y, Z; < *S. setacea* – S]

Stipulicida setacea Michaux *var.* ***setacea***, Wire-plant. Cp (FL, GA, NC, SC, VA): xeric sands of sandhills, dry pine flatwoods, maritime forests; common, rare in VA. May-August. Se. VA south to s. FL, west to e. LA (Florida parishes). A third variety, var. *filiformis* (Nash) D.B. Ward, endemic to c. Peninsular FL, is often considered a mere form of var. *setacea* (see synonymy and references). [= Y; < *S. setacea* var. *setacea* – FNA, K, WH, X, Z (including var. *filiformis*, but not var. *lacerata*); < *S. setacea* – RAB, C, S; < *S. setacea* – S (including var. *lacerata* but not var. *filiformis*)]

Vaccaria von Wolf 1781 (Cow-cockle, Cow-herb)

A genus of 1-4 species, herbs, of c. and e. Europe, Mediterranean, and temperate Asia. References: Thieret & Rabeler in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Vaccaria hispanica*** (P. Miller) Rauschert, Cow-cockle, Cow-herb. Pd (SC, VA): fields, disturbed areas; rare, native of Europe. May-June. The record from VA (Arlington County) probably represents a waif. [= C, FNA, K; =*? V. pyramidata* Medikus – RAB; = *Saponaria vaccaria* Linnaeus – F; =*? Vaccaria segetalis* Garcke ex Ascherson – G; = *Vaccaria vaccaria* (Linnaeus) Britton – S]

CASUARINACEAE R. Brown 1814 (Casuarina Family)

A family of 4 genera and about 100 species, trees and shrubs, of Malesia, Australia, and Melanesia. References: Johnson & Wilson in Kubitzki, Rohwer, & Bittrich (1993); Rogers (1982c).

Casuarina Rumph. ex Linnaeus 1759 (Casuarina, Beefwood, She-oak)

A genus of about 17 species, trees, tropical to warm temperate in s. Asia, Australia, and Polynesia. References: Johnson & Wilson in Kubitzki, Rohwer, & Bittrich (1993); Rogers (1982c)=Z.

* ***Casuarina equisetifolia*** Linnaeus *ssp.* ***equisetifolia***, Casuarina, Australian-pine, Horsetail Casuarina, Beach She-oak, Coastal She-oak. Cp (FL): beaches, dunes, disturbed areas; rare, native of Malaysia, s. Asia, and Oceania. *C. equisetifolia* was reported as planted and persistent on the Outer Banks of NC by Brown (1959); it is not established so far north. [= FNA; < *C. equisetifolia* – K, S, WH, Z]

CELASTRACEAE R. Brown 1814 (Bittersweet Family)

A family of ca. 98 genera and ca. 1200 species, trees, shrubs, lianas, perennial and annual herbs, nearly cosmopolitan, especially in the tropics and subtropics. References: Brizicky (1964); Simmons in Kubitzki (2004).

1 Leaves spiny-toothed, coriaceous; [rare waif in our area] ..... ***Crossopetalum***
1 Leaves entire to serrate (but not spiny-toothed), herbaceous to coriaceous; [collectively common in our area].
  2 Leaves alternate; twining woody vines ..... ***Celastrus***
  2 Leaves opposite; upright to trailing shrubs.
    3 Leaves widely spaced, averaging < 1 pair per cm of stem; leaves 2.5-12 cm long, (0.5-) 1-6 cm wide; [shrubs to small trees, mostly > 0.4 m tall, collectively in many habitats] ..... ***Euonymus***
    3 Leaves closely spaced, 2-4 pairs per cm of stem; leaves 1.1-2.5 cm long, 0.2-0.6 cm wide; [shrub < 0.4 m tall, native to calcareous rock outcrops, rarely naturalized elsewhere] ..... ***Paxistima***

Celastrus Linnaeus 1753 (Bittersweet)

A genus of ca. 30 species, scandent shrubs, primarily in e. Asia, Malaysia, Oceania, Madagascar, and Central and South America. The one species native to e. North America is related to e. Asian species. The grammatical gender of the genus has been conserved as masculine (Brummitt 2005). References: Duncan (1969)=Z ; Leicht-Young et al. (2007); Simmons in Kubitzki (2004).

1 Flowers in 2-3-flowered axillary cymes; mature leaves mostly obovate, averaging 1.2-1.4 (-1.7)× as long as wide; expanding leaves folded (conduplicate); pollen white ..... ***C. orbiculatus***
1 Flowers in 6-many-flowered terminal panicles; mature leaves mostly ovate-lanceolate to elliptic, averaging (1.8-) 2.0-2.6× as long as wide; expanding leaves rolled (Involute); pollen yellow ..... ***C. scandens***

* ***Celastrus orbiculatus*** Thunberg, Oriental Bittersweet. Mt, Pd, Cp (GA, NC, SC, VA): thickets, roadsides, forests; common, native of Asia. May; August-September. *C. orbiculatus*, though attractive, is becoming a noxious weed in our area. The first reports of its occurrence in our area appear to be in the 1960's; it is now much more common than its native relative, *C. scandens*. [= RAB, C, F, W, Z; = *C. orbiculata* – G, K, orthographic variant]

Celastrus scandens Linnaeus, American Bittersweet. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): mesic forests; common (uncommon in VA Piedmont and VA Coastal Plain, rare south of VA) (GA Special Concern, NC Watch List). May-June; August-September. Québec west to Manitoba and WY, south to w. SC, n. GA, AL, LA, and TX. [= RAB, C, F, G, K, S, W, Z]

Crossopetalum P. Browne 1756 (Christmas-berry)

A genus of about 26 species, trees and shrubs, of the West Indies and tropical America. References: Simmons in Kubitzki (2004).

* ***Crossopetalum ilicifolium*** (Poiret) Kuntze, Holly-leaf Rhacoma, Christmas-berry. Cp (NC): disturbed, acid, peaty soil; rare, native of subtropical FL. Presumably introduced via cattle at an agricultural experiment station near Wenona, Washington County, NC (Hayes 1946). The species has probably not persisted in our area. [= K; = *Rhacoma ilicifolia* (Poiret) Trelease – S]

Euonymus Linnaeus 1753 (Spindle-tree, Euonymus, Strawberry-bush)

A genus of ca. 129 species, of temperate and tropical areas, trees, shrubs, and lianas. The genus name was variously spelled "*Euonymus*" and "*Evonymus*" by Linnaeus. The spelling *Euonymus* has been nomenclaturally "conserved." The genus is now considered to be grammatically masculine, and specific epithets therefore end in "*-us*." References: Voss (1985)=Z; Simmons in Kubitzki (2004).

1 Leaf undersurface with mostly erect hairs to ca. 0.2 mm long; petioles 8-20 mm long; flowers 4-merous; [native]; [section *Euonymus*] ..... ***E. atropurpureus var. atropurpureus***
1 Leaf undersurface glabrous (or with some hairs on the midrib); flowers 4- or 5-merous; [introduced or native].
  2 Leaves evergreen; flowers 4-merous; [introduced species, rarely naturalized].
    3 Petioles of the larger leaves (8-) 11-17 mm long; trailing shrub or climbing vine ..... ***E. fortunei var. radicans***
    3 Petioles of the larger leaves 4-7 (-8) mm long; shrub or small tree to 6 m tall.
      4 Petioles of the larger leaves 6-12 mm long; leaves evergreen, rather thick in texture; inflorescence a dense, few-flowered cyme; shrub or small tree to 6 m tall ..... ***E. japonicus***
      4 Petioles of the larger leaves 4-7 (-8) mm long; leaves semi-evergreen, rather thin in texture; inflorescence a loose, many-flowered cyme; spreading shrub to 3 m tall ..... ***E. kiautschovicus***
  2 Leaves deciduous; flowers 4- or 5-merous; [introduced or native].
    5 Petioles 5-33 mm long; flowers 4-merous; [introduced, rarely naturalized].
      6 Leaf apex long-acuminate; larger leaves with teeth 6-8 per cm ..... ***E. bungeanus***
      6 Leaf apex acute to short-acuminate; larger leaves 8-11 per cm; [section *Euonymus*] ..... ***E. europaeus***
    5 Petioles 1-5 mm long; flowers 4- or 5-merous; [native and introduced].
      7 Twigs and branches with 2-4 corky wings; flowers 4-merous; capsules smooth; [introduced, rarely naturalized]; [section *Melanocarya*] ..... ***E. alatus***
      7 Twigs and small branches lacking corky wings, terete (or nearly so); flowers 5-merous; capsules muricate; [native species]; [section *Echinococcus*].
        8 Primary stems erect, to 20 dm tall; upper leaves widest at or below the middle; petioles mostly 1-3 mm long; [widespread in our area] ..... ***E. americanus***
        8 Primary stems trailing or decumbent, the tips and flowering branches ascending to 3 (-6) dm tall; upper leaves widest at or beyond the middle; petioles mostly 3-5 mm long; [of the Mountains] ..... ***E. obovatus***

* ***Euonymus alatus*** (Thunberg) Siebold, Winged Euonymus. Cp, Pd (NC, SC, VA), Mt (NC, VA): cultivated, rarely naturalized; rare, native of e. Asia. Reported for NC (Jackson Co.) by Pittillo & Brown (1988). [= C, F, G; = *Euonymus alata* – K, Z; > *Euonymus alatus* var. *alatus*; > *Euonymus alatus* var. *apterus* Regel]

Euonymus americanus Linnaeus, Strawberry-bush, Heart's-a-bustin'-(with-love). Mt, Pd, Cp (NC, SC, VA): forests; common. May-June; September-October. Se. NY west to s. OH and se. MO, south to n. peninsular FL and TX. A variety, var. *angustifolia* (Pursh) A. Wood, with narrowly lanceolate to linear leaves, has been named and occurs in our area; it is of uncertain status (Brizicky 1964). [= RAB, C, F, G, S, W; = *Euonymus americana* – K]

Euonymus atropurpureus Jacquin *var.* ***atropurpureus***, American Wahoo, Burning Bush. Mt (NC, SC, VA), Pd (NC, SC, VA), Cp (VA): bottomland forests, riverbanks, mostly on rich alluvial sediments, or on slopes over mafic or calcareous rocks; uncommon (rare south of VA). May; October. NY west to ND, south to panhandle FL and TX. [= K; < *Euonymus atropurpureus* – RAB, C, F, G, S, W; < *Euonymus atropurpurea* – Z]

* ***Euonymus bungeanus*** Maximowicz, Winterberry. Cp (SC): cultivated, rarely naturalized; rare, native of n. China. [= *Euonymus bungeanum* – K]

* ***Euonymus europaeus*** Linnaeus, European Spindle-tree. Cp (VA): cultivated, rarely naturalized; rare, native of Europe. [= C, F, G; = *Euonymus europaea* – K, Z]

* ***Euonymus fortunei*** (Turczaninow) Handel-Mazzetti *var.* ***radicans*** (Siebold ex Miq.) Rehder, Wintercreeper, Chinese Spindle-tree. Pd (NC, SC), Mt, Cp (VA): cultivated, rarely naturalized, as in bottomlands or swamps, where sometimes climbing into the canopy; rare, native of China. [= K; < *E. fortunei* – F, G, Z]

* ***Euonymus japonicus*** Thunberg, Japanese Spindle-tree. Cp (NC, VA): disturbed areas; rare, native of Japan. Widely planted on the Outer Banks of NC because of its resistance to salt damage (Brown 1959). [= C; = *E. japonica* – K]

* ***Euonymus kiautschovicus*** Loesener, Spreading Euonymus. Pd (NC): cultivated, rarely naturalized; rare, native of e. and c. China. [= *Euonymus kiautschovica* – K]

Euonymus obovatus Nuttall, Running Strawberry-bush. Mt (GA, NC): cove forests, northern hardwood forests, other mesic forests, especially in boulderfields, where sometimes quite abundant locally; uncommon. May-June; September-October. W. NY west to s. MI, south to sw. NC, ne. GA, TN, and MO. [= RAB, C, F, G, S, W; = *Euonymus obovata* – K, Z]

Paxistima Rafinesque 1838 (Mountain-lover)

CELASTRACEAE

A genus of 2 species, rhizomatous shrubs, of temperate North America. The only other species in the genus is *P. myrsinites* (Pursh) Rafinesque of the Western Cordillera; its two subspecies are ssp. *myrsinites*, ranging from British Columbia and Alberta south to AZ and NM, and ssp. *mexicana* Navaro & Blackwell of mountainous Mexico (Coahuila, Nuevo Leon, and Tamaulipas). For discussion of the long confusion and controversy over the appropriate spelling of the genus, see Navaro & Blackwell (1990) and Uttal (1986). The first validly published spelling of the name was "Paxistima," and this spelling should be retained. References: Navaro & Blackwell (1990)=Z; Simmons in Kubitzki (2004).

Paxistima canbyi A. Gray, Cliff-green, Canby's Mountain-lover, Ratstripper. Mt (NC*, VA): in VA on calcareous bluffs and cliffs (generally near the top of the cliffs or bluffs, rarely far below the crest), mostly on limestone and dolostone, but rarely on greenstone or shale; in NC naturalized at the site of a plant nursery and possibly also native (see discussion below); rare. April-May; September. The species is a Central Appalachian endemic: sc. PA (Bedford County) (Rhoads & Klein 1993), e. WV, w. VA, s. OH, e KY, ne. TN, and w. NC (where questionably native). The only collection definitely known from NC is that from an old nursery site (Hardin 1963). Navaro & Blackwell (1990) note that "the presence of *P. canbyi* in North Carolina was, however, noticed as long ago as 1883 by Chapman, and *P. canbyi* is likely native to North Carolina." Small (1933) reports it from "n. NC." Casting some doubt on its native status in NC is the species' habitat: limestone ravines and bluffs, a very rare habitat in NC. [= RAB, C, K, W, Z; = *Pachistima canbyi* – F (the name not validly published); = *Pachystima canbyi* – G, S (the name not validly published)]

CERATOPHYLLACEAE S.F. Gray 1821 (Hornwort Family)

A peculiar and apparently very primitive family, of a single genus and about 6 species, aquatic herbs, of cosmopolitan distribution. The Ceratophyllaceae "may have actually arisen from early angiosperms that existed prior to the fundamental evolutionary divergence of monocots and dicots (Les 1988c; Les in Kubitzki, Rohwer, & Bittrich 1993). References: Les in FNA (1997); Les (1985, 1986, 1988a,1988b, 1988c, 1989)=Z; Les in Kubitzki, Rohwer, & Bittrich (1993). Key adapted from Les.

Ceratophyllum Linnaeus 1753 (Hornwort, Coontail)

A genus of about 6 species, aquatic herbs, of cosmopolitan distribution. References: Les in FNA (1997); Les (1985, 1986, 1988a, 1988b, 1988c, 1989)=Z; Les in Kubitzki, Rohwer, & Bittrich (1993). Key adapted from Les.

Identification notes: *Ceratophyllum* is sometimes mistaken for other, superficially somewhat similar aquatics, such as *Cabomba* (Cabombaceae), *Utricularia* (Lentibulariaceae), and *Myriophyllum* (Haloragaceae). *Cabomba* has the leaves opposite (rather than whorled), dichotomously divided (like *Ceratophyllum*), but the divisions lacking the marginal denticles of *Ceratophyllum*, and on a 1-3 cm long petiole (vs. sessile or on a petiole 0-2 mm long). *Utricularia* has the leaves sometimes dichotomously divided, but the divisions are usually irregular, the leaves are alternate (in most species), and bladder traps are present. *Myriophyllum* has the leaves pectinately rather than dichotomously divided.

1 Largest leaves forking 1-2× (count branching-nodes from the base of the leaf to the tip of the most-forked division); leaves coarse-textured, stiff, the marginal denticles usually strongly raised on a broad base of green tissue; achene margin wingless, with 2 basal spines or tubercles (these rarely absent), otherwise entire (lacking marginal spines)..... ***C. demersum***
1 Largest leaves forking 3-4× (count branching nodes from the base of the leaf to the tip of the most-forked division); leaves fine-textured, flaccid, the marginal denticles not raised on a broad base of green tissue, sometimes obscure or obsolete; achene margin winged, with 2-20 lateral spines 0.1-6.5 mm long (occasionally spineless), with 2 basal spines (these rarely absent).
  2 Achene body (excluding the spines) 3-4.5 mm long; first leaves of the plumule simple; [Coastal Plain, NC southward]..... ***C. australe***
  2 Achene body (excluding the spines) 4.5-6 mm long; first leaves of the plumule forked; [widespread]..... ***C. echinatum***

Ceratophyllum australe Grisebach. Cp (GA, NC): ponds, pools, slow-moving streams; rare (NC Watch List). May-September. Se. NC south to s. FL and panhandle FL, and in the West Indies; also in s. Mexico, Central America, n. South America, with apparent disjunctions in c. South America and the Galapagos Islands. Les treats this taxon as a subspecies of the Old World *C. muricatum*. Because of their allopatric distribution on separate continents and relative morphological distinctiveness (as shown by Les), I prefer to recognize them at the species level. [= *Ceratophyllum muricatum* Chamisso ssp. *australe* (Grisebach) Les – FNA, K, Z; < *C. muricatum* Chamisso – GW (also see *C. echinatum*)]

Ceratophyllum demersum Linnaeus, Coontail. Cp (GA, NC, SC, VA), Mt (GA, VA), Pd (VA): ponds, pools, slow-moving streams; uncommon. May-September. Newfoundland west to AK, south to s. FL, TX, CA, and south through the West Indies and Central America to South America. [= RAB, C, F, FNA, G, GW, K, W, S, Z]

Ceratophyllum echinatum A. Gray in Torrey & A. Gray. Cp (NC, SC, VA), Mt (GA, VA), Pd (VA): ponds, pools, slow-moving streams; uncommon. May-September. Newfoundland west to Ontario and n. MN, south to c. peninsular FL and e. TX; also in British Columbia, WA, and OR. [= RAB, C, F, FNA, G, K, S, Z; < *C. muricatum* Chamisso – GW (also see *C. australe*); = *C. submersum* Linnaeus var. *echinatum* (A. Gray) Wilmot-Dear]

CHENOPODIACEAE Ventenat 1799 (Goosefoot Family)

CHENOPODIACEAE

A family of over 100 genera and about 1450-1500 species, nearly cosmopolitan, but most diverse in subtropical and temperate regions (Judd & Ferguson 1999). Perhaps better united with the Amaranthaceae. References: Welsh, Crompton, & Clemants in FNA (2003b); Judd & Ferguson (1999)=Z; Kühn in Kubitzki, Rohwer, & Bittrich (1993).

{Note: several of the genera below have been treated in very different ways by various authors. Complicating the situation is the pantemperate or pantropical distribution of some species, questions of application of names having priority, and the use of technical characters not readily observed on herbarium specimens. The treatments below of *Salicornia, Sarcocornia, Atriplex*, and *Suaeda* may require considerable change prior to publication}

1 Leaves opposite, reduced to scales a few mm long, clasping and appressed against the succulent stem; flowers in groups of 3, sunken into the stem; [subfamily *Salicornioideae*, tribe *Salicornieae*].
2 Annual from a taproot; central flower (of each group of 3) considerably longer than the 2 lateral flowers ..... ***Salicornia***
2 Perennial from a horizontal rhizome; central flower (of each group of 3) slightly or not at all longer than the 2 lateral flowers ..... ***Sarcocornia***
1 Leaves mostly or entirely alternate (the lower sometimes opposite), not reduced to appressed scales; flowers not usually grouped into groups of 3, not sunken into the stem.
3 Fruit enclosed and concealed by paired accrescent bracteoles (these usually deltoid, diamond-shaped, or ovoid).
4 Leaves pale green to silvery green; stigmas 2; plants without basal leaves, the stems freely and rather divergently branched; [native or introduced, primarily in saline situations]; [subfamily *Chenopodioideae*, tribe *Atripliceae*] ..... ***Atriplex***
4 Leaves bright to dark green; stigmas 4-5; plants with basal leaves, the flowering stems erect, strict or with ascending branches in the inflorescence; [introduced, frequently cultivated as a garden vegetable, rarely escaped]; [subfamily *Chenopodioideae*, tribe *Atripliceae*] ..... ***Spinacia***
3 Fruit enclosed by the persistent calyx.
5 Leaves petiolate, lanceolate or wider, the larger leaves generally toothed, not succulent or only slightly so; [subfamily *Chenopodioideae*].
6 Fruit dehiscent; ovary half-inferior; roots usually enlarged; [tribe *Beteae*] ..... ***Beta***
6 Fruit indehiscent; ovary superior; roots not enlarged.
7 Fruiting calyx not winged, the lobes flat, keeled, or hooded; [tribe *Chenopodieae*] ..... ***Chenopodium***
7 Fruiting calyx winged horizontally; [tribe *Camphorosmeae*] ..... ***Cycloloma***
5 Leaves sessile, linear, entire, succulent or not.
8 Leaves spine-tipped; [subfamily *Salsoloideae*; tribe *Salsoleae*] ..... ***Salsola***
8 Leaves not spine-tipped.
9 Leaves pubescent to villous; [subfamily *Chenopodioideae*, tribe *Camphorosmeae*] ..... ***Bassia***
9 Leaves glabrous; [subfamily *Salsoloideae*, tribe *Suaedeae*] ..... ***Suaeda***

Atriplex Linnaeus 1753 (Orach)

A genus of about 300 species, herbs and shrubs, of cosmopolitan distribution. References: Judd & Ferguson (1999)=Z; Clemants (1992)=Y; Welsh in FNA (2003b); Kühn in Kubitzki, Rohwer, & Bittrich (1993). Treatment based closely on Welsh in FNA (2003b)

Identification notes: There are a number of idiosyncratic characters that are used for the identification of the species of *Atriplex*. Many important characters are associated with the mature fruits. The fruit is closely invested by 2 **bracteoles**, which are variously shaped and ornamented. Mature seeds are dimorphic in most of our species, with **large, brown seeds** and **small, black seeds**. The **radicle** of the seeds is variously apical, lateral, or basal (which can be seen by observing the seed through the clarified bracteoles or with strong transmitted light).

1 Leaves white to gray, densely and finely scurfy, especially adaxially.
2 Seeds dimorphic, black and brown; branches not angled; [introduced, of disturbed situations]; [subgenus *Atriplex*, section *Semibaccata*] ..... ***[A. semibaccata]***
2 Seeds monomorphic, brown; branches obtusely angled; [native, of coastal saline situations]; [subgenus *Obione*, section *Obione*, subsection *Arenariae*].
3 Fruiting bracteoles (3.5-) 4.5-7 mm long, 3.5-5.6 mm wide, longer than broad; faces with or without appendages; [of NC northward] ..... ***A. mucronata***
3 Fruiting bracteoles 2.5-4.5 mm long, 2.6-5 mm wide, as wide as or wider than long; faces with appendages; [of NC southward] ..... ***A. pentandra***
1 Leaves usually green on both surfaces, glabrous or only sparingly powdery or scurfy; [subgenus *Atriplex*, section *Teutliopsis*].
4 Fruiting bracteoles not thickened with spongy tissue.
5 Bracteoles rhombic to diamond-shaped, broadly cuneate at the base; brown seeds broadly elliptic, (1.5-) 2.1-3.0 mm wide; seed radicle lateral; [of saline coastal habitats] ..... ***A. dioica***
5 Bracteoles triangular, nearly truncate across the bottom; brown seeds round, 2.5-3.1 (-3.7) mm wide; seed radicle subbasal; [primarily ruderal, of inland situations] ..... ***A. patula***
4 Fruiting bracteoles thickened with spongy tissue, especially toward the base.
6 Seeds ellipsoid, wider than long; leaves thickened in texture ..... ***A. dioica***
6 Seeds disc-shaped, as wide as long; leaves thin in texture.
7 Lower leaves linear or ovate-lanceolate; brown seeds 2.0-2.8 mm wide; black seeds 1.5-2.0 mm wide; [of MD and PA northward] ..... ***[A. littoralis]***
7 Lower leaves triangular-hastate; brown seeds 1.0-2.5 mm wide; black seeds 1.0-1.5 mm wide; [widespread in our area, primarily in the outer Coastal Plain] ..... ***A. prostrata***

Atriplex dioica Rafinesque. Cp (NC, VA?), Mt (VA): brackish flats; rare? July-frost. Newfoundland west to AK, south to NC and CA. [= FNA; = *Atriplex subspicata* (Nuttall) Rydberg – K, Y; < *A. littoralis* Linnaeus – C, misapplied; < *A. patula* Linnaeus var. *littoralis* (Linnaeus) A. Gray – F, misapplied]

Atriplex mucronata Rafinesque, Seabeach Orach. Cp (NC, VA): ocean beaches, island-end flats; uncommon. July-frost. NH south to FL west to TX. This species and *A. pentandra* are closely related, and have been variously treated as species, subspecies, varieties, and forms. [= FNA; < *A. arenaria* Nuttall – RAB, C, G, GW, S, Y (also see *A. pentandra*); < *A. cristata* Humboldt and Bonpland ex Willenow – K (also see *A. pentandra*); < *A. pentandra* ssp. *arenaria* H.M. Hall & Clements]

* ***Atriplex patula*** Linnaeus, Spear Orach. Pd, Mt (VA): disturbed areas, inland saline areas; rare, native of Eurasia. July-frost. [= C, FNA, K, S, Y; < *A. patula* Linnaeus – RAB, W (also see *A. prostrata*); = *A. patula* var. *patula* – F, G]

Atriplex pentandra (Jacquin) Standley in N.L. Britton et al., Seabeach Orach. Cp (GA, NC, SC): ocean beaches, island-end flats; uncommon. July-frost. NC to FL, west to TX; West Indies; South America. This species and *A. mucronata* are closely related, and have been variously treated as species, subspecies, varieties, and forms. [= FNA; < *A. arenaria* Nuttall – RAB, C, G, GW, S, Y (also see *A. mucronata*); < *A. cristata* Humboldt and Bonpland ex Willenow – K (also see *A. mucronata*); = *A. pentandra* ssp. *pentandra*]

* ***Atriplex prostrata*** Boucher ex A.P. de Candolle, Thinleaf Orach, Fat-hen. Cp (NC, SC, VA), Mt? (VA?): marsh edges, brackish flats; uncommon. July-frost. Widespread in e. North America, also in w. North America and Eurasia, usually considered to be native of Eurasia. {Is Saltville VA occurrence of *Atriplex* this taxon?} [= FNA, K, Y; *? A. hastata* Linnaeus – C, S, misapplied; < *A. patula* Linnaeus – RAB, W, in part; *? A. patula* var. *hastata* (Linnaeus) A. Gray – F, G, GW]

* *Atriplex littoralis* Linnaeus, Narrow-leaved Atriplex. Introduced south to PA (FNA) and MD (Kartesz 1999). [= FNA, K; < *A. littoralis* Linnaeus – C; < *A. patula* Linnaeus var. *littoralis* (Linnaeus) A. Gray – F]

* *Atriplex semibaccata* R. Brown, Australian Saltbush, Berry Saltbush. Introduced at various localities in North America, including DC (FNA). [= FNA, K]

* *Atriplex tatarica* Linnaeus, Tatarian Orach. Introduced on ballast at scattered localities, including AL, FL, NJ, and PA (FNA). [= FNA; *? A. lampa* Gillies – K, S, misapplied] {not keyed}

Bassia Allioni 1766 (Bassia)

A genus of about 21 species, herbs and dwarf shrubs, of Europe, Asia, Africa, and North America. All or part (the annuals) of *Kochia* are now sometimes merged into *Bassia* (Judd & Ferguson 1999). References: Judd & Ferguson (1999)=Z; Mosyakin in FNA (2003b); Blackwell, Baechle, & Williamson (1978)=Y; Collins & Blackwell (1979)=X; Kühn in Kubitzki, Rohwer, & Bittrich (1993).

1 Calyx segments (1 lower and 2 upper) bearing stout knobs ..... ***B. hirsuta***
1 Calyx segments (all 5) bearing a horizontal wing ..... ***B. scoparia***

* ***Bassia hirsuta*** (Linnaeus) Ascherson, Bassia. Cp (VA): beaches, salt marshes; uncommon, native of Eurasia. August-October. [= C, F, FNA, G, K, X, Z]

* ***Bassia scoparia*** (Linnaeus) A.J. Scott, Summer-cypress. Pd, Mt (VA), Cp (SC, VA): waste ground, particularly along railroad tracks, also in waste areas near wool-combing mill; uncommon, native of Eurasia. Reported for SC (Berkeley Co.) by Pittillo & Brown (1988). [= Z; = *Kochia scoparia* (Linnaeus) Schrader – C, F, G, K, W, Y; > *Kochia scoparia* ssp. *scoparia* – FNA]

Beta Linnaeus 1753 (Beet)

A genus of about 6-12 species, herbs, of Mediterranean region and w. and c. Asia. References: Schultz in FNA (2003b); Judd & Ferguson (1999)=Z; Kühn in Kubitzki, Rohwer, & Bittrich (1993).

* ***Beta vulgaris*** Linnaeus *ssp.* ***vulgaris***, Garden Beet, Swiss Chard, Ruby Chard, Mangel-wurzel. Cp, Pd, Mt (NC, SC, VA): commonly cultivated, rarely escaped or persisting, native of Eurasia. [= FNA; > *B. vulgaris* var. *vulgaris* – G; > *B. vulgaris* var. *cicla* – G; < *B. vulgaris* – K, Z; *? B. vulgaris* – S]

Chenopodium Linnaeus 1753 (Goosefoot, Lamb's-quarters, Pigweed)

A genus of about 140 species, herbs, shrubs, and small trees, of nearly cosmopolitan distribution. References: Clemants & Mosyakin in FNA (2003b); Judd & Ferguson (1999)=Z; Wahl (1954)=Y; Mosyakin & Clemants (1996); Kühn in Kubitzki, Rohwer, & Bittrich (1993). Draft key based closely on Clemants & Mosyakin in FNA (2003b). [also see *Dysphania*]

1 Seeds vertical or both horizontal and vertical; leaf blades glabrous or occasionally sparsely farinose; [subgenus *Blitum*].
  2 Perianth segments 5; plants perennial; [subgenus *Blitum*, section *Agathophytum*] ..... ***[Ch. bonus-henricus]***
  2 Perianth segments 3; plants annual.
    3 Leaves lancolate or oblong, glaucous on the lower surface ..... ***Ch. glaucum***
    3 Leaves triangular or rhombic, green on the lower surface.
      4 Leaves farinose on the lower surface; [subgenus *Blitum*, section *Degenia*] ..... ***Ch. macrospermum***

4 Leaves glabrous on the lower surface.
5 Glomerules 3-10 mm in diameter, borne sessile on unbranched terminal and occasionally axillary spikes; perianth segments fleshy and red at maturity; [subgenus *Blitum*, section *Blitum*] ..... ***Ch. capitatum* var. *capitatum***
5 Glomerules 2-5 mm in diameter, borne sessile on lateral branched spikes; perianth segments membranaceous, green at maturity; [subgenus *Blitum*, section *Pseudoblitum*] ..... ***[Ch. rubrum]***
1 Seeds all horizontal; leaf blades usually farinose; [subgenus *Chenopodium*].
6 Flowers individually disposed in panicles; leaf blades glabrous; [subgenus *Chenopodium*, section *Grossefoveata*] ..... ***Ch. simplex***
6 Flowers in loose or sense glomerules; leaf blades usually farinose; [subgenus *Chenopodium*, section *Chenopodium*].
7 Primary leaves linear, linear-lanceolate, at least 2-3× as long as wide, usually untoothed and unlobed (but often with 2 basal lobes in *Ch. foggii*); [subsection *Leptophylla*].
8 Perianth spreading from fruit at maturity; plants strictly erect ..... ***Ch. pratericola***
8 Perianth enclosing the fruit at maturity; plants erect to spreading.
9 Plants usually spreading; perienth segments obtuse; leaf blades usually unlobed ..... ***[Ch. desiccatum]***
9 Plants erect; perianth segments acute; leaf blades often with basal lobes ..... ***Ch. foggii***
7 Primary leaves ovate, rhombic, triangular, or lanceolate, usually with basal lobes and often also with additional teeth on the margins.
10 Seeds honeycomb-pitted; [subsection *Favosa*].
11 Seeds 1.2-2.0 mm in diameter.
12 Style bases with yellow area; seeds 1.2.1.5 mm in diameter ..... ***Ch. berlandieri* var. *zschackei***
12 Style bases without yellow area; seeds 1.3-2.0 mm in diameter.
13 Inflorescences large and drooping; seeds 1.7-2.0 mm in diameter ..... ***Ch. berlandieri* var. *bushianum***
13 Inflorescences small and erect; seeds 1.3-1.9 mm in diameter ..... ***Ch. berlandieri* var. *macrocalycium***
11 Seeds 1.0-1.3 mm in diameter.
14 Leaves rhombic-triangular, usually without basal lobes; inflorescences becoming bractless ..... ***Ch. berlandieri* var. *boscianum***
14 Leaves 3-lobed; inflorescences with or without bracts.
15 Inflorescences bractless ..... ***[Ch. berlandieri* var. *berlandieri]***
15 Inflorescences with leafy bracts ..... ***Ch. berlandieri* var. *zschackei***
10 Seeds smooth or areolate.
16 Leaves triangular.
17 Seeds 1.0-1.5 mm in diameter, the seed margin sharp; leaf blades without basal lobes; [subsection *Undata*] ..... ***Ch. murale***
17 Seeds 0.8-1.2 mm in diameter, the seed margin rounded; leaf blades often with basal lobes; [subsection *Urbica*] ..... ***[Ch. urbicum]***
16 Leaves ovate to broadly ovate, rhombic, or lanceolate, variously lobed or toothed.
18 Leaf blades without teeth, except for the often present basal lobes or teeth.
19 Leaves not aromatic; flowers in each glomerule in markedly different stages of development; [subsection *Standleyana*] ..... ***Ch. standleyanum***
19 Leaves strongly malodorous; flowers in each glomerule in similar stages of development; [subsection *Chenopodium*] ..... ***[Ch. vulvaria]***
18 Leaf blades with lateral teeth and often basal lobes; [subsection *Chenopodium*].
20 Leaves widely ovate, 1× as long as wide; lateral leaf lobes as large as the terminal lobe ..... ***Ch. opulifolium***
20 Leaves ovate, rhombic, or lanceolate, >1× as long as wide; lateral leaf lobes smaller than the terminal lobe (or absent).
21 Leaf margins tapering to an acute apex; leaves ovate, rhombic, or lanceolate; inflorescence branched (spicate or cymose) . ..... ***Ch. album***
21 Leaf margins more or less parallel below the obtuse apex; leaves lanceolate yo narrowly elliptic; inflorescence generally moniliform, not profusely branched ..... ***Ch. strictum***

Chenopodium album Linnaeus, Lamb's-quarters, Pigweed. Cp, Pd, Mt (GA, NC, SC, VA): disturbed soils, gardens; common. June-November. As broadly interpreted, this species includes both native and alien races and is now distributed nearly worldwide. [= FNA, W; < *Ch. album* – RAB, in part (also including *Ch. berlandieri* and all vars); > *Ch. album* Linnaeus var. *album* – K; > *Ch. album* Linnaeus var. *missouriense* (Aellen) I.J. Bassett & C.W. Crompton – K; > *Ch. album* – C, in the narrow sense; < *Ch. album* – G; > *Ch. missouriense* Aellen – C, Y; > *Ch. paganum* – F, S, misapplied; < *Ch. album* – FNA, G, in part; > *Ch. album* var. *album* – Y; > *Ch. album* var. *lanceolatum* (Muhlenberg ex Willdenow) Coss. & Germ. – Y; > *Ch. giganteum* Don – Y; > *Ch. lanceolatum* Muhlenberg ex Willdenow]

* ***Chenopodium atrovirens*** Rydberg. Cp (SC): waste areas near wool-combing mills; rare, perhaps merely a waif, native of w. North America. [= FNA, K] {not yet keyed}

*? ***Chenopodium berlandieri*** Moquin-Tandon *var. **boscianum*** (Moquin-Tandon) H.A. Wahl. Cp (GA, NC, SC, VA): beaches, marshes; uncommon. August-September. FL west to e. TX; with scattered occurrences further north (these of unknown nativity). [= FNA, K, Y; < *Ch. album* – RAB]

Chenopodium berlandieri Moquin-Tandon *var. **bushianum*** (Aellen) Cronquist, Soybean Goosefoot. Cp (NC, SC, VA): disturbed areas, alluvial forests; rare. June-November. ME west to ND, south to VA, TN, LA, and KS. [= C, FNA, K; < *Ch. album* – RAB, G; < *Ch. berlandieri* – S; = *Ch. bushianum* Aellen – Y]

Chenopodium berlandieri Moquin-Tandon *var. **macrocalycium*** (Aellen) Cronquist. Cp (NC, SC, VA): coastal sands, beaches; rare. August-October. Nova Scotia south to FL. [= C, FNA, K; < *Ch. album* – RAB, G; = *Ch. macrocalycium* Aellen – Y]

* ***Chenopodium berlandieri*** Moquin-Tandon *var. **sinuatum*** (J. Murr) H.A. Wahl. Cp (SC): waste areas near wool-combing mills; rare, perhaps merely a waif, native of sw. North America. [= FNA, K, Y] {not yet keyed}

*? ***Chenopodium berlandieri*** Moquin-Tandon *var. **zschackei*** (J. Murr) J. Murr ex Ascherson. Mt (VA), {NC, SC}. Ontario west to AK, south to LA, CA, and Mexico; scattered eastern occurrences may be introduced. [= C, FNA, K, Y; < *Ch. album* – RAB]

Chenopodium foggii H.A. Wahl. Mt (NC, VA): rocky, mountain slopes; rare. July. ME and Ontario south to w. VA and w. NC. [= FNA, K, Y; < *Ch. pratericola* Rydberg – C, in part]

* ***Chenopodium fremontii*** S. Watson. Cp (SC): waste areas near wool-combing mills; rare, perhaps merely a waif, native of w. North America. [= FNA; = *Ch. fremontii* var. *fremontii* – K, Y] {not yet keyed}

* ***Chenopodium glaucum*** Linnaeus, Oakleaf Goosefoot. Pd (VA), {SC}: disturbed areas; rare, native of ne. North America and Europe. [= FNA, K; < *Ch. glaucum* – C, F, G, in a broad sense; = *Ch. glaucum* var. *glaucum* – Y]

* ***Chenopodium incanum*** (S. Watson) Heller *var.* ***incanum.*** Cp (SC): waste areas near wool-combing mills; rare, perhaps merely a waif, native of w. North America. [=FNA, K; *? Ch. incanum* – Y] {not keyed}

* ***Chenopodium macrospermum*** Hooker f. Cp (NC): disturbed areas; rare, native of South America. Reported for NC (FNA 2003b). [= FNA; > *Ch. macrospermum* Hooker f. var. *farinosum* (S. Watson) J.T. Howell – K; > *Ch. macrospermum* Hooker f. var. *halophilum* (Phil.) Standley – K, Y]

* ***Chenopodium murale*** Linnaeus, Nettleleaf Goosefoot, Sowbane. Cp (GA, NC, SC, VA): disturbed areas; rare, native of Europe, Asia, and n. Africa. May-November. [= RAB, C, F, FNA, G, K, S, W, Y]

* ***Chenopodium opulifolium*** Schrader ex Koch & Ziz, Gray Goosefoot. Cp (NC): disturbed areas on ship's ballast; rare, native of s. Europe. [= RAB, C, FNA, K]

Chenopodium pratericola Rydberg, Narrowleaf Goosefoot. Cp (GA, NC, SC, VA): sandy soils, roadsides, disturbed areas; uncommon. May-November. Maine and Ontario west to Yukon, south to FL, TX, and CA. [= FNA, K; = *Ch. desiccatum* A. Nelson var. *leptophylloides* (J. Murray) H.A. Wahl – RAB, W, misapplied; < *Ch. pratericola* – C (also see *Ch. foggii*); *? Ch. leptophyllum* – F, G, misapplied; = *Ch. pratericola* var. *pratericola* – Y]

Chenopodium simplex (Torrey) Rafinesque, Mapleleaf Goosefoot. Mt (NC, VA), Pd (VA): in shaded situations, generally at cliff bases; rare (NC Rare, VA Watch List). July-October. Nova Scotia west to AK, south to nw. NC, LA, TX, and UT. [= FNA, K; = *Ch. gigantospermum* Aellen – C, W, Y; = *Ch. hybridum* Linnaeus var. *gigantospermum* (Aellen) Rouleau – F; < Ch. hybridum – G; = *Ch. hybridum* Linnaeus ssp. *gigantospermum* (Aellen) Hultén]

Chenopodium standleyanum Aellen, Woodland Goosefoot. Mt, Pd, Cp (VA), {GA, NC, SC}: rock outcrops, steep slopes, shaded disturbed soils; uncommon? Québec west to ND, south to FL and e. TX. [= RAB, C, FNA, G, K, W; < *Ch. boscianum* – F, S, misapplied]

Chenopodium berlandieri Moquin-Tandon var. *berlandieri.* (SC, VA). Reported for SC and VA by Kartesz (1999), but not attributed to our area by FNA (2003b). [= FNA, K]

* *Chenopodium bonus-henricus* Linnaeus, Good King Henry, is cultivated and is known from as far south as MD and PA. [= FNA, C, K, Y]

Chenopodium capitatum (Linnaeus) Ascherson var. *capitatum*, Indian-paint, Strawberry-blite, a native, occurs south to scattered locations in PA (Rhoads & Klein 1993). [= FNA, Y; < *Ch. capitatum* – C; = *Ch. capitatum* – K, in a narrow sense; *Blitum capitatum* Linnaeus]

* *Chenopodium desiccatum* A. Nelson. (SC?, VA?). (VA Watch List). {Resolve against *Ch. pratericola*}. [= FNA; *Ch. pratericola* var. *oblongifolium* (S. Watson) H.A. Wahl – Y]

* *Chenopodium rubrum* Linnaeus, Red Goosefoot, alien, reported as far south as MD and in other widely scattered sites (such as AL) (Kartesz 1999) and PA (FNA). [= C, K; > *Ch. rubrum* var. *rubrum* – FNA, Y]

* ***Chenopodium strictum*** Roth. Scattered locations south to se. PA. Reported for SC (Kartesz 1999). [= FNA; = *Chenopodium album* Linnaeus var. *striatum* (Krašan) comb. nov. ined. – K; > *Chenopodium strictum* ssp. *glaucophyllum* (Aellen) Aellen & Just.; > *Chenopodium strictum* Roth var. *glaucophyllum* (Aellen) H.A. Wahl – Y]

* *Chenopodium urbicum* Linnaeus, City Goosefoot, occurs as an introduction in waste ground south to MD, s. PA (Rhoads & Klein 1993), WV, KY, and TN (Kartesz 1999, FNA 2003b). [= C, FNA, K, Y]

* *Chenopodium vulvaria* Linnaeus, Stinking Goosefoot, is introduced at scattered locations in eastern North America, as in MD, PA, DE, FL (FNA 2003b). [= C, FNA, K, Y]

Cycloloma Moquin 1840 (Winged-pigweed)

A monotypic genus, an annual herb, native of c. and w. North America. References: Mosyakin in FNA (2003b); Judd & Ferguson (1999)=Z; Kühn in Kubitzki, Rohwer, & Bittrich (1993).

* ***Cycloloma atriplicifolium*** (Sprengel) Coulter, Winged-pigweed. Cp (NC, SC, VA): sandy fields; uncommon, rare north of SC, native of w. North America, adventive in our area. May-frost. [= RAB, C, F, FNA, G, GW, K, S]

Dysphania R. Brown 1810

A genus of about 32 species, annual and perennial herbs, nearly cosmopolitan, mostly in the tropics, subtropics, and warm temperate areas. References: Clemants & Mosyakin in FNA (2003b); Wahl (1954)=Y.

1 Leaves deeply pinnately lobed, the lobes linear; plant perennial; mature calyx shallowly toothed, obovoid-urceolate, reticulate-veiny; [section *Adenois*] ..... ***D. multifida***
1 Leaves serrate to sinuate-pinnatifid, the lobes broad-based and triangular-tapered; plant annual; mature calyx deeply lobed, neither reticulate nor prominently veined.
2 Flowers in a slender thyrsoid inflorescence of lateral cymes; [section *Botryoides*] ..... ***D. botrys***
2 Flowers in dense glomerules arranged in spikes and panicles.
3 Leaf blades 2-8 cm long; seeds mostly horizontal; stems 3-15 dm tall; [section *Adenois*].
4 Inflorescences foliose throughout ..... ***D. ambrosioides***
4 Inflorescences leafless (leaves in the inflorescence absent or shorter than the glomerules) ..... ***D. anthelmintica***
3 Leaf blades 0.5-2.7 cm long; seeds vertical; stems 0.5-5 dm tall; [section *Orthospora*].
5 Perianth segments keeled and crested ..... ***D. cristata***
5 Perianth segments rounded ..... ***D. pumilio***

*? ***Dysphania ambrosioides*** (Linnaeus) Mosyakin & Clemants, Mexican-tea. Cp, Pd, Mt (GA, NC, SC, VA): disturbed habitats; common, probably native southward. Widespread in North America to South America, the original range unclear. [= FNA; < *Chenopodium ambrosioides* – RAB, C, G, W, Y (also see *Dysphania anthelminitica*); = *Ch. ambrosioides* var. *ambrosioides* – F, in a narrow sense; < *Ch. ambrosioides* var. *ambrosioides* – K (also see *Dysphania anthelmintica*); < *Ambrina ambrosioides* (Linnaeus) Spach – S (also see *D. anthelmintica*); < *Teloxys ambrosioides* (Linnaeus) W.A. Weber]

Dysphania anthelmintica (Linnaeus) Mosyakin & Clemants, Wormseed. Cp (GA, NC, SC, VA): dunes; common. NY south to FL, west to TX; Mexico, West Indies, Bermuda, Central America; scattered inland in North America probably as an introduction. [= FNA; < *Ch. ambrosioides* – RAB, C, G, W, Y; = *Ch. ambrosioides* var. *anthelminticum* (Linnaeus) A. Gray – F; < *Ch. ambrosioides* var. *ambrosioides* – K; < *Ambrina ambrosioides* (Linnaeus) Spach – S]

* ***Dysphania botrys*** (Linnaeus) Mosyakin & Clemants, Jerusalem-oak, Feather-geranium. Cp (NC, VA): disturbed areas, ship's ballast; rare, native of Eurasia. August-October. [= FNA; = *Chenopodium botrys* Linnaeus – RAB, C, F, G, K, Y; = *Botrydium botrys* (Linnaeus) Small – S; = *Teloxys botrys* (Linnaeus) W.A. Weber]

* ***Dysphania cristata*** (F. Mueller) Mosyakin & Clemants, Crested Goosefoot. Cp (SC): wool mill waste areas; rare, native of Australia. July. [= FNA; = *Chenopodium cristatum* (F. Mueller) F. Mueller – K]

* ***Dysphania multifida*** (Linnaeus) Mosyakin & Clemants, Cutleaf Goosefoot, Scented Goosefoot. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): disturbed areas, rare, native of South America. [= FNA; = *Chenopodium multifidum* Linnaeus – C, K, Y; = *Roubieva multifida* (Linnaeus) Moquin-Tandon – RAB, F, S; = *Teloxys multifida* (Linnaeus) W.A. Weber]

* ***Dysphania pumilio*** (R. Brown) Mosyakin & Clemants, Clammy Goosefoot. Pd (GA, SC, VA): disturbed areas; rare, native of Australia. First reported for South Carolina by Hill & Horn (1997). Also known from DC. [= FNA; = *Chenopodium pumilio* R. Brown – C, G, K, Y; < *Ch. carinatum* R. Brown – F, misapplied; = *Teloxys pumilio* (R. Brown) W. A. Weber]

Salicornia Linnaeus 1753 (Glasswort)

A genus of about 10-20 species, succulent herbs, of cosmopolitan distribution. References: Judd & Ferguson (1999)=Z; Ball in FNA (2003b); Kadereit et al. (2007); Kühn in Kubitzki, Rohwer, & Bittrich (1993). [also see *Sarcocornia*]

1 Scale-leaves below the spikes mucronate; spikes mostly 4.5-6 mm in diameter ..... ***S. bigelovii***
1 Scale-leaves below the spike obtuse to slightly acute; spikes mostly 1.5-4.5 mm in diameter ..... ***S. virginica***

Salicornia bigelovii Torrey, Dwarf Glasswort, Dwarf Saltwort. Cp (GA, NC, SC, VA): salt pannes in coastal marshes; common. July-October. ME (Nova Scotia?) south to FL, west to TX; also West Indies; also CA. [= RAB, C, F, FNA, G, GW, K, S, Z]

Salicornia virginica Linnaeus, Samphire. Cp (GA, NC, SC, VA), Mt (VA): salt pannes in coastal marshes; common. July-October. Nova Scotia and Québec south to FL. It is unclear whether our eastern North American plants are distinct from European plants of the *S. europaea* complex. Recent European workers recognize multiple species in the *S. europaea* complex. *S. europaea* (in the narrow sense) is a diploid species; our plants are apparently all tetraploid and may or may not be conspecific with one of the European tetraploid entities in this complex. Until further studies are completed, it seems best to recognize our plants as distinct. The oldest name available for the American plants is *Salicornia virginica* Linnaeus, which has unfortunately been generally misapplied to the perennial glasswort, *Sarcocornia perennis*. [= K; = *Salicornia depressa* Standley in N.L. Britton et al. – FNA; < *Salicornia europaea* Linnaus – RAB, C, G, GW, S, W, Z, misapplied; >< *Salicornia europaea* var. *europaea* – F]

Salicornia maritima Wolff & Jefferies, Sea Saltwort, supposedly occurs south to MD (Kartesz (1999); FNA (2003b) does not map it south of the Canadian Maritimes. [= FNA, K] {not yet mapped; synonymy incomplete}

Salsola Linnaeus 1753 (Saltwort, Russian-thistle)

A genus of about 116 species, herbs and shrubs, of Europe, Asia, n. Africa, and America. References: Mosyakin in FNA (2003b); Judd & Ferguson (1999)=Z; Kühn in Kubitzki, Rohwer, & Bittrich (1993). Treatment based on Mosyakin in FNA (2003b).

1 Leaf blades not fleshy in fresh material, narrowly linear to filiform, < 1 mm wide in herbarium material; leaves with a weak apical spine; [of disturbed areas] ..... ***S. tragus***
1 Leaf blades fleshy in fresh material, linear, 1-2 mm wide in dried specimens; leaves with a strong apical spine; [of sea-beaches].
  2 Perianth segments with a weak non-spiny apex and obscure midvein; bracteoles connate at base, swollen ..... ***S. caroliniana***
  2 Perianth segments with a subspinose apex and prominent midvein; bracteoles distinct, not swollen ..... ***S. kali***

*? ***Salsola caroliniana*** Walter, Southern Saltwort. Cp (GA, NC, SC, VA): upper beaches, fore-dunes, and island-end flats; uncommon. June-frost. MA to FL, west to TX and Mexico; Eurasia, n. Africa; introduced on the west coast of North America. Generally considered to be introduced in North America, but it may well be a native. [< *S. kali* Linnaeus – RAB, C, S, Z, in part; = *S. kali* var. *caroliniana* (Walter) Nuttall – F; < *S. kali* Linnaeus ssp. *pontica* (Pallas) Mosyakin – FNA, K; < *S. kali* var. *kali* – G, in part]

*? ***Salsola kali*** Linnaeus, Northern Saltwort. Cp (NC, SC, VA): upper beaches, fore-dunes, and island-end flats; uncommon. June-frost. Newfoundland to SC; Europe. Generally considered to be introduced in North America, but it may well be a native. [< *S. kali* Linnaeus – RAB, C, S, Z, in part; = *S. kali* var. *kali* – F; = *S. kali* ssp. *kali* – FNA, K; < *S. kali* var. *kali* – G]

* ***Salsola tragus*** Linnaeus, Russian Thistle, Tumbleweed. Mt (VA), Pd (GA?, NC, SC?, VA): disturbed areas; rare, native of Eurasia. June-frost. [= C, FNA, K; < *S. kali* Linnaeus – RAB, in part; = *S. kali* var. *tenuifolia* Tausch – F, G; = *S. pestifer* A. Nelson – S, Z; = *S. iberica* Sennen & Pau]

Sarcocornia A.J. Scott 1978 (Woody Glasswort)

A genus of about 15 species, dwarf shrubs. Of controversial and uncertain taxonomic status, *Sarcocornia* is sometimes included in *Salicornia*, sometimes in *Arthrocnemum*, and sometimes maintained as a separate genus. References: Judd & Ferguson (1999)=Z; Ball in FNA (2003b); Kühn in Kubitzki, Rohwer, & Bittrich (1993).

Sarcocornia pacifica (Standley) A.J. Scott, Woody Glasswort, Perennial Glasswort. Cp (GA, NC, SC, VA): coastal salt marshes; common. July-October. NH south to FL; CA south into w. Mexico. Ball in FNA (2003b) treats all North American *Sarcocornia* as *Sarcocornia pacifica*, which is also present on the Pacific coast of North America. *Sarcocornia perennis* is restricted to the Pacific coast of North America, as well as being in Europe, sw. Asia, and Africa. [= FNA; *? Sarcocornia perennis* (P. Miller) A.J. Scott – K, apparently misapplied to east Coast material; *? Salicornia virginica* Linnaeus – RAB, C, F, G, GW, misapplied; *? Salicornia perennis* P. Miller – S, Z, apparently misapplied to East Coast material; *? Arthrocnemum perenne* (P. Miller) Moss; *? Salicornia ambigua* Michaux]

Spinacia Linnaeus 1753 (Spinach)

A genus of 3 species, herbs, of n. Africa and w. Asia. References: Judd & Ferguson (1999)=Z; Schultz in FNA (2003b); Kühn in Kubitzki, Rohwer, & Bittrich (1993).

* ***Spinacia oleracea*** Linnaeus, Spinach. Mt, Pd, Cp (NC, SC, VA): commonly grown in gardens, rarely persisting, native of Eurasia. [= F, FNA, G, K, S, Z]

Suaeda Forsskål ex Scopoli 1777 (Sea-blite)

A genus of about 100 species, herbs and subshrubs, of cosmopolitan distribution. References: Judd & Ferguson (1999)=Z; Ferren & Schenk in FNA (2003b); Hopkins & Blackwell (1977)=Y; Fisher et al. (1997); Kühn in Kubitzki, Rohwer, & Bittrich (1993).

1 Calyx segments keeled on the back; flowers in 1-3-flowered glomerules, these aggregated in a dense panicle; seeds dimorphic, black seeds shiny, 1-1.8 mm in diameter, brown seeds dull, 1.5-2.6 mm in diameter ..... ***S. linearis***
1 Calyx segments rounded or obscurely keeled on the back; flowers in axillary glomerules of 1-3 (-4) flowers; seeds monomorphic, reddish brown or black, 1-2.2 mm in diameter ..... ***S. maritima***

Suaeda linearis (Elliott) Moquin, Southern Sea-blite. Cp (GA, NC, SC, VA): island-end flats, marsh edges, brackish flats; uncommon. August-frost. ME south to FL, west to TX; West Indies. [= C, F, FNA, G, GW, K, Y, Z; = *Dondia linearis* (Eliott) Heller – S]

*? ***Suaeda maritima*** (Linnaeus) Dumortier, White Sea-blite. Cp (VA): salt marsh edges and disturbed saline habitats; uncommon, possibly native, introduced, or a combination. Usually considered (as by C, GW, S) to be naturalized from Eurasia, but Ferren & Schenk (2003b) consider *S. maritima* in North America to include native and naturalized components. [= C, F, FNA, G, GW, Y, Z; > *S. maritima* ssp. *maritima* – K; = *Dondia maritima* (Linnaeus) Druce – S]

CHRYSOBALANACEAE R. Brown 1818 (Coco-plum Family)

A family of about 18 genera and 530 species, trees and shrubs, of tropical and subtropical areas, especially tropical America. References: Prance & Sothers (2003); Prance (1970).

Licania Aublet (Gopher-apple)

A genus of about 218 species, trees and shrubs, mainly of tropical America, but with a few species in Africa and Asia. References: Prance (1970)=X; Prance (1972)=Y; Prance & Sothers (2003)=Z.

Licania michauxii Prance, Gopher-apple, Ground-oak. Cp (GA, SC): sandhills, dry sandy pinelands; common (uncommon in GA, rare in SC). May-June; September-October. Se. SC south to s. FL, west to LA, becoming abundant and ubiquitous in dry sandy habitats in the southern part of its range. *L. michauxii* is one of 49 species of subgenus *Moquilea*, section *Moquilea*, which

is distributed from se. North America through Central America and the West Indies to South America; our species may be most closely related to *L. retifolia* Blake, a small tree of sw. Mexico and El Salvador (Prance 1970; Prance & Sothers 2003). A rare upright shrub form (to over 1.5 dm tall) has been found in Brevard County, FL, suggesting that *L. michauxii* evolved from a taller and more upright ancestor (Ward & Taylor 1999). [= K, X, Y, Z; = *Chrysobalanus oblongifolius* Michaux – RAB; > *Geobalanus oblongifolius* (Michaux) Small – S; > *Geobalanus pallidus* Small – S]

CISTACEAE A.L. de Jussieu 1789 (Rockrose Family)

A family of about 8 genera and 180 species, shrubs and herbs, of warm temperate and subtropical areas, centered in Mediterranean Europe. References: Arrington & Kubitzki in Kubitzki & Bayer (2003).

1 Shrub, usually much branched from the lower stem; flowers solitary, terminal on the branches; leaves 1-3 mm long and scalelike, or 3-7 mm long and acicular; capsule cylindric, > 2× as long as wide ..... ***Hudsonia***
1 Suffrutescent herb, usually little branched from the lower stem (often much branched above, and in *Lechea* with specialized short basal shoots at ground level); flowers axillary or terminal in branching inflorescences; leaves 4-50 mm long, mostly linear, lanceolate, oblong, or elliptic; capsule globose, subglobose, ellipsoid, ovoid, or obovoid, < 2× as long as wide.
2 Flowers of 2 types, the chasmogamous with 5 showy yellow petals, the cleistogamous lacking petals; pubescence of the stem stellate; leaves 10-50 mm long, alternate; plants with shoots of one type only, not producing short basal shoots; capsules 1.3-12.5 mm long, the larger capsules of chasmogamous flowers at least 2.0 mm long ..... ***Crocanthemum***
2 Flowers of 1 type, with 3 inconspicuous, dark red petals; pubescence of the stem simple; leaves 4-15 mm long (to 30 mm long in *L. pulchella* and *L. mucronata*), linear to linear-elliptic, 0.5-4 mm wide (to 13 mm wide in *L. mucronata*), alternate, opposite, or whorled; plants with shoots of two types, the short, prostrate to ascending basal shoots produced late in the season and overwintering; capsules 0.9-1.7 mm long ..... ***Lechea***

Crocanthemum Spach 1836 (Frostweed, Rockrose)

A genus of about 24 species, of eastern North America, California, Mexico, and s. South America. The eastern North American species previously attributed to *Helianthemum* are in a clade distinct from the Old World *Helianthemum*, and should be recognized as *Crocanthemum*. References: Daoud & Wilbur (1965)=Z; Wilbur & Daoud (1964)=Y; Arrington & Kubitzki in Kubitzki & Bayer (2003).

Identification notes: The identification of most of our species of *Crocanthemum* requires an understanding of the 2 types of flowers produced. Chasmogamous flowers have showy yellow petals and larger sepals, the distinct portion of the 2 linear outer sepals usually linear, (0.7-) 1.3-5.5 mm long, the distinct portion of the 3 broader inner sepals 2.5-12 (-14) mm long. Cleistogamous flowers lack petals and have smaller sepals, the distinct portion of the 2 linear outer sepals 0.2-3 mm long, the distinct portion of the 3 broader inner sepals 1.5-4.8 mm long. In some species (*C. canadense*, *C. bicknellii*, *C. propinquum*) the chasmogamous flowers open earlier (April-July) than the cleistogamous (June-September). In others (*C. corymbosum*, *C. georgianum*, *C. nashii*, *C. rosmarinifolium*), the two types of flowers open at the same time (March-June) or cleistogamous flowers are nearly always absent (*C. carolinianum*). Capsules from chasmogamous flowers are larger and contain more seeds than those from cleistogamous flowers.

1 Leaves 1-4 (-7) mm wide, (5-) 7-15× as long as wide; capsules from chasmogamous flowers 2-3 mm long, with 1-3 (-6) seeds; capsules from cleistogamous flowers 1.3-1.7 mm long, with 1 (-2) seeds ..... ***C. rosmarinifolium***
1 Leaves 2-20 mm wide, 2-6 (-8)× as long as wide; capsules from chasmogamous flowers (2.4-) 3-9 (-10.5) mm long, with 6-92 (-135) seeds; capsules from cleistogamous flowers 1.5-4.2 mm long, with 1-20 seeds.
2 Leaves basally disposed, the largest and most prominent leaves in a basal rosette; stem leaves 2-5 below those subtending flowers or fruits; stem with spreading trichomes to 2.5 mm long; lower surface of leaves sparsely pubescent, the surface readily visible; cleistogamous flowers usually never produced; capsules 6-9 (-10.5) mm long, with 80-92 (-135) papillate seeds ..... ***C. carolinianum***
2 Leaves predominantly cauline (in some species a rosette of closely spaced smaller and caducous leaves present at the ground's surface); stem leaves 5-20 below those subtending flowers or fruits; stem glabrate to densely puberulent (the pubescence not long and spreading); lower surface of leaves densely pubescent, hiding the surface; cleistogamous flowers regularly produced, either intermixed with the chasmogamous or in separate inflorescences; capsules 1.3-7 (-8.5) mm long, with 1-46 papillate, reticulate, or smooth seeds (pebbled to somewhat papillate in *H. nashii*).
3 Ovary and capsule densely stellate pubescent
4 Inflorescence a terminal umbellate cluster; fruit 2-valved ..... ***C. arenicola***
4 Inflorescence a thyrse, the flowers borne in clusters the axils of leaves; fruit 3-valved ..... ***C. nashii***
3 Ovary and capsule glabrous.
5 Chasmogamous flowers usually solitary, terminal or subterminal, later overtopped by lateral branches; seeds papillate, 35-46 per chasmogamous capsule, 5-9 (-12) per cleistogamous capsule; chasmogamous capsules (4-) 6-7 (-8.5) mm long, cleistogamous capsules (2-) 2.3-3.0 (-3.8) mm long; upper surface of cauline leaves with some long simple trichomes mixed with the shorter stellate trichomes ..... ***C. canadense***
5 Chasmogamous flowers usually (1-) 2-18, rarely overtopped by lateral branches (often 1-3 in cymes in *H. georgianum*); seeds smooth or reticulate, 12-35 per chasmogamous capsule, 1-20 per cleistogamous capsule; chasmogamous capsules (2.4-) 3.5-5.7 mm long, cleistogamous capsules 1.5-4.2 mm long; upper surface of cauline leaves with the shorter stellate trichomes only.
6 Chasmogamous and cleistogamous flowers borne together, the two types of flowers open at the same time (March-June); seeds smooth, 15-35 per chasmogamous capsule, 4-20 per cleistogamous capsule; outer sepals of the cleistogamous flowers 1.4-3.0 mm long; inner sepals of the cleistogamous flowers 2.0-4.8 mm long; [of the outer Coastal Plain (primarily barrier islands) of NC and SC].
7 Flowers borne in dense many-flowered flat-topped cymes terminating the stem and sometimes also the main branches; capsules of the cleistogamous flowers 1.6-3.8 mm long, with 4-8 (-10) seeds; pedicels and calyx with 0.5-1.5 mm long simple trichomes

mixed with the shorter stellate trichomes; outer sepals of both chasmogamous and cleistogamous flowers with an expanded, obtuse, spatulate tip, 0.3-1.2 mm wide ..... ***C. corymbosum***

7 Flowers borne in loose 1-7-flowered cymes or racemes at the ends of the main branches; capsules of the cleistogamous flowers 3.0-4.2 mm long, with 12-20 seeds; pedicels and calyx with short stellate pubescence only; outer sepals of both chasmogamous and cleistogamous flowers linear, 0.2-0.5 mm wide ..... ***C. georgianum***

6 Chasmogamous and cleistogamous flowers borne in separate inflorescences, the chasmogamous flowers opening earlier (April-July) than the cleistogamous flowers (June-September); seeds reticulate, 12-26 per chasmogamous capsule, 1-2 (-3) per cleistogamous capsule; outer sepals of the cleistogamous flowers 0.2-1.2 (-1.8) mm long; inner sepals of the cleistogamous flowers 1.7-2.5 (-3.0) mm long; [of the Mountains and less commonly the Piedmont of NC and VA, and very rarely the Coastal Plain of VA].

8 Stems mostly 20-50 cm tall, clustered, arising from an upright caudex; distinct portion of the outer sepals of the cleistogamous flowers linear, (0.3-) 0.6-1.2 (-1.8) mm long, about 3-5× as long as wide; distinct portion of calyx of the chasmogamous flowers (2.4-) 3.5-4.5 (-8) mm long; cleistogamous capsules sharply 3-angled in cross-section; leaf with broadly cuneate base ... ***C. bicknellii***

8 Stems mostly 10-30 cm tall, scattered, arising from horizontal elongate rootstocks; distinct portion of the outer sepals of the cleistogamous flowers rudimentary, knob-like, 0.2-0.5 mm long, 1-2× as long as wide; distinct portion of calyx of the chasmogamous flowers (0.7-) 1.5-3.0 (-4.0) mm long; cleistogamous capsules somewhat rounded in cross-section; leaf with narrowly cuneate to attenuate base ..... ***C. propinquum***

Crocanthemum arenicola (Chapman) Barnhart, Gulf Coast Frostweed. Cp (FL): sandhills, dunes, scrub; rare. Panhandle FL west to s. MS. [= S; = *Helianthemum arenicola* Chapman – K, WH, Y, Z]

Crocanthemum bicknellii (Fernald) Barnhart, Hoary Frostweed, Plains Frostweed, Plains Sunrose, Bicknell's Hoary Rockrose. Mt (GA, NC, VA), Pd (NC, VA): woodlands, glades, barrens, rock outcrops, and grassy balds, to at least 1500m in elevation; rare. June-July (chasm.), July-September (cleist.); August-October. ME and s. Ontario west to MN and s. Manitoba, south to ne. GA, e. TN, AR, KS, and CO. [= S; = *Helianthemum bicknellii* Fernald – RAB, C, F, G, K, W, Y, Z; *Halimium*]

Crocanthemum canadense (Linnaeus) Britton, Canada Frostweed, Canada Sunrose. Cp (GA, NC, SC, VA), Pd (NC, SC, VA), Mt (GA, NC, VA): fields, woodlands, forest edges, roadsides, disturbed areas; common (uncommon in VA Mountains and VA Piedmont, rare in GA). April-May (chasm.), May-August (cleist.); June-October. Nova Scotia and ME west to MI and MN, south to e. GA, e. AL, e. TN, KY, and MO. [= S; = *Helianthemum canadense* (Linnaeus) Michaux – RAB, C, F, G, K, W, Y, Z; > *Helianthemum canadense* var. *canadense* – F; > *Helianthemum canadense* var. *sabulonum* Fernald – F; = *Halimium canadense* (Linnaeus) Grosser]

Crocanthemum carolinianum (Walter) Spach, Carolina Sunrose. Cp (FL, GA, NC, SC): fields, savannas, dry pine flatwoods; common (uncommon in GA and SC, rare in NC). April-May; July-August. E. NC south to s. FL, west to AR and e. TX. [= S; = *Helianthemum carolinianum* (Walter) Michaux – RAB, K, WH, Y, Z; = *Halimium carolinianum* (Walter) Grosser]

Crocanthemum corymbosum (Michaux) Britton, Pinebarren Sunrose. Cp (FL, GA, NC, SC): openings in maritime forests; uncommon (rare in NC). April-May; July-October. E. NC south to s. FL, east to s. MS. [= S; = *Helianthemum corymbosum* Michaux – RAB, K, WH, Y, Z; = *Halimium corymbosum* (Michaux) Grosser]

Crocanthemum georgianum (Chapman) Barnhart, Georgia Sunrose, Georgia Frostweed. Cp (FL, GA, NC, SC): openings in maritime forests; uncommon (rare in GA, NC, and SC). April-May; May-October. E. NC south to n. FL, west to c. TX and AR. [= S; = *Helianthemum georgianum* Chapman – RAB, K, WH, Y, Z; = *Halimium georgianum* (Chapman) Grosser]

Crocanthemum nashii (Britton) Barnhart, Florida Scrub Sunrose, Nash's Sunrose. Cp (NC): xeric sandhills; rare. Endemic to peninsular FL; disjunct in se. NC (New Hanover County). May-June; July-September. [= S; = *Helianthemum nashii* Britton – K, WH, Y, Z; *Halimium nashii* (Britton) Grosser]

Crocanthemum propinquum (Bicknell) Bicknell, Low Frostweed, Creeping Sunrose. Mt, Pd (NC, VA), Cp (VA): woodlands, rock outcrops, sandy barrens and fields (in VA); rare. June-July (chasm.), July-September (cleist.); August-October. Se. MA and se. NH south to w. NC and e. and c. TN. [= *Helianthemum propinquum* Bicknell – RAB, C, F, G, K, W, Y, Z; *Halimium*]

Crocanthemum rosmarinifolium (Pursh) Barnhart, Rosemary Sunrose. Cp (FL, GA, NC, SC): sandy roadsides, fields; common (uncommon in FL, rare in NC). May-June; July-October. S. NC south to panhandle FL, west to c. TX; also disjunct in the West Indies. [= S; = *Helianthemum rosmarinifolium* Pursh – RAB, K, WH, Y, Z; = *Halimium rosmarinifolium*]

Hudsonia Linnaeus 1767 (Sand-heather, Golden-heather, Beach-heather)

A genus of 3 species, dwarf shrubs, of ne. North America. Molecular systematics suggests that *H. tomentosa* may warrant generic status separate from *H. ericoides* and *H. montana*. References: Morse (1979)=Z; Skog & Nickerson (1972)=Y; Arrington & Kubitzki in Kubitzki & Bayer (2003). Key based in part on Morse (1979).

1 Pedicels 0-1 (-3) mm long; leaves 1-3 mm long, ovate, densely tomentose, appressed to the stem and overlapping; stamens 8-20; [of the outer Coastal Plain of VA and ne. NC northward] ..... ***H. tomentosa***

1 Pedicels 4-10 mm long; leaves 3-7 mm long, subulate, slightly pubescent, spreading; stamens 10-30; [collectively of the Mountains of NC and inner Coastal Plain of SC].

2 Sepals obtuse to acute, lacking long-acuminate apices; stamens 10-20; leaves 3-4.5 (-6) mm long, sparsely villous; fruits cylindric; [of the inner Coastal Plain of SC (in our area)] ..... ***H. ericoides***

2 Sepals acuminate, with attenuate apices 1-2 mm long; stamens 20-30; leaves 5-7 mm long, glabrate to sparsely villous; fruits urceolate to campanulate; [of the Mountains of NC] ..... ***H. montana***

Hudsonia ericoides Linnaeus, Northern Golden-heather. Cp (SC): sandy flats in longleaf pine sandhill; rare. May; August. Newfoundland south to ME, NH, MD (Sipple 2002), and DE; disjunct in nc. SC. The disjunct occurrence in SC has every appearance of being native; it is discussed by Bozeman & Logue (1968). [= RAB, C, F, G, K, S, Z; = *H. ericoides* Linnaeus ssp. *ericoides* – Y]

Hudsonia montana Nuttall, Mountain Golden-heather. Mt (NC): shallow sandy soils on ledges of quartzite or other felsic rocks in the Blue Ridge Escarpment, at various sites along the eastern side of Linville Gorge, Burke County, NC, and disjunct further south in McDowell County, NC; rare. June-early July; mid-July-September. This species is endemic to w. NC; it is almost certainly a southern sibling of the more northern *H. ericoides*. As well as being a very narrowly distributed endemic, *H. montana* is endangered by fire suppression in its habitat. [= RAB, K, S, W, Z; = *H. ericoides* Linnaeus ssp. *montana* (Nuttall) Nickerson & J. Skog – Y]

Hudsonia tomentosa Nuttall, Woolly Beach-heather. Cp (NC, VA): dunes, sand flats, blowouts; common (rare in NC). May-June; August-September. Labrador west to s. Mackenzie and Manitoba, south to WV (Panther Knob), WI, and MN, and south along the Atlantic Coast from ME to VA and ne. NC (where it reaches its southern limit in Dare County). [= RAB, C, F, G, S, Z; > *H. tomentosa* var. *tomentosa* – K; = *H. ericoides* Linnaeus ssp. *tomentosa* (Nuttall) Nickerson & J. Skog – Y]

Lechea Linnaeus 1753 (Pinweed)
(contributed by Bruce A. Sorrie)

A genus of about 18 species, herbs, of North America, the West Indies, and Central America. References: Hodgdon (1938)=Z; Wilbur & Daoud (1961)=Y; Sorrie & Weakley (2007b, c); Arrington & Kubitzki in Kubitzki & Bayer (2003).

Identification notes: *Lechea* is recognizable by its production of numerous basal shoots (usually prostrate) in the late summer and fall. These are evergreen and overwinter, and the fertile stems (usually erect or ascending) are produced from renewed growth of the basal shoots in the spring and summer.

1 Pubescence of the stems strongly spreading, not at all appressed; inner sepals carinate (U- or V-shaped in cross-section); plant tall, often > 5 dm tall ..... ***L. mucronata***
1 Pubescence of the stems more or less appressed, usually strongly so; inner sepals shallowly curved in cross section, not carinate; plants variable in height.
2 Outer (slender) sepals equalling or exceeding the inner (broad) sepals.
3 Base of the fruiting calyx clearly differentiated into a hardened, shiny, yellowish, obconic base 0.4-0.6 mm long, contrasting in color and texture with the rest of the calyx; pedicels averaging > 2 mm long ..... ***L. racemulosa***
3 Base of the fruiting calyx not conspicuously differentiated in texture and color; pedicels averaging < 1.5 (-2) mm long.
4 Capsule completely enclosed by the sepals, subglobose; leaves averaging > 10× as long as wide; plant short and usually densely bushy, < 3 dm tall ..... ***L. tenuifolia***
4 Capsule exserted, usually conspicuously so, the sepals not enclosing the summit of the fruit, ellipsoid to ovate; leaves < 8× (usually < 6×) as long as wide; plant usually taller, 1-7 dm tall.
5 Outer sepals distinctly longer than the inner sepals, usually also longer than the capsule; stem leaves usually whorled, 2 mm wide; plant erect, with short, ascending branches ..... ***L. minor***
5 Outer sepals shorter than to barely longer than the inner sepals, shorter than the capsule; stem leaves alternate, rarely wider than 1.5 mm wide; plant ascending (sometimes erect or spreading, branches spreading ..... ***L. sessiliflora***
2 Outer (slender) sepals shorter than the inner (broad) sepals.
6 Capsules ellipsoid to narrowly pyriform, normally about 2× as long as wide (or even longer in *L. racemulosa*).
7 Stigmas not persistent; pedicels averaging about 2 mm long; base of the fruiting calyx clearly differentiated into a hardened, shiny, yellowish, obconic base 0.4-0.6 mm long, contrasting in color and texture with the rest of the calyx ..... ***L. racemulosa***
7 Stigmas persistent, reddish-brown, conspicuous on the summit of the capsule; base of the fruiting calyx not conspicuously differentiated in texture and color ..... ***L. sessiliflora***
6 Capsules of a broader shape, ovoid, broadly ellipsoid, or subglobose, normally < 1.5× as long as wide.
8 Capsules obviously longer than the sepals.
9 Seeds 3 (-4), relatively narrow and 3-sided, like the sections of an orange; fruiting stems 2.5-5.5 dm tall; panicle ovoid to subcylindric, the principal branches subequal and relatively short; capsulesclustered at branch tips, or in a dense row ..... ***L. pulchella var. pulchella***
9 Seeds 2 (-3), broad and compressed, or obscurely 3-sided; fruiting stems 3.5-8.5 dm tall; panicle subcylindric to subglobose, the principal branches diminishing upward, relatively long; capsules in a sparse row (rarely more dense) ..... ***L. pulchella var. ramosissima***
8 Capsules almost completely enveloped by the sepals.
10 Leaves sparsely pubescent on the midrib and margin only beneath; branches and stems sparsely subappressed-pilose; seeds 4-6 ..... ***L. intermedia var. intermedia***
10 Leaves appressed pubescent on the surface beneath; branches and stems moderately to densely gray-canescent; seeds 2-3.
11 Leaves 0.5-1.0 mm wide; seeds 3; [of sandhills and flatwoods] ..... ***L. torreyi var. congesta***
11 Leaves 1.5-3.0 (-4.0) mm wide; seeds 2-4 (-5); [of coastal dunes].
12 Seeds 3-4 (-5), obscurely 3-sided and more-or-less resembling sections of an orange, or 2-sided and convex ventrally; main stems 1.0-2.5 mm diameter, strongly ascending-erect to subprocumbent; sepals strongly tinged maroon, occasionally dull brown; [s. ME and c. NH south to DE] ..... ***[L. maritima var. maritima]***
12 Seeds 2 (-3), 2-sided and flattish, concave ventrally; main stems 2.0-4.0 mm diameter, procumbent to ascending; sepals dull brown, occasionally tinged maroon; [se. DE south to ne. NC] ..... ***L. maritima var. virginica***

Lechea intermedia Leggett ex Britton *var. **intermedia***, Pinweed. Mt, Pd (VA): dry areas; rare (VA Rare). July-August; August-October. *L. intermedia* ranges from New Brunswick west to Ontario, MN, and Saskatchewan, south to VA, n. OH, n. IL,

and nw. NE. Only var. *intermedia* ranges south of New England; 3 other varieties occur in New England and Canada. [= F, K; < *L. intermedia* – C, G, W; = *L. intermedia* var. *typica* – Z]

Lechea maritima Leggett ex Britton, Sterns, & Poggenburg *var.* ***virginica*** Hodgdon. Cp (NC, VA): sandy dunes, flats, and blowouts, often associated with *Hudsonia tomentosa*; uncommon (NC Rare, VA Watch List). June-August; August-September. *L. maritima* occurs from s. ME south to n. NC, and disjunct in n. New Brunswick (reports of this species south to GA are apparently based on misidentifications); var. *virginica* is endemic from se. DE, e. MD, e. VA, and ne. NC. [= C, F, G, K, Z; < *L. maritima* – S]

Lechea minor Linnaeus, Thymeleaf Pinweed. Cp, Pd (GA, NC, SC, VA): savannas, sandhills, pine-oak woodlands, sandy disturbed places; common, rare in VA Piedmont. July-August; August-October. MA and VT west to s. Ontario and n. IN, south to FL and LA (primarily Coastal Plain and around the Great Lakes). [= RAB, C, F, G, K, S, W, Y, Z; ? *L. thymifolia* Michaux]

Lechea mucronata Rafinesque. Pd (GA, NC, SC, VA), Mt (GA, NC, SC), Cp (VA): open dry habitats, dunes, woodlands; common (uncommon in VA Coastal Plain, rare in Piedmont and Mountains). June-August; July-October. NH west to MI and OK, south to FL, TX, and n. Mexico. [= C, K, W; = *L. villosa* Elliott – RAB, F, G, S, Y; > *L. villosa* var. *typica* – Z]

Lechea pulchella Rafinesque *var.* ***pulchella***. Mt, Pd (VA): dry woodlands, disturbed places; uncommon. June-August; August-October. *L. pulchella* was interpreted by Hodgdon (under the name *L. leggettii*) as consisting of 3 varieties. Var. *pulchella* ranges from e. MA west to ne. OH, south to c. VA. A second variety, var. *moniliformis* (Bicknell) Seymour, is not known from our area, occurring on the Coastal Plain from Nantucket Island, MA south to s. NJ, and disjunct along the Great Lakes (a common phytogeographic pattern, lending credence to the validity of the variety). The third variety, of the Southeastern Coastal Plain, is treated below. [< *L. leggettii* Britton & Hollick – RAB, C; = *L. leggettii* var. *leggettii* – F, G, Y; < *L. pulchella* var. *pulchella* – K; < *L. pulchella* – W; = *L. leggettii* var. *typica* – Z]

Lechea pulchella Rafinesque *var.* ***ramosissima*** (Hodgdon) Sorrie & Weakley. Cp (GA, NC, SC, VA): pine-oak woodlands, savannas, flatwoods, sandhills, openings in maritime forests, sometimes in wet, almost peaty soils; common. June-August; August-October. Se. VA south to n. FL and west to e. LA; disjunct in sc. TN (Coffee County). [< *L. leggettii* Britton & Hollick – RAB, C, G, S; = *L. leggettii* Britton & Hollick var. *ramosissima* Hodgdon – F, G, Y, Z; < *L. pulchella* var. *pulchella* – K]

Lechea racemulosa Michaux. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): dry pine woodlands, other woodlands, forest edges, old fields; common. June-July; July-October. Se. NY west to s. OH and s. IL, south to se. VA, NC, c. GA, and AL, with a few disjunct occurrences west to MO; the range is centered on the Appalachian Mountains. [= RAB, C, F, G, K, S, W, Y, Z]

Lechea sessiliflora Rafinesque. Cp (GA, NC, SC): sandhills; common. July-August; August-October. A Southeastern Coastal Plain endemic: s. NC south to s. FL and west to s. MS. [= K; = *L. patula* Leggett – RAB, S, Y, Z]

Lechea tenuifolia Michaux. Pd, Cp (GA, NC, SC, VA): dry oak-pine forests and openings; common. June-August; August-October. S. ME south to SC (mostly inner Coastal Plain and Piedmont), and from s. IN n. IL, s. MN, and NE south to e. LA and c. TX. [= RAB, K, S, W, Y; > *L. tenuifolia* var. *tenuifolia* – C, F, G; > *L. tenuifolia* var. *typica* – Z]

Lechea torreyi Leggett ex Britton *var.* ***congesta*** Hodgdon. Cp (GA, NC, SC): sandhills and pine flatwoods; rare (NC Rare, SC Rare). June-July; August-October. As interpreted by Hodgdon, *L. torreyi* consists of 2 varieties, the more widespread var. *congesta* ranging from se. NC south to s. FL and west to s. MS (disjunct in Belize), and the more restricted var. *torreyi* restricted to FL. Wilbur & Daoud (1961) express doubt about the validity of the 2 varieties, but present little evidence for or against their recognition. Var. *congesta* may indeed prove to be no more than a form. [= Z; < *L. torreyi* – RAB, K, S, Y]

Lechea deckertii Small, Deckert's Pinweed. Cp (GA): xeric sands of scrub; rare (GA Special Concern). Sc. GA (Jones & Coile 1988) south to s. FL. [= K, S] {not yet keyed; synonymy incomplete}

Lechea maritima Leggett ex Britton, Sterns, & Poggenburg var. *maritima*, Coastal dunes. S. ME and c. NH south to DE. [= C, F, G, K, Z]

CLEOMACEAE Horaninow 1834 (Cleome Family)

The Cleomaceae is here circumscribed to include the members of the Capparaceae, subfamily Cleomoideae, following phylogenetic analyses which show this group to be a monophyletic clade more closely related to Brassicaceae than to the rest of Capparidaceae (Hall, Sytsma, & Iltis 2002). References: Hall, Sytsma, & Iltis (2002); Judd, Sanders, & Donoghue (1994); Sanders & Judd (2000).

1 Stamens (8-) 10-27; petals notched or irregularly lacerate at the apex; gynophore (stipe of the pistil, above the calyx) 2-6 mm long; leaflets (1-) 3 ..... ***Polanisia***

1 Stamens 6; petals obtuse or acute at the apex; gynophore (stipe of the pistil, above the calyx) 1-80 mm long; leaflets 5-7 ..... ***[Cleome]***

[2 Plants with nodal spines (and sometimes with prickles on petioles and leaf veins).

3 Petals 5-10 mm long; gynophore 1-4 mm long; petioles and leaf blades unarmed ..... ***Hemiscola***

3 Petals 10-30 mm; gynophore 45-80 mm; petioles and sometimes leaf blades prickly ..... ***Tarenaya***

2 Plants lacking nodal spines and lacking prickles on petioles and leaf veins.

4 Filaments free from gynophore ..... ***Cleoserrata***

4 Filaments fused to lower half of gynophore (evident from scars near the midpoint of the gynophore of fruiting specimens) ..... ***[Gynandropsis]***

Cleome Linnaeus 1753 (Cleome, Spiderflower)

CLEOMACEAE

A genus of about 250 species, annual and perennial herbs, pantropical and extending into subtropical and warm temperate regions. References: Vanderpool & Tucker in FNA (in prep.); Iltis (1960)=Z; Kers in Kubitzki & Bayer (2003).

1 Bracts subtending the flowers 3-foliolate; leaves lacking stipular spines; corolla in bud minute, not covering the stamens ..... ***C. gynandra***
1 Bracts subtending the flowers simple; leaves subtended by stipular spines; corolla in bud well-developed, the petals overlapping and surrounding the stamens ..... ***C. hassleriana***

* ***Cleome aculeata*** Linnaeus *var.* ***aculeata***, Prickly Spiderflower. Disturbed areas. Reported for AL. [< *Cleome aculeata* Linnaeus – K; = ***Hemiscola aculeata*** (Linnaeus) Rafinesque *var.* ***aculeata*** – FNA]

* ***Cleome gynandra*** Linnaeus, Spiderwisp. Cp (GA, NC, SC): fields, disturbed areas; rare, native of Africa. June-October. [= RAB, K, S, Z; = ***Gynandropsis gynandra*** (Linnaeus) Briquet – FNA]

* ***Cleome hassleriana*** Chodat, Cleome, Spiderflower. Pd, Cp, Mt (GA, NC, SC, VA): gardens, disturbed areas, persistent and self-seeding from cultivation as an ornamental; rare, native of South America. June-November. The petals in bud are a pale pink to nearly white, they turn a deep pink upon opening late in the day; by morning the petals have once again faded to a pale pink or white. [= C, K; = ***Tarenaya hassleriana*** (Chodat) H.H. Iltis – FNA; *? C. houtteana* Schlechtendahl – RAB, misapplied; *? C. spinosa* Jacquin – F, G, misapplied; *? Neocleome spinosa* (Jacquin) Small – S, misapplied]

* ***Cleome serrata*** Jacquin. Reported as introduced in GA (Kartesz 1999). [= K; = ***Cleoserrata serrata*** (Jacquin) H.H. Iltis – FNA; = *Neocleome serrata* (Jacquin) Small – S] {not yet keyed; synonymy incomplete}

* ***Cleome viscosa*** Linnaeus, Wild Caia, Yellow Cleome. Cp (GA, SC): disturbed areas; rare, introduced, native of Asia (now pantropical). Reported for sc. GA (Jones & Coile 1988), se. PA (Rhoads & Klein 1993), and recently from Beaufort County, SC (J. Nelson, pers.comm. 2006). [= K; = ***Arivela viscosa*** (Linnaeus) Rafinesque – FNA] {not yet keyed; synonymy incomplete}

* *Cleome diffusa* Banks ex de Candolle. On ballast , Mobile AL. [= K; = ***Hemiscola diffusa*** (Banks ex de Candolle) H.H. Iltis – FNA]
* *Cleome spinosa* Jacquin. []

Polanisia Rafinesque (Clammy-weed)

A genus of about 6 species, of North America. References:

Identification notes: *Polanisia* has some resemblance to *Warea*.

1 Petals broadest toward the base, barely or not at all clawed; capsule valvate; [of xeric longleaf pine sandhills] ..... ***P. tenuifolia***
1 Petals broadest toward the tip, narrowed to a long, distinct claw; capsule opening near the tip; [of floodplains and disturbed soils].
2 Larger petals 3.5-6.5 (-8) mm long; longest stamens 4-10 (-14) mm long ..... ***P. dodecandra*** *var.* ***dodecandra***
2 Larger petals (7-) 8-13 (-16) mm long; longest stamens (9-) 12-30 mm long ..... ***P. dodecandra*** *var.* ***trachysperma***

Polanisia dodecandra (Linnaeus) A.P. de Candolle *var.* ***dodecandra***, Clammy-weed, Spider-weed. Mt, Pd (VA): sandy or gravelly floodplains along the James River; rare (VA Rare). June-September. VT west to Manitoba, south to MD, w. VA, TN, AR, and OK. Apparently native in our area. [= C; = *P. dodecandra* ssp. *dodecandra* – K; = *P. graveolens* Rafinesque – F, S; = *P. dodecandra* – G; < *P. dodecandra* – W; ? *Cleome graveolens* (Rafinesque) Sch. & Sch.]

* ***Polanisia dodecandra*** (Linnaeus) A.P. de Candolle *var.* ***trachysperma*** (Torrey & A. Gray) Iltis. Cp (VA): disturbed areas; rare, apparently adventive from w. North America. June-September. [= C; = *P. dodecandra* ssp. *trachysperma* (Torrey & A. Gray) Iltis – K; = *P. trachysperma* Torrey & A. Gray – F, G, S]

Polanisia tenuifolia Torrey & A. Gray, Slenderleaf Clammy-weed. Cp (GA): sandhills; uncommon. E. GA (several counties from the SC border) (Jones & Coile 1988) south to FL. [= K; = *Aldenella tenuifolia* (Torrey & A. Gray) Greene – S]

CLETHRACEAE Klotzsch 1851 (Clethra Family)

A monogeneric family of 65-95 species, shrubs and trees, primarily of tropical America and Asia. Sometimes combined into the Cyrillaceae. References: Sleumer (1967b); Anderberg & Zhang (2002); Schneider & Bayer in Kubitzki (2004).

Clethra Linnaeus (Sweet Pepperbush, White-alder, Clethra)

A genus of 65-95 species, shrubs and trees, primarily of tropical America and Asia. References: Sleumer (1967b)=Z ; Schneider & Bayer in Kubitzki (2004).

1 Leaves oblong or elliptic, 8-20 cm long, acuminate; [of the Mountains] ..... ***C. acuminata***
1 Leaves obovate or oblong, 4-11 cm long, obtuse to acute; [of the Coastal Plain and rarely lower Piedmont] ..... ***C. alnifolia***

Clethra acuminata Michaux, Mountain White-alder. Mt (GA, NC, SC, VA): moist forests, heath balds, margins of rock outcrops at high elevations; common. July-August; September-October. Endemic to the Southern and Central Appalachians, *C. acuminata* ranges from sw. PA south through e. WV, w. VA, e. TN, w. NC to nw. SC and ne. GA. [= RAB, C, F, G, K, S, W, Z]

Clethra alnifolia Linnaeus, Coastal White-alder. Cp (GA, NC, SC, VA), Pd (VA): pocosins, blackwater swamp forests, nonriverine swamp forests; common (rare in Piedmont). June-July; September-October. Primarily a southeastern Coastal Plain

species, *C. alnifolia* ranges from Nova Scotia and ME south to FL, west to TX; disjunct in sc. TN (Coffee County) (Chester, Wofford, & Kral 1997). Two taxa are sometimes recognized; they need additional assessment. Var. *alnifolia*, with glabrous to glabrescent undersurface of the leaf occupies the full range of the species. Var. *pubescens* Aiton differs in its persistently white-tomentose undersurface of the leaf, and ranges from e. SC south to FL, and west to e. LA (east of the Mississippi River). If the more pubescent (and more southern) variety is recognized, the correct name is var. *pubescens* Aiton, which predates var. *tomentosa* (Lamarck) Michaux (Sleumer 1967b, Wilbur 1970b). [= C, F, G, GW, K, S; > *C. alnifolia* var. *alnifolia* – RAB, Z; > *C. alnifolia* var. *tomentosa* (Lamarck) Michaux – RAB; > *C. alnifolia* – S; > *C. tomentosa* Lamarck – S; > *C. alnifolia* var. *pubescens* Aiton – Z]

CONVOLVULACEAE A.L. de Jussieu 1789 (Morning Glory Family)

A family of about 56 genera and 1600 species, nearly cosmopolitan, especially in tropical and subtropical areas. Tribes follow the classification of Stefanović, Austin, & Olmstead (2003). References: Wilson (1960b); Austin (1979), Stefanović, Krueger, & Olmstead (2002); Stefanović, Austin, & Olmstead (2003). [including *CUSCUTACEAE*]

1 Plant parasitic; stems orange; [tribe *Cuscuteae*) ..... ***Cuscuta***
1 Plant photosynthetic; stems green.
  2 Corolla 0.1-0.2 cm long; capsule deeply 2-lobed; leaves orbicular-reniform, 1-3 cm long and wide, not fleshy; [tribe *Dichondreae*] ..... ***Dichondra***
  2 Corolla 1-10 cm long; capsule entire; leaves various, but not as above (most similar vegetatively are *Calystegia soldanella, Ipomoea pes-caprae* var. *emarginata,* and *I. imperati,* all beach plants with fleshy, emarginate, and usually larger leaves).
    3 Styles 2, free nearly to the ovary or fused most of their length (at least the terminal 1-2 mm free); corolla 1-2.5 cm long; leaves cuneate or rounded at the base, and narrowly ovate, lanceolate, or linear; [tribe *Cresseae*].
      4 Styles free, each 2-cleft, the stigmas therefore 4, linear-filiform ..... ***Evolvulus***
      4 Styles free or fused at the base, the stigmas 2, globose-peltate ..... ***Stylisma***
    3 Styles 1 (sometimes with 2 stigmas, or a bilobed stigma); stigmas capitate, elongate, flattened, or filiform; corolla > 2.5 cm long (except *Jacquemontia*, *Convolvulus*, and a few *Ipomoea* spp.); leaves cordate, sagittate, or truncate at the base, and (mostly) ovate in outline.
      5 Flowers in a dense head with numerous interspersed bracts; [tribe *Jacquemontieae*] ..... ***Jacquemontia***
      5 Flowers solitary or in an open, few-flowered inflorescence.
        6 Calyx concealed by 2 large bracts; [tribe *Convolvuleae*] ..... ***Calystegia***
        6 Calyx not concealed by bracts.
          7 Stigmas 2, elongate; leaves 2-4 cm long, truncate or weakly hastate at base; corolla white or pink; [tribe Convolvuleae] ..... ***Convolvulus***
          7 Stigma 1, capitate (sometimes lobed); leaves 3-15 cm long, mostly strongly hastate or cordate at base; corolla white, pink, lavender, blue, orange, or red.
            8 Anthers straight after dehiscence; fruits valvate-dehiscent; [tribe *Ipomoeeae*] ..... ***Ipomoea***
            8 Anthers twisted after dehiscence; fruits longitudinally or irregularly dehiscent; [tribe *Merremieae*] ..... ***Merremia***

Calystegia R. Brown 1810 (Bindweed)

A genus of about 25 species, vines, cosmopolitan. Stefanović, Krueger, & Olmstead (2002) conclude (based on molecular phylogeny) that *Calystegia* should be combined with *Convolvulus*. References: Wilson (1960b)=Z; Lewis & Oliver (1965); Brummitt (1965, 1980); Austin, Diggs, & Lipscomb (1997)=Y.

1 Plant an upright herb.
  2 ..... ***C. spithamaea ssp. purshiana***
  2 ..... ***C. spithamaea ssp. spithamaea***
1 Plant a trailing or climbing vine.
  3 Leaves about as wide as long, rounded at the tip ..... ***C. soldanella***
  3 Leaves longer than wide, abtuse , acute, or acuminate at the tip .....
C. catesbiana, C. macounii, C. pubescens, C. sepium sspp., C. silvatica ssp. fraterniflora

Calystegia catesbeiana Pursh, Catesby's Bindweed. (GA, NC, SC, VA): longleaf pine savannas, openings in dry to dry-mesic montane forests; rare (GA Special Concern). [= K; < *Calystegia spithamaea* – C; < *Convolvulus spithamaeus* Linnaeus var. *pubescens* (Gray) Fernald – F; = *Calystegia sericata* (House) Bell – RAB, W; = ***Convolvulus sericatus*** House – S, Z]

Calystegia macounii (Greene) Brummitt. (NC, VA). {R.K. Brummitt says not east of the Mississippi} [= K, Y; = ***Convolvulus macounii*** Greene]

* ***Calystegia pubescens*** Lindley. (NC, VA). [? *Calystegia pellita* (Ledebour) G. Don – K; ? *Convolvulus pellitus* Ledebour – F, Z; ? *Convolvulus japonicus* Thunberg – G; ? *Calystegia hederacea* Wallroth – C]

Calystegia sepium (Linnaeus) R. Brown *ssp.* ***americana*** (Sims) Brummitt. (GA, NC, VA). [= K; < *Calystegia sepium* – RAB, C, GW, W; < *Convolvulus sepium* Linnaeus var. *repens* (Linnaeus) A. Gray – F, Z; > *Convolvulus sepium* Linnaeus var. *repens* (Linnaeus) A. Gray – G; > *Convolvulus sepium* var. *americanus* Sims – G; > *Convolvulus americanus* (Sims) Greene – S; > *Convolvulus repens* Linnaeus – S]

Calystegia sepium (Linnaeus) R. Brown *ssp.* ***angulata*** (Sims) Brummitt. (GA, NC, SC, VA). New Brunswick to British Columbia, south to SC, TX, NM, and OR. [= K, Y; < *Calystegia sepium* – RAB, C, GW, W; < *Convolvulus sepium* Linnaeus var. *sepium* – F, G, Z]

Calystegia sepium (Linnaeus) R. Brown *ssp.* ***appalachiana*** Brummitt. (NC, VA). [= K; < *Calystegia sepium* – RAB, C, GW, W; < *Convolvulus sepium* Linnaeus var. *sepium* – F, G, Z]

Calystegia sepium (Linnaeus) R. Brown *ssp.* ***limnophila*** (Greene) Brummitt. (GA, NC, SC, VA). [= K, Y; < *Calystegia sepium* – RAB, C, GW, W; < *Convolvulus sepium* Linnaeus var. *sepium* – F, G, Z; = *Convolvulus limnophilus* Greene]

Calystegia sepium (Linnaeus) R. Brown *ssp.* ***sepium***. (GA, NC, SC, VA). [= K; < *Calystegia sepium* – RAB, C, GW, W; < *Convolvulus sepium* Linnaeus var. *sepium* – F, Z; > *Convolvulus sepium* var. *sepium* – G; > *Convolvulus sepium* var. *communis* R. Tryon – G; < *Convolvulus sepium* – S]

Calystegia silvatica (Kit.) Grisebach *ssp.* ***fraterniflora*** (Mackenzie & Bush) Brummitt. (GA, NC, SC, VA). Ssp. *silvatica* and ssp. *disjuncta* are European. [= K, Y; < *Calystegia sepium* – C; = *Convolvulus sepium* Linnaeus var. *fraterniflorus* Mackenzie & Bush – F, G, Z; = *Calystegia sepium* (Linnaeus) R. Brown var. *fraterniflora* (Mackenzie & Bush) Shinners]

* ***Calystegia soldanella*** (Linnaeus) R. Brown ex Roemer & J.A. Schultes. Cp (NC, VA): beaches, dunes; rare (NC Watch List, VA Watch List). [= RAB, K; = ***Convolvulus soldanella*** Linnaeus]

Calystegia spithamaea (Linnaeus) Pursh *ssp.* ***purshiana*** (Wherry) Brummitt, Shale Bindweed. Mt (GA, NC, SC, VA): shale barrens and woodlands; common. [= K; < *Calystegia spithamaea* – RAB, C, W; < *Calystegia spithamaea* var. *pubescens*; < *Convolvulus spithamaeus* Linnaeus var. *pubescens* (A. Gray) Fernald – F; = ***Convolvulus purshianus*** Wherry – G; < *Convolvulus spithamaeus* – Z]

Calystegia spithamaea (Linnaeus) Pursh *ssp.* ***spithamaea***, Low Bindweed. (VA) [= K; < *Calystegia spithamaea* – RAB, C, W; = *Calystegia spithamaea* var. *spithamaea*; = *Convolvulus spithamaeus* var. *spithamaeus* – F; = ***Convolvulus spithamaeus*** Linnaeus – G, S; < *Convolvulus spithamaeus* – Z]

Convolvulus Linnaeus (Field-bindweed)

A genus of about 100 species, vines, cosmopolitan, especially in tempertae areas. [also see *Calystegia*]

* ***Convolvulus arvensis*** Linnaeus, Field-bindweed, Creeping Jenny. Mt (NC, SC, VA), Pd (GA, NC, VA), Cp (NC, VA): fields, roadsides, disturbed areas; common (uncommon to rare south of VA), native of Europe. June-November. [= RAB, C, F, G, K, W; = *Strophocaulos arvensis* (Linnaeus) Small – S]

Cuscuta Linnaeus 1753 (Dodder)

A genus of about 100 species, parasitic, achlorophyllose herbs, nearly cosmopolitan. Variously treated as a monogeneric family, or as a component of the Convolvulaceae; Neyland (2001) and Stefanović, Krueger, & Olmstead (2002) provide molecular evidence for the treatment of *Cuscuta* as a derived member of Convolvulaceae. References: Yuncker (1921); Yuncker (1965)=Z; Musselman (1986)=Y; Gandhi, Thomas, & Hatch (1987)=X; Costea, Nesom, & Stefanović (2006a, 2006b, 2006c)=V; Neyland (2001); Stefanović, Krueger, & Olmstead (2002). Key based on Yuncker (1965).

Identification notes: corolla measurements are from the base to the sinuses of the corolla. The **infrastaminal scales** are transparent structures at the base of the stamens.

1 Styles more-or-less united; capsule circumscissile; [subgenus *Monogynella*]
  2 Stigmas flattened-depressed; flowers 2.5-4 mm long ..... ***C. cassytoides***
  2 Stigmas oval or conical; flowers ca. 2 mm long ..... ***[C. japonica]***
1 Styles separate and distinct from the base; capsule not circumscissile (except the rare aliens *C. epilinum* and *C. epithymum*).
  3 Stigmas elongated, terete or conical; capsule circumscissile; [subgenus *Cuscuta*].
    4 Style about equalling the ovary, included in the corolla; fruit 2.0-2.5 mm long ..... ***[C. epilinum]***
    4 Style (including the stigma) much longer than the ovary, exserted from the corolla; fruit ca. 1.5 mm long ..... ***[C. epithymum]***
  3 Stigmas capitate, about as wide as long; capsule not circumscissile, either indehiscent or rupturing irregularly; [subgenus *Grammica*].
    5 Each flower subtended by 1-10 imbricate bracts; sepals distinct nearly to the base.
      6 Bract apex reflexed or spreading ..... ***[C. glomerata]***
      6 Bract apex erect.
        7 Pedicels absent, the flowers in compact clusters sessile on the stem ..... ***C. compacta***
        7 Pedicels 0.5-3 mm long, the flowers in loose panicles ..... ***[C. cuspidata]***
    5 Flowers not bracteate; sepals various.
      8 Perianth surface granular; fresh flowers fleshy; corolla lobes acute, tips typically curved inwards.
        9 Corolla tubular; calyx > ½ as long as the corolla; flowers 4 (-5)-merous; infrastaminal scales reduced, merely bifid or shallowly toothed ..... ***C. coryli***
        9 Corolla campanulate; calyx ca. ½ as long as the corolla; flowers 5-merous; infrastaminal scales profusely fringed ..... ***C. indecora***
      8 Perianth surface not granular; fresh flowers not especially fleshy; corolla lobes various.
        10 Stylopodium (a thickened ridge at the base of the style) present; flowers 5-merous.
          11 Ovary with a long, beak-like projection at the top; corolla 2.2-3.5 mm long, 2-3 mm wide; seeds ca. 1.5 mm long; [widespread] ..... ***C. gronovii***
          11 Ovary blunt to pointed, but not beaked; corolla 4-6 mm long, 4-6 mm wide; seeds 2-3 mm long; [of the Mountains] ..... ***C. rostrata***
        10 Stylopodium absent; flowers 3-4-merous or 5-merous.
          12 Flowers subsessile, therefore in globular inflorescences.
            13 Flowers 5-merous ..... ***C. obtusiflora var. glandulosa***
            13 Flowers mostly 3-4-merous.
              14 Corolla lobes rounded or obtuse ..... ***C. cephalanthi***

14 Corolla lobes acute ..... ***C. polygonorum***
12 Flowers on pedicels slightly shorter than to longer than the flowers, therefore in loose inflorescences.
15 Flowers mostly longer than wide ..... ***[C. suaveolens]***
15 Flowers mostly as wide as long.
16 Flowers 1.5-3.0 mm long, at least some exceeding 2.5 mm long; calyx lobes not overlapping at the base in older flowers, and therefore the flowers not pronouncedly 5-angled ..... ***C. campestris***
16 Flowers 0.9-2.5 mm long; calyx lobes strongly overlapping and forming definite angles at the sinuses, thus the flower strongly 4-5-angled.
17 Flowers 4-merous; flowers 0.9-1.4 mm long; stems very slender; [on granite and sandstone outcrops] ..... ***C. harperi***
17 Flowers 5-merous; flowers 1.5-2.5 mm long; stems not especially slender; [widespread] ..... ***C. pentagona***

Cuscuta campestris Yuncker, Field Dodder. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): roadsides and old fields, often on Fabaceae; common. June-November. Nearly cosmopolitan because of its common association with cultivated legumes, its original distribution unclear. [= RAB, F, GW, V, W, Y, Z; < *C. pentagona* Engelmann – C, G; < *C. pentagona* var. *pentagona* – K, X; = *Grammica campestris* (Yuncker) Hadac & Chrtek]

* ***Cuscuta cassytoides*** Nees ex Engelmann, African Dodder. Cp (NC): on *Quercus phellos*; rare, native of s. Africa. June. [= RAB, K, Z]

Cuscuta cephalanthi Engelmann, Buttonbush Dodder. Cp (GA, VA), Pd (NC, SC), Mt (NC, VA): primarily on woody hosts; rare. August-September. New Brunswick west to British Columbia, south to GA, TX, CA, and Mexico. See Nelson (1993) for the first SC record. [= C, F, G, GW, K, S, X, Z; = *C. cephalanthii* – RAB, Y, orthographic error; = *Grammica cephalanthii* (Engelmann) Hadac & Chrtek]

Cuscuta compacta Antoine Laurent de Jussieu ex Choisy *var.* ***compacta***, Compact Dodder. Cp, Pd, Mt (GA, NC, SC, VA): wet habitats, on herbaceous and especially on woody hosts; common. August-November. VT, Québec, and NE south to FL and TX. [= K, W, Y, Z; < *C. compacta* – RAB, C, F, G, GW, S, X]

Cuscuta coryli Engelmann, Hazel Dodder. Cp (NC, SC), Mt (NC, VA), Pd (VA): on a wide variety of woody and herbaeous hosts; rare. July-November. MA, NY, and Saskatchewan south to SC, AL, TX, and AZ. [= C, F, G, GW, K, S, V, X, Z; = *C. corylii* – RAB, W, orthographic variant; = *Grammica coryli* (Engelmann) Hadac & Chrtek]

Cuscuta gronovii Willdenow ex J.A. Schultes, Common Dodder. Cp, Pd, Mt (GA, NC, SC, VA): on a very wide variety of herbaceous and woody plants; common. August-October. Québec west to British Columbia, south to FL and AZ. [= RAB, C, F, G, GW, S, W, Y; > *C. gronovii* var. *gronovii* – K, V, X, Z; > *C. gronovii* var. *latiflora* Engelmann – K, V, Z; = *Grammica gronovii* (Willdenow ex J.A. Schultes) Hadac & Chrtek]

Cuscuta harperi Small, Harper's Dodder. Cp, Pd (GA): outcrops of granite (Piedmont) and Altamaha grit (Coastal Plain), typically on plants such as *Liatris microcephala, Bigelowia nuttallii, Hypericum gentianoides*, and *Croton willdenowii*; rare (GA Threatened). September-November. C. and wc. GA west to nw. AL. [= K, S, V, Z]

Cuscuta indecora Choisy. Cp (GA, NC, SC, VA), Pd (GA, NC, VA), Mt (VA): salt marshes (on *Iva frutescens*), roadsides; rare. NJ, MN, and ID, south to FL, TX, CA, Mexico, Central America, and South America. See Nelson (1993) for the first SC record. Silberhorn (1998) describes an occurrence of this species in VA. [= C, GW, S, X, Y; > *C. indecora* var. *indecora* – F, K, V, Z; > *C. indecora* var. *neuropetala* (Engelmann) A.S. Hitchcock – F, K, Z; = *Grammica indecora* (Choisy) W.A. Weber]

* ***Cuscuta japonica*** Choisy, Japanese Dodder. Mt (SC): disturbed area; rare, native of e. Asia. Apparently known in our area only from Pickens County, SC, and eradicated. [= K, Z]

Cuscuta obtusiflora Kunth *var.* ***glandulosa*** Engelmann, Glandular Dodder. Cp (FL, GA): on herbs in calcareous glades and other habitats; rare. GA and OK south to FL, TX, Mexico; West Indies. See Anderson (2007) for FL Panhandle record. [= G, GW, K, V, X; = *C. glandulosa* Small – S]

Cuscuta pentagona Engelmann. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): on a wide variety of hosts; common. May-November. Throughout the United States and s. Canada. [= RAB, F, GW, S, V, W, Y, Z; < *C. pentagona* – C, G; >< *C. pentagona* var. *pentagona* – K, X; = *Grammica pentagona* (Engelmann) W.A. Weber]

Cuscuta polygonorum Engelmann, Smartweed Dodder. Pd, Mt (VA): on *Polygonum* and other hosts; rare. NY and Ontario west to ND, south to FL and TX. [= C, F, G, K, S, W, V, X, Y, Z]

Cuscuta rostrata Shuttleworth, Appalachian Dodder, Beaked Dodder. Mt (GA, NC, SC, VA): high elevation hardwood forests and thickets; common (GA Special Concern). August-September. A Southern Appalachian endemic: WV and MD south through w. VA, e. KY, e. TN, w. NC to n. GA. [= RAB, C, F, G, K, S, W, Y, Z; = *Grammica rostrata* (Shuttleworth) Hadac & Chrtek]

Cuscuta cuspidata Engelmann. IN, ND, and UT south to KY, MS, TX, and NM. [= C, F, K, X, Z]

* *Cuscuta epilinum* Weihe, Flax Dodder. Primarily on *Linum*. Native of Europe, south to DE, MD, and PA (Kartesz 1999). [= G, K, Z]

* *Cuscuta epithymum* Linnaeus, introduced, is known from scattered localities in PA (Rhoads & Klein 1993). Reported for VA by Kartesz (1999), based on Massey (1961). [= G, K, Z]

Cuscuta glomerata Choisy. OH, MI, MN, and ND south to KY, TN, MS, and TX. [= C, F, G, GW, K, S, X, Z]

* *Cuscuta suaveolens* Seringe, Fringed Dodder. Scattered sites in eastern North America, including AL, MD, and OH. [= C, G, K, Z]

Dichondra J.R. & J.G. Forster (Ponyfoot, Dichondra)

A genus of about 9 species, of tropical subtropical and warm temperate areas. References: Tharp & Johnston (1961).

Dichondra carolinensis Michaux, Carolina Ponyfoot. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): lawns, roadsides, moist pinelands; common (VA Watch List). March-May. Se. VA south to FL, west to AR and TX; also in Bermuda and reported for

the Bahamas. This plant is rarely seen in a "natural" habitat, but is often seen in lawns and other mowed grassy areas. [= RAB, C, GW, K, S; = *D. repens* J.R. Forster var. *carolinensis* (Michaux) Choisy – F, G]

Evolvulus Linnaeus (Dwarf Morning-glory)

A genus of about 90-100 species, almost all of tropical, subtropical, and warm temperate America. References: Ward (1968); Wilson (1960b)=Z.

1 Leaves densely pilose on both surfaces with spreading to loosely appressed hairs; internodes short, generally < 1 cm long; [of calcareous glades and barrens of c. TN] ..... ***[E. nuttallianus]***
1 Leaves densely pilose with appressed (sericeous) hairs below, the upper surface glabrous or loosely pubescent; internodes long, many over 1.5 cm long; [of Altamaha Grit outcrops in the the Coastal Plain of GA] ..... ***E. sericeus var. sericeus***

Evolvulus sericeus Swartz ***var. sericeus***, Silky Dwarf Morning-glory. Cp (GA): Altamaha Grit outcrops; uncommon (rare in GA). Coastal Plain of ec. GA (Appling, Jeff Davis, and Coffee counties) (Bridges & Orzell 1989; Patrick, Allison, & Krakow 1995) south to s. FL; AR and LA west to AZ, south into Mexico; West Indies. [= K; < *E. sericeus* – S, Z]

Evolvulus nuttallianus J.A. Schultes, Shaggy Dwarf Morning-glory, in c. TN (Chester, Wofford, & Kral 1997), disjunct from the Great Plains. [= F, K, Z; *E. nuttalianus* – C, orthographic variant; = *E. pilosus* Nuttall – G]

Ipomoea Linnaeus 1753 (Morning-glory)

A genus of about 650 species, herbs, vines, and shrubs, of tropical, subtropical, and warm temperate areas. References: Austin (1984)=Z; Austin & Huáman (1996)=Y; Austin & Bianchini (1998). Key adapted closely from Z.

1 Erect woody shrub with hollow stems; [subgenus *Eriospermum*, section *Eriospermum,* series *Jalapae*] ..... ***I. carnea ssp. fistulosa***
1 Trailing or twining vine.
  2 Corolla salverform, the long narrow tube cylindrical (with sides more-or-less parallel) for most of its length, the limb abruptly flaring at the summit of the tube.
    3 Corolla 3-9 cm long, lavender to white; flowers open from evening until early morning.
      4 Leaves tomentose beneath; corolla mostly white on the outer surface, lavender to purple on the inner surface, thus bicolored in-and-out; [of outer Coastal Plain hammocks and shell middens in se. NC and SC]; [subgenus *Eriospermum*, section *Eriospermum,* series *Jalapae*] ..... ***I. macrorhiza***
      4 Leaves glabrous beneath; corolla either white on both surfaces or lavender on both surfaces, not bicolored in-and-out; [weedy, of disturbed habitats]; [subgenus *Quamoclit*, section *Calonyction*] ..... ***I. muricata***
    3 Corolla 2-4 cm long, scarlet, orange or yellow; flowers open from early morning to late morning or late afternoon; [subgenus *Quamoclit,* section *Mina*].
      5 Leaf blade pinnately divided into 11-31 (or more) linear segments ..... ***I. quamoclit***
      5 Leaf blade entire, or angled or lobed into 3-7 lanceolate or ovate segments.
        6 Calyx (5-) 6-8 (-9) mm long; fruit reflexed ..... ***I. coccinea***
        6 Calyx 4-4.5 mm long; fruits erect ..... ***I. hederifolia***
  2 Corolla funnelform to campanulate, the short to long tube expanding from below the middle, the limb gradually to abruptly flaring at the summit of the tube.
    7 Pedicels and peduncles with spreading, ascending, or reflexed trichomes; gynoecium 3-parted; [subgenus *Ipomoea,* section *Pharbitis*].
      8 Sepals with slightly narrowed green tips shorter than to slightly longer than the body of the sepal; [series *Pharbitis*] ..... ***I. purpurea***
      8 Sepals with very narrow elongate green tips much longer than the body of the sepal; [series *Heterophyllae*].
        9 Sepals abruptly narrowed, the long subacute tips strongly spreading or curved ..... ***I. hederacea***
        9 Sepals gradually narrowed, the long acute tips suberect, straight, scarcely spreading ..... ***[I. nil]***
    7 Pedicels and peduncles glabrous or with short, appressed trichomes; gynoecium 2-parted; [subgenus *Eriospermum*].
      10 Stems trailing, rooting at the nodes; leaf apex emarginate, truncate, or obtuse; [of beaches from se. NC southward]; [subgenus *Eriospermum*, section *Erpipomoea*].
        11 Corolla white with a yellowish or purple eye; larger leaves 3-7-lobed ..... ***I. imperati***
        11 Corolla lavender; larger leaves not lobed (though notched at the apex) ..... ***I. pes-caprae var. emarginata***
      10 Stems erect or twining, not rooting at the nodes (except sometimes in *I. batatas*); leaf apex acute to acuminate; [collectively of various habitats, not beaches, widespread]; [subgenus *Eriospermum*, section *Eriospermum*].
        12 Leaf base sagittate; [series *Jalapae*] ..... ***I. sagittata***
        12 Leaf base cuneate to cordate.
          13 Corolla 1.5-2.3 cm long, white; [series *Batatas*] ..... ***I. lacunosa***
          13 Corolla 3-8 cm long, at least partly pink to lavender (sometimes entirely white in *I. batatas*).
            14 Sepals ovate to oblong-elliptic; corolla usually white on the limb, the throat purple; anthers 5-7 mm long; [series *Jalapae*] .... ***I. pandurata***
            14 Sepals oblong-ovate to oblong-lanceolate; corolla usually pink to lavender on the limb, the throat lavender to purple; anthers 1.5-3.2 mm long; [series *Batatas*].
              15 Sepals unequal in length, oblong-ovate, with acute to caudate apices; leaves mostly 10-15 cm wide ..... ***I. batatas***
              15 Sepals more-or-less equal in length, oblong-lanceolate, with acuminate apices; leaves 2-5 cm wide ..... ***I. cordatotriloba var. cordatotriloba***

* ***Ipomoea batatas*** (Linnaeus) Lamarck, Sweet Potato. Cp (GA?, NC, SC, VA?): persistent in fields after cultivation, disturbed areas; rare, apparently native of tropical America. [= RAB, K, S, Y, Z]

* ***Ipomoea carnea*** Jacquin *ssp.* ***fistulosa*** (Martius ex Choisy) D. Austin, Bush Morning-glory. Cp (SC): barrier island; rare, apparently native of the tropics. [= K, Y, Z; = *I. fistulosa* Martius – RAB, S]

Ipomoea coccinea Linnaeus, Scarlet Creeper, Red Morning-glory. Cp, Pd, Mt (GA, NC, SC, VA): fields, roadsides, thickets, streambanks; common (uncommon in VA Mountains). August-December. Native distribution uncertain, but apparently native to se. United States. [= RAB, C, F, GW, K, W, Y, Z; = *Quamoclit coccinea* (Linnaeus) Moench – G, S]

Ipomoea cordatotriloba Dennstedt *var.* ***cordatotriloba***, Coastal Morning-glory. Cp (GA, NC, SC): dunes, sandy areas on barrier islands, other sandy habitats; uncommon. September-October. Se. NC south to s. FL, west to e. TX and AR. The correct nomenclature is discussed by Manitz (1983). [= K; *? I. trichocarpa* Elliott – RAB, GW, S, Z; *? I. trifida* – S, misapplied; *? I. cordatotriloba* – Y]

Ipomoea hederacea Jacquin, Ivyleaf Morning-glory. Cp, Pd, Mt (GA, NC, SC, VA): fields, disturbed areas; common. July-December. Native distribution obscure, apparently native to temperate North America, including our area. [= C, GW, K, W, Y, Z; > *I. hederacea* var. *hederacea* – RAB, F, G; > *I. hederacea* var. *integriuscula* A. Gray – RAB, F, G; > *Pharbitis hederacea* (Linnaeus) Choisy – S; > *Pharbitis barbigera* (Sweet) G. Don – S]

* ***Ipomoea hederifolia*** Linnaeus, Scarlet Creeper. Cp (GA): disturbed areas; uncommon. {Distribution in our area uncertain, native of tropical America – Kartesz (1999) says GA only} [= GW, K, Y, Z; = *I. coccinea* Linnaeus var. *hederifolia* (Linnaeus) A. Gray]

Ipomoea imperati (Vahl) Grisebach, Beach Morning-glory. Cp (GA, NC, SC): beaches, dune blowouts, fore-dunes; rare (NC Rare, SC Rare). August-October. Se. NC south to s. FL, west to TX, and extensively distributed in the tropics. [= K, Y; *I. stolonifera* (Cirillo) J.F. Gmelin – RAB, GW, S, Z]

Ipomoea lacunosa Linnaeus, White Morning-glory. Cp, Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common (rare in VA Mountains). September-December. NJ west to OH, IL, and KS, south to FL and e. TX. [= RAB, C, F, G, GW, K, S, W, Y, Z]

Ipomoea macrorhiza Michaux, Manroot. Cp (GA, NC, SC): hammocks, shell middens, dry sands, disturbed maritime areas; rare (GA Special Concern, NC Watch List, SC Rare). June-July. Se. NC south to FL, west to s. AL. [= RAB, K, S, Y, Z]

* ***Ipomoea muricata*** (Linnaeus) Jacquin, Lilacbell, Purple Moonflower. Cp (GA, NC, SC): fields, disturbed areas; rare, native (apparently) of Mexico. Austin & Jansson (1988) discuss the species' spread in se. United States, apparently as a contaminent in soybean seeds. Staples et al. (2005) reinstate the name *I. muricata*. [= *Ipomoea turbinata* Lagasca y Segura – K, Y, Z]

Ipomoea pandurata (Linnaeus) G.F.W. Meyer, Wild Sweet Potato, Manroot, Man-of-the-earth. Cp, Pd, Mt (GA, NC, SC, VA): May-July; July-September. CT, NY, and s. Ontario west to OH, s. MI, and KS, south to c. peninsular FL and e. TX. [= RAB, C, F, G, GW, K, S, W, Y, Z; > *I. pandurata* var. *pandurata* – G; > *I. pandurata* var. *rubescens* Choisy – G]

Ipomoea pes-caprae (Linnaeus) R. Brown *var.* ***emarginata*** Hallier f., Railroad Vine, Goat's-foot, Bay Hops, Bay Winders. Cp (GA, NC, SC): ocean beaches; rare. E. NC (Carteret County), SC (Beaufort, Horry, Charleston, Colleton, and Georgetown counties), south to FL, west to TX, and widespread on tropical shores of the the New World and Old World. The records in the Carolinas may reflect the periodic arrival of sea-borne seeds. [< *I. pes-caprae* – GW, S, Z; *? I. pes-caprae* ssp. *brasiliensis* (Linnaeus) van Ooststr. – K, Y]

* ***Ipomoea purpurea*** (Linnaeus) Roth, Common Morning-glory. Cp, Pd, Mt (GA, NC, SC, VA): fields, disturbed areas; common, native of tropical America. July-September. [= RAB, C, F, G, GW, K, W, Y, Z; = *Pharbitis purpurea* (Linnaeus) Voigt – S]

* ***Ipomoea quamoclit*** Linnaeus, Cypress-vine. Cp (GA, NC, SC), Pd (NC, SC, VA): fields, hedgerows, disturbed areas; common (rare in VA), native of tropical America. September-December. [= RAB, C, F, GW, K, Y, Z; = *Quamoclit vulgaris* Choisy – G; = *Quamoclit quamoclit* (Linnaeus) Britton – S]

Ipomoea sagittata Poiret. Cp (GA, NC, SC): edges of brackish marshes, moist thickets on barrier islands, hammocks; common. July-September. E. NC south to s. FL, west to TX; also in the West Indies. [= RAB, GW, K, S, Y, Z]

* *Ipomoea cairica* (Linnaeus) Sweet. East to AL, native of Africa. [= K, S] {not yet keyed; synonymy incomplete}

* *Ipomoea nil* (Linnaeus) Roth occurs in scattered states, such as MD and MS, as a rare introduction from tropical America (Kartesz 1999). [= K, Y, Z; *Pharbitis nil* (Linnaeus) Choisy – S]

* *Ipomoea tricolor* Cavanilles is reported for several locations in se. PA (Rhoads & Klein 1993). [= K] {not yet keyed; synonymy incomplete}

* *Ipomoea wrightii* A. Gray, native of India, has been reported as likely naturalized in central TN, "spreading northward from the Gulf Coastal Plain" (Kral 1981). It also is known from GA (Kartesz 1999). [= K] {not yet keyed; synonymy incomplete}

* *Ipomoea* ×*multifida* (Rafinesque) Shinners [*I. coccinea* × *quamoclit*], Cardinal Climber, is cultivated and may escape. [= K] {not keyed}

Jacquemontia Choisy (Jacquemontia)

A genus of about 90 species, tropical, subtropical, and warm temperate areas, especially America. References: Wilson (1960b)=Z.

* ***Jacquemontia tamnifolia*** (Linnaeus) Grisebach, Jacquemontia. Cp (GA, NC, SC, VA), Pd (GA, SC): fields, roadsides, other disturbed areas; uncommon (rare in VA). August-September. Se. VA south to FL, west to AR and TX; also widespread in West Indies, Central America, and South America, its original range difficult to determine. In our area, it is probably adventive. Fox, Godfrey, & Blomquist (1952) report the first collections of the species in NC, in 1938 and 1950, from obviously disturbed situations. [= RAB, C, F, G, GW, K, Z; = *Thyella tamnifolia* (Linnaeus) Rafinesque – S]

Merremia Dennst. ex Endlicher

References: Wilson (1960b)=Z.

* ***Merremia dissecta*** (Jacquin) Hallier f., Noyau Vine. Cp (GA): disturbed areas; rare, native of South America. Ranges as far north as e. and sw. GA. [= K, Z; =*? Ipomoea sinuata* Ortega; = *Operculina dissecta* (Jacquin) House]

Stylisma Rafinesque (Dawnflower)

A genus of about 6 species (and about 8 taxa), vining to trailing herbs, endemic to se. North America. References: Myint (1966)=Z; Shinners (1962d)=Y; Wilson (1960b)=X.

1 Corolla < 2× as long as the calyx; leaves < 2 cm long; [of FL] ..... ***S. abdita***
1 Corolla > 2× as long as the calyx; leaves (at least the larger on a plant) > 2 cm long; [collectively widespread].
  2 Corolla pink or purple; filaments glabrous, or nearly so; leaves densely and conspicuously silvery-sericeous; [of seasonally wet habitats] ..... ***S. aquatica***
  2 Corolla white; filaments villous, at least near the base; leaves puberulent or pubescent, but not consopicuously silky-sericeous; [of dry habitats].
    3 Larger leaves (7-) 12-30 mm wide; peduncles with (1-) 3-7 (-12) flowers; stems with a tendency to twine, at least near growing tip.
      4 Sepals glabrous; [widespread in the Coastal Plain and Piedmont of our area] ..... ***S. humistrata***
      4 Sepals densely villous; [of s. GA southward and westward] ..... ***S. villosa***
    3 Larger leaves 2-10 mm wide; peduncles with 1 (-5) flowers; stems without a tendency to twine.
      5 Bracteoles (2-) 10-20 mm long; stylar branches usually fused more than 5/6 of the total length (occasionally fused less than ½ of length), the free portion of the stylar branches usually less than 3 mm long; sepals villous, 4-6 (-7) mm long, ovate-elliptic with obtuse to acute apices; leaves 1-3 mm wide.
        6 Stylar branches 1-1.5 mm long, usually unequal in length, the longer nearly 2× as long as the shorter; sepals mostly acute; [of MS westward] ..... ***[S. pickeringii var. pattersonii]***
        6 Stylar branches 2-3 mm long, nearly equal, the longer 1.0-1.3× as long as the shorter; sepals mostly obtuse; [of NC south and west to AL; disjunct in NJ] ..... ***S. pickeringii var. pickeringii***
      5 Bracteoles 1-3 (-5) mm long; stylar branches free nearly to base, the free portion more than 5 mm long; sepals villous or glabrous, 6-9 mm long, ovate-lanceolate with acuminate apices; leaves 2-10 mm wide.
        7 Sepals glabrous (-glabrate), though the margins ciliate; leaves 2-3 (-5) mm wide, mostly 7-15 × as long as wide ..... ***S. patens var. angustifolia***
        7 Sepals moderately to densely villous; leaves 3-10 mm wide, mostly 4-6 × as long as wide ..... ***S. patens var. patens***

Stylisma abdita Myint. Cp (FL): scrub; rare. Ne. FL (Clay County) south to s. FL. [= K, WH, Z; = *Bonamia abdita* (Myint) R.W. Long]

Stylisma aquatica (Walter) Rafinesque, Water Dawnflower. Cp (AL, FL, GA; LA, MS, NC, SC): clay-based Carolina bays and wet savannas; uncommon (rare in NC and SC). June-July. Se. NC south to c. and w. FL panhandle, west to se. AR and e. TX. *S. aquatica*, as the epithet implies, occurs in wetter habitats than our other species. [= GW, K, S, WH, Z; = *Bonamia aquatica* (Walter) A. Gray – RAB, Y; = *Breweria michauxii* Fernald & Schubert – F; = *Bonamia michauxii* (Fernald & Schubert) K.A. Wilson – X]

Stylisma humistrata (Walter) Chapman, Southern Dawnflower. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): sandhills and other dry woodlands, especially on dryish stream terraces; common (uncommon in FL and rare in VA). June-August. Se. VA south to Panhandle FL, west to AR and e. TX, north in the interior to n. AL and w. TN. [= C, K, S, WH, Z; = *Bonamia humistrata* (Walter) A. Gray – RAB, X, Y; = *Breweria humistrata* (Walter) A. Gray – F, G]

Stylisma patens (Desrousseaux) Myint *var.* ***angustifolia*** (Nash) Shinners, Narrowleaf Dawnflower. Cp (FL, GA, NC, SC): sandhills; uncommon (rare in NC and SC). May-August. SE. NC south to c. peninsular FL, west to w. Panhandle FL. [= *Stylisma patens* (Desrousseaux) Myint ssp. *angustifolia* (Nash) Myint – K, Z; = *Bonamia patens* (Desrousseaux) Shinners var. *angustifolia* (Nash) Shinners – RAB, Y; = *S. angustifolia* (Nash) House – S; < *S. patens* – WH; = *Bonamia angustifolia* (Nash) K.A. Wilson – X]

Stylisma patens (Desrousseaux) Myint *var.* ***patens***, Common Dawnflower. Cp (GA, NC, SC): sandhills and other relatively dry sandy areas; common. June-August. Overall, the most common and widespread taxon of the genus in our area, regularly encountered in its habitat. E. NC south to n. FL, and west to s. MS. [= *Stylisma patens* (Desrousseaux) Myint ssp. *patens* – K, Z; = *Bonamia patens* (Desrousseaux) Shinners var. *patens* – RAB, Y; = *S. trichosanthes* (Michaux) House – S, misapplied; < *S. patens* – WH; = *Bonamia aquatica* (Walter) A. Gray – X, misapplied]

Stylisma pickeringii (Torrey ex M.A. Curtis) A. Gray *var.* ***pickeringii***, Pickering's Dawnflower. Cp (AL, GA, MS, NC, NJ, SC): sandhills, usually in the driest, most barren, deep-sand areas, occasionally colonizing dry, disturbed areas in sandhills, such as sandy roadbanks, known from the Fall-line Sandhills, aeolian rims of Carolina bays, and sandhills on relict riverine dunes along Coastal Plain rivers; rare. June-August (-September); July-September. Var. *pickeringii* ranges from s. NC south through SC, GA, AL, and e. MS, with a disjunct area in the Pine Barrens of s. NJ, sometimes treated as a separate variety "*caesariensis*" (see synonymy). This rare species is easily recognizable by its growth form, with numerous stems arching from a central point, then trailing radially away, forming a mound 1-2 meters in diameter. The narrowly linear leaves are borne vertically. Fernald and Schubert (1949) named four varieties in this widely but disjunctly distributed species; Myint (1966) reduced this to two varieties, one eastern and one western. [= C, K, Z; < *Bonamia pickeringii* (Torrey ex M.A. Curtis) A. Gray – RAB, X, Y; >

Breweria pickeringii (Torrey ex M.A. Curtis) A. Gray var. *pickeringii* – F; > *Breweria pickeringii* var. *caesariensis* Fernald & Schubert – F; < *Breweria pickeringii* (Torrey ex M.A. Curtis) A. Gray – G; < *S. pickeringii* (Torrey ex M.A. Curtis) A. Gray – S]

Stylisma villosa (Nash) House, Hairy Dawnflower. Cp (FL, GA): sandhills, scrub; uncommon (rare in GA). Late April-July. S. GA south to s. FL, west to e. TX. [= K, S, WH, Z; = *Bonamia villosa* (Nash) K.A. Wilson – X, Y; = *Breweria villosa* Nash]

Stylisma pickeringii (Torrey ex M.A. Curtis) A. Gray var. *pattersonii* (Fernald & Schubert) Myint. Cp (MS): sandhills; rare. IL and IA south through KS and OK to w. LA and e. TX; disjunct east of the Mississippi River in w. MS (the material somewhat ambiguous as to varietal affinity). [= K, Z; < *Bonamia pickeringii* (Torrey ex M.A. Curtis) A. Gray – X, Y; < *S. pickeringii* (Torrey ex M.A. Curtis) A. Gray – S]

CORNACEAE (Berchtold & J. Presl) Dumortier 1829 (Dogwood Family)

A family of 2 genera and about 85 species, trees, shrubs, lianas, and subshrubs, semicosmopolitan (mainly northern hemisphere). The Cornaceae is best circumscribed to exclude *Nyssa* (Xiang et al. 2002). References: Xiang et al. (2002); Kubitzki in Kubitzki (2004).

Cornus Linnaeus 1753 (Dogwood, Cornel)
(contributed by Z.E. Murrell & A.S. Weakley)

A genus of about 65 species, trees, shrubs, and subshrubs, mainly north temperate. The generic limits are controversial. Phylogenetic analyses show that *Cornus* is monophyletic, but various clades within it are also monophyletic and have levels of genetic and morphologic divergence often regarded as warranting generic distinction. At very least, the subgenera are well-marked. References: Godfrey (1988)=Z; Wilson (1965); Murrell (1993); Xiang et al. (2006); Fan & Xiang (2001); Eyde (1987); Xiang, Soltis, & Soltis (1998); Ferguson (1966c, 1966d)=Y; Kubitzki in Kubitzki (2004).

1 Leaves alternate (the internodes typically short and therefore the leaves looking nearly whorled); [subgenus *Mesomora*] ..... ***C. alternifolia***
1 Leaves opposite.
  2 Herb or dwarf shrub from a woody rhizome, to 2 dm tall; leaves in 2-4 pairs below the inflorescence; [of NJ and montane VA and WV northward]; [subgenus *Arctocrania*] ..... ***C. canadensis***
  2 Shrub or tree, much taller than 2 dm when mature; leaves many; [collectively widespread].
    3 Inflorescence subtended by 4 showy (white, creamy, or pink) bracts.
      4 Showy bracts subtending the inflorescence rounded and notched; fruits separate in a compact cluster; [common native small tree]; [subgenus *Cynoxylon*] ..... ***C. florida***
      4 Showy bracts subtending the inflorescence acute; fruits fused together; [exotic uncommonly planted, rarely escaped or persistent]; [subgenus *Syncarpea*] ..... ***[C. kousa]***
    3 Inflorescence lacking bracts; [subgenus *Kraniopsis*].
      5 Veins usually 5 or more per leaf side.
        6 Bark of older branches and stems splitting longitudinally, appearing braided; leaves without tufts of trichomes in axils of secondary veins on abaxial surface.
          7 Abaxial leaf surface not coronulate, trichomes appressed and rigid, and erect and curling, on the same leaf, leaf base usually rounded or truncate ..... ***C. amomum***
          7 Abaxial leaf surface coronulate, trichomes all appressed and rigid, leaf base usually cuneate ..... ***C. obliqua***
        6 Bark of older branches and stems smooth, with scattered protruding lenticels; leaves with tufts of trichomes in axils of secondary veins on the abaxial surface.
          8 Area surrounding lenticels suffused with purple; leaves suborbicular or broadly ovate; 7-9 veins per leaf side; tertiary veins usually prominent ..... ***C. rugosa***
          8 Area surrounding lenticels not differentiated; leaves lanceolate, elliptic, or ovate; 5-7 veins per leaf side; tertiary veins not prominent ..... ***C. stolonifera***
      5 Veins usually 3-4 per leaf side.
        9 Trichomes erect on abaxial surface.
          10 Petioles 3-7 mm long; leaf veins evenly spaced ..... ***C. asperifolia*** [or ***C. asperifolia* × *stricta***]
          10 Petioles 8-25 mm long; leaf veins emanate from the basal half of the leaf ..... ***C. drummondii***
        9 Trichomes appressed or slightly raised on abaxial leaf surface.
          11 Rhizomatous, forming large colonies; lenticels protrude slightly, older stems appear verrucose; fruit white ..... ***C. racemosa***
          11 Multiple stems from a single rootstock (occasionally appearing rhizomatous from decumbent stems); lenticels not protruding, bark swelling between lenticels; fruit blue ..... ***C. stricta***

Cornus alternifolia Linnaeus f., Alternate-leaf Dogwood, Pagoda Cornel, Pagoda Dogwood. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, VA): moist forests; common (rare in Coastal Plain, rare in Piedmont south of VA). May-June; August-September. Newfoundland west to MN, south to Panhandle FL, AL, s. MS, and AR. [= RAB, C, F, G, K, W, WH, Y, Z; = *Svida alternifolia* – S; = ***Swida alternifolia*** (Linnaeus f.) Small]

Cornus amomum P. Miller, Silky Dogwood. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): shores, streams, bottomlands; common (rare in FL). May-June; August-September. NY and MA west to IN, south to GA, Panhandle FL, and MS. [= RAB, F, G, K, W; = *Cornus amomum* var. *amomum* – C; = *Cornus amomum* P. Miller ssp. *amomum* – GW, Y, Z; = *Svida amomum* – S; = ***Swida amomum*** (P. Miller) Small]

Cornus asperifolia Michaux, Eastern Roughleaf Dogwood. Cp (GA, NC, SC), Pd (GA): mesic calcareous forests and thickets, shell middens, calcareous hammocks; uncommon (rare in NC). May-June; August-September. Se. NC south to n.

peninsular FL, west to s. AL. Nash (1896) collected *C. asperifolia* Michaux at River Junction, Florida; based upon conflicting reports of fruit colors given by Chapman (1860) and Coulter and Evans (1890) for the two rough-leaved dogwoods (*C. asperifolia* and *C. drummondii*), Nash decided to name the rough-leaved dogwood with blue fruit as *C. microcarpa*. However, Michaux's (1803) description, even without reference to fruit color, is clearly attributable to this species, since its locality was given as "Carolinae inferioris." The populations of this rough-leaved dogwood in NC and SC have morphology intermediate between *C. stricta* and *C. asperifolia* and these should possibly be attributed to a hybrid origin. More analysis needs to done on this complex. [= RAB, K, Y, Z; = *Cornus foemina* P. Miller ssp. *microcarpa* (Nash) J.S. Wilson – GW; = *Svida microcarpa* (Nash) Small – S; = ***Swida asperifolia*** (Michaux) Small]

Cornus canadensis Linnaeus, Bunchberry, Dwarf Cornel, Dwarf Dogwood. Mt (VA): high elevation forests, in humus or on talus, under *Betula cordifolia*, *Picea rubens*, or *Pinus rigida*; rare. Greenland west to AK, south to NJ, VA, WV, and CA. [= C, F, G, K, W, Y; = ***Chamaepericlymenum canadense*** (Linnaeus) Ascherson & Graebner]

Cornus drummondii C.A. Meyer, Midwestern Roughleaf Dogwood. Mt (GA): open woodlands and glades over calcareous rocks (limestone, calcareous shale); rare. NY, Ontario, and SD south to e. TN, nw. GA, LA, and TX. [= C, G, GW, K, Y; > *Cornus drummondii* – F; > *Cornus priceae* Small – F; > *Svida priceae* (Small) Small – S; > *Svida asperifolia* – S, misapplied; = ***Swida drummondii*** (C.A. Meyer) Sojak]

Cornus florida Linnaeus, Flowering Dogwood. Mt, Pd, Cp (GA, NC, SC, VA): dry to moist forests and woodlands; common. March-May; September-October. ME west to MI, south to c. peninsular FL and ne. Mexico (Veracruz and Nuevo Léon). *C. florida* has been impacted since the 1980s by widespread infection by the dogwood anthracnose fungus (*Discula destructiva*). [= RAB, C, F, G, K, W, WH, Y, Z; = ***Cynoxylon floridum*** (Linnaeus) Rafinesque ex B.D. Jackson – S]

Cornus obliqua Rafinesque, Silky Dogwood. Mt, Pd (VA): rocky rivershores, where periodically scoured; rare. ME and Québec west to MN, south to VA, KY, c. TN, AR, and OK. Some material intermediate between *C. amomum* and *C. obliqua* has been found in the Mountains of nw. NC and w. VA. It is recognizable by leaves intermediate between the putative parents, ovate with an attenuate base, abaxial surface papillose; abaxial and adaxial surfaces with mostly appressed ornamented trichomes, but with scattered unornamented trichomes with erect arms on both blade surfaces and midvein and secondary veins. [= F, K; = *Cornus amomum* P. Miller var. *schuetzeana* (C.A. Meyer) Rickett – C; = *Cornus purpusii* Koehne – G; = *Cornus amomum* P. Miller ssp. *obliqua* (Rafinesque) J.S. Wilson – GW, Y; = ***Swida obliqua*** (Rafinesque) Moldenke]

Cornus racemosa Lamarck, Northern Swamp Dogwood. Mt (VA), Pd (NC, VA), Cp (VA): wet forests and thickets; uncommon (rare in NC). May; August-September. ME and s. Québec west to s. Manitoba, south to VA, nc. NC, s. IL, and MO. [= RAB, C, F, G, K; = *Svida femina* (P. Miller) Small – S, misapplied; = *Cornus foemina* P. Miller ssp. *racemosa* (Lamarck) J.S. Wilson – W, Y; = ***Swida racemosa*** (Lamarck) Moldenke]

Cornus rugosa Lamarck, Roundleaf Dogwood. Mt, Pd (VA): at high elevations, usually on talus (greenstone, quartzite, sandstone); rare. Québec to Manitoba, south to NJ, PA, w. VA, OH, IN, and IL. [= C, F, G, K, W; = ***Swida rugosa*** (Lamarck) Rydberg]

*? ***Cornus stolonifera*** Michaux, Red Osier Dogwood. Pd, Mt, Cp* (VA): shrub swamps, bottomlands, suburban areas; rare. At least some of the occurrences in VA represent horticultural introductions. Labrador and AK south to VA, KY (Clark et al. 2005), IL, NM, AZ, and CA. Attempts to link the name *C. sericea* Linnaeus to the red-osier dogwood have focused on the Linnaean description of "foliis subtus sericeis" and "ramis rubicundis." The reference to the red branches has been emphasized to rule out any other species, yet *C. amomum* and *C. obliqua* also have reddish-maroon branches. The description of "fructo nigro-caeruleo" cannot be dismissed as a reference to individuals of the red-osier dogwood which have pale blue fruit, often considered to be due to hybridization with *C. amomum* or *C. obliqua*. It seems clear that the description fits *C. obliqua* better than it does the red-osier dogwood. Although there is a specimen in the Linnaean herbarium which has been identified as the red-osier dogwood, it is neither dated nor is the label of *C. sericea* in Linnaeus' hand. Also, considering the similarity of the red-osier dogwood and *C. alba* Linnaeus, it is doubtful Linnaeus would have described the red-osier dogwood without reference to *C. alba*. Therefore, we agree with Rickett's rejection of *C. sericea* as a nomen dubium. [= G, W; = *C. sericea* Linnaeus – C, nomen dubium; = *Cornus stolonifera* Michaux – G, W; > *Cornus stolonifera* var. *stolonifera* – F; > *Cornus stolonifera* var. *baileyi* (Coulter & Evans) Drescher – F; > *C. sericea* ssp. *sericea* – K, nomen dubium; = *Swida sericea* (Linnaeus) Holub, nomen dubium; = ***Swida stolonifera*** (Michaux) Rydberg]

Cornus stricta Lamarck, Southern Swamp Dogwood. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): swamps, streambanks, marshes, alluvial forests; common, rare in Mountains. April-May; July-August. DE south to s. FL, west to TX, and north in the interior to TN, s. IN, s. IL, AR, and se. OK. [= RAB, C, G; = *Cornus foemina* P. Miller – F, K, WH, Z; = *Cornus stricta* Lamarck – RAB, C, G; = *Svida stricta* (Lamarck) Small – S; = *Cornus foemina* P. Miller ssp. *foemina* – GW, W, Y; = *Swida foemina* (P. Miller) Rydberg; = ***Swida stricta*** (Lamarck) Small]

* *Cornus kousa* Hance, Kousa Dogwood, is sometimes planted as an ornamental and may persist. [= K; = ***Cynoxylon kousa*** (Hance) Nakai]

CRASSULACEAE A.P. de Candolle 1825 (Stonecrop Family)

A family of about 34-35 genera and 1100-1410 species, succulent shrubs and herbs, nearly cosmopolitan, but with centers of diversity in s. Africa and Mexico. References: Moran in FNA (in prep.); Thiede & Eggli in Kubitzki, Bayer, & Stevens (2007). [also see *PENTHORACEAE*]

1 Leaves connate at the base, opposite; flowers solitary in the axils of leaves; flowers 3-4-merous; [subfamily *Crassuloideae*]..... ***Crassula***
1 Leaves distinct, whorled or alternate; flowers in terminal cymose inflorescences; flowers 4-5 (-8)-merous; [subfamily *Sempervivoideae*].
2 Perennials without rosettes, the stems 0.5-10 dm tall; leaves large, relatively thin in texture, usually 5-25 times as wide as thick, often crenate; flowers pink, purple, white, or greenish.

3 Flowers 5-merous, bisexual; flowering stems 2-10 dm tall, from an underground, tuberous base; average leaves 3-11 cm long, 1-5 cm wide; ovaries attenuate at the base; [tribe *Telephieae*] ..... ***Hylotelephium***

3 Flowers 4 -(5)-merous, usually unisexual and then the plants dioecious; flowering stems 0.5-4 dm tall, from axils of brown scale-leaves clothing a stout rootstock at least in part exposed aboveground; average leaves 1-5 cm long, 0.4-1.5 cm wide; ovaries not attenuate at the base; [tribe *Umbiliceae*] ..... ***Rhodiola***

2 Perennials or annuals with or without rosettes, the stems < 2 dm tall; leaves smaller, flat or terete, relatively thicker, entire; flowers white or yellow; [tribe *Sedeae*].

4 Carpels united basally (to about 1/3 their length); petals cucullate, initially partly enclosing 4 of the 8 stamens; follicles dehiscing by a tear-shaped valve on the abaxial (lower) surface; stem and leaves normally red; [of granitic flatrocks of the Piedmont of NC and SC] ..... ***Diamorpha***

4 Carpels free; petals flat, never enclosing any of the 8 anthers; follicle dehiscing by a longitudinal slit along the adaxial (upper) suture; stem and leaves normally green, sometimes somewhat pink or reddish; [collectively various habitats, including granitic flatrocks of GA, NC, SC, and VA] ..... ***Sedum***

Crassula Linnaeus 1753

A genus of 195-250 species, nearly cosmopolitan (centered in s. Africa). References: Moran in FNA (in prep.); Thiede & Eggli in Kubitzki, Bayer, & Stevens (2007).

1 Seeds rugulose; leaves 2-6 mm long, the apex acute; sepals 0.5-1.5 mm long ..... ***C. aquatica***

1 Seeds with sharp-pointed papillae; leaves 1.5-3 mm long, the apex acute; sepals 0.4-0.6 mm long ..... ***C. drummondii***

Crassula aquatica (Linnaeus) Schönland, Pygmyweed. Pd (SC): artificial lake; rare. Introduced? Occuring in tidal marshes and shores, south to MD and se. PA, and also in GA and AL (Kartesz 1999). [= FNA, K; = *Tillaea aquatica* Linnaeus – GW; = *Tillaeastrum aquaticum* (Linnaeus) Britton – S]

* ***Crassula drummondii*** (Torrey & A. Gray) Fedde. Cp (SC): waste area around wool-combing mill; rare, perhaps merely a waif, native of sc. United States. [= FNA, K; = *Tillaea drummondii* Torrey & A. Gray]

Crassula longipes (Rose) Bywater & Wickens. {AL, GA}. [= K] {not yet keyed; synonymy incomplete}

Diamorpha Nuttall 1818 (Elf-orpine)

A monotypic genus, a succulent annual, endemic to se. North America. References: Wilbur (1988a)=Z; Moran in FNA (in prep.); Clausen (1975)=Y; Thiede & Eggli in Kubitzki, Bayer, & Stevens (2007).

Diamorpha smallii Britton ex Small, Elf-orpine. Pd (GA, NC, SC, VA), Mt (GA, NC, SC): in very thin soil (generally less than 2 cm deep) of vernally wet depressions on granite flatrocks and other granitic outcrops; uncommon (rare in Mountains) (VA Rare). April-May; May-June. Primarily limited to granitic flatrocks of the Piedmont, ranging from sc. VA to ec. AL, and locally north into se. TN. This species is both one of the most typical and one of the most interesting of the dozens of species endemic (or largely so) to granite flatrocks of the southeastern Piedmont. See Wilbur (1988a) for a thorough discussion of the muddled nomenclatural history of this remarkable species, as well as for a detailed summary of systematic and ecological information. [= FNA, GW, K, Z; = *Sedum smallii* (Britton ex Small) Ahles – RAB, W; = *Diamorpha cymosa* (Nuttall) Britton ex Small – Y; > *Diamorpha cymosa* – S; > *Diamorpha smallii* – S]

Hylotelephium H. Ohba 1977 (Live-for-ever)

A genus of about 30 species, of temperate Eurasia and North America. References: Moran in FNA (in prep.); Clausen (1975)=Z; Thiede & Eggli in Kubitzki, Bayer, & Stevens (2007). Key based on Moran in FNA (in prep.).

1 Petals 2× as long as the sepals; nectaries wider than long; flowers fertile; [native] ..... ***H. telephioides***

1 Petals 3-4× as long as the sepals; nectaries longer than wide; flowers sterile (rarely fertile); [introduced].

2 Flowers white or greenish; cymes lax, subcorymbose; leaves not markedly reduced upward from base of plant upward ..... ***H. erythrostictum***

2 Flowers deep pink to purple; cymes densely subglobose; leaves typically strongly reduced in size from base of plant upward ..... ***H. telephium***

* ***Hylotelephium erythrostictum*** (Miquel) H. Ohba, Garden Orpine, Live-for-ever. Pd (GA, NC, VA), Cp (NC, VA), Mt (VA): disturbed areas; rare, inroduced from Europe. August-September; September-October. [= FNA, K; ? *Sedum spectabile* Boreau – RAB, misapplied; = *Sedum* ×*erythrostictum* – C; ? *Sedum alboroseum* Baker – F, G, Z]

Hylotelephium telephioides (Michaux) H. Ohba, Allegheny Live-for-ever. Mt, Pd (NC, SC, VA): rock outcrops, mostly at high to moderate elevations, ascending to 2000 m; uncommon. July-September; August-October. Essentially a Central and Southern Appalachian endemic, *H. telephioides* ranges from s. PA south to w. NC, with a few outlying populations to the west in s. IL, s. IN, and w. KY. The species is apparently not known from TN. [= FNA, K; = *Sedum telephioides* Michaux – RAB, C, F, G, W, Z; = *Anacampseros telephioides* (Michaux) Haworth – S]

* ***Hylotelephium telephium*** (Linnaeus) H. Ohba, Live-for-ever. Cp (NC), Pd (VA): disturbed areas; rare, native of Europe. September-October; October-November. [= FNA; > *Sedum purpureum* (Linnaeus) Link – RAB, C, F, Z; > *S. telephium* – F; >

Sedum telephium Linnaeus ssp. *purpureum* (Link) Schinz & R. Keller – G; > *Sedum telephium* ssp. *fabaria* (Koch) Schinz & Keller – G; = *Hylotelephium telephium* ssp. *telephium* – K]

Rhodiola Linnaeus 1753 (Roseroot)

A genus of about 40-60 species, of cold temperate and boreal areas of the northern hemisphere. References: Moran in FNA (in prep.); Clausen (1975)=Z; Thiede & Eggli in Kubitzki, Bayer, & Stevens (2007).

Rhodiola rosea Linnaeus, Roseroot. Mt (NC): high elevation rocky summits; rare (NC Endangered). July-August; August-September. Circumboreal, widely distributed in northern Europe, Asia, and North America, south in e. North America to e. PA and thence disjunct to Roan Mountain (Mitchell County, NC) and Grandfather Mountain (Avery County, NC), where nearly (if not completely) extirpated. Dwarfed, high elevation forms of *Sedum telephioides*, with narrow, nearly toothless leaves, have been confused with *Rh. rosea*; they are perhaps readily distinguished only in flower or fruit. [= FNA, K; = *Sedum rosea* (Linnaeus) Scopoli – Z; = *Sedum rosea* (Linaeus) Scopoli var. *rosea* – C; < *S. rosea* var. *rosea* – F; < *S. rosea* – RAB, G, W; > *Rhodiola roanensis* Britton – S; > *Sedum rosea* (Linnaeus) Scopoli var. *roanense* (Britton) Berger]

Sedum Linnaeus 1753 (Stonecrop, Orpine, Sedum)

A genus of perhaps 200 species, depending on circumscription. There is considerable controversy about the circumscription of the genus *Sedum*. *Diamorpha* is usually separated, but Thiede & Eggli (2007) include it in *Sedum*; the separation of *Rhodiola* and *Hylotelephium* have been more controversial, but Thiede & Eggli (2007) place these in separate tribes from *Sedum* s.s. Other segregates which would affect the species treated below have been proposed, such as *Chetyson*, *Clausenellia*, and *Spathulata* (see synonymy). References: Ohba in FNA (in prep.); Clausen (1975)=Z; Calie (1981)=Y; Thiede & Eggli in Kubitzki, Bayer, & Stevens (2007). [also see *Diamorpha*, *Hylotelephium*, and *Rhodiola*]

1 Leaves primarily whorled in 3's or 4's.
  2 Largest leaves distinctly spatulate, much wider than thick, 8-20 mm wide; flowers and fruits 4-merous; petals white; [native, of moist forest and rock outcrops]; [section *Ternata*] ..... ***S. ternatum***
  2 Largest leaves linear-lanceolate, oblanceolate, or elliptic, almost as thick as wide, < 7 mm wide; flowers and fruits 5-merous; petals yellow; [alien].
    3 Stems decumbent; leaves linear-lanceolate ..... ***[S. lineare]***
    3 Stems long-creeping; leaves oblanceolate to elliptic ..... ***S. sarmentosum***
1 Leaves primarily alternate.
  4 Flowers and fruits 5-merous; [plants aliens].
    5 Leaves 2-5 mm long; petals yellow ..... ***S. acre***
    5 Leaves 6-15 mm long; petals yellow or white.
      6 Petals white; flowers 5-merous ..... ***[S. album]***
      6 Petals yellow; flowers (5-) 7 (-9) merous ..... ***[S. reflexum]***
  4 Flowers and fruits 4-merous; [plants natives].
    7 Leaves of flower-bearing stems linear, sagittate-spurred at the base (the spurs clasping the stem); petals pink to white; annual; [section *Ternata*] ..... ***S. pulchellum***
    7 Leaves of flower-bearing stems narrowly elliptic, oblanceolate, spatulate, cuneate or short-spurred at the base (not clasping); petals white; perennial or annual.
      8 Plants annual; sepals 0.4-1 mm long; petals 1.4-4.2 mm long; [restricted to shallow soils of granitic flatrocks of the Piedmont, from s. NC south to wc. GA]; [section *Tetrorum*] ..... ***S. pusillum***
      8 Plants perennial; sepals 2-9 mm long; petals 4-9 mm long; [of outcrops of various rocks, not as above]; [section *Ternata*].
        9 Leaves of flowering stems with width/thickness ratio of >2.0; seeds averaging 0.8 mm long; leaves pale green or bluish green, sometimes with a glaucous coating; [of MD south through VA and WV to sc. and sw. NC] ..... ***S. glaucophyllum***
        9 Leaves of flowering stems with width/thickness ratio of <1.7; seeds averaging 0.7 mm long; leaves green or gray-green, but not glaucous; [of se. TN south into AL and GA] ..... ***S. nevii***

* ***Sedum acre*** Linnaeus, Wallpepper, Mossy Stonecrop, Golden Carpet, Gold-moss, Bitter Stonecrop. Mt (NC, VA), Pd (NC, VA): rock outcrops, gravel parking lots, disturbed areas; commonly cultivated, rarely naturalizing, native of Europe. May-June; June-July. [= RAB, C, F, FNA, G, K, S, W, Z]

Sedum glaucophyllum Clausen, Cliff Stonecrop. Mt, Pd (NC, VA): rock outcrops, usually basic and/or sedimentary; common (rare in Piedmont and south of VA). May-June; June-July. Endemic to the Central and Southern Appalachians (extending into the Piedmont), known from MD, WV, VA, and NC (reports for GA are based on confusion with *S. nevii*). This species is complex, with several ploidies and morphologies represented, some at least showing geographic integrity and perhaps worthy of taxonomic recognition. Material in sw. NC (south of the Asheville Basin) has been identified as polyploid and differs in many ways from more typical *S. glaucophyllum*, in some ways suggesting the similar and closely related *S. nevii* A. Gray (known from nearby TN and AL). Further study is needed of this group. [= C, F, FNA, K, W, Y, Z; < *S. nevii* A. Gray – RAB, G, S]

Sedum nevii A. Gray, Nevius's Stonecrop. Pd (GA): gneiss rock outcrops on river bluffs; rare. Endemic to se. TN (Polk County, just west of Cherokee County, NC) (Chester, Wofford, & Kral 1997), nc. and ec. AL, and wc. GA (where it occurs on gneiss outcrops along the Chattahoochee River in Muscogee and Harris counties). [= FNA, K, W, Y, Z; < *S. nevii* – S (also see *S. glaucophyllum*)]

Sedum pulchellum Michaux, Widow's-cross. Mt (GA): calcareous rock outcrops; rare. E. TN (Monroe, Knox, and Bradley counties) (Chester, Wofford, & Kral 1997) and nw. GA (Jones & Coile 1988) west to KS, OK, and TX. [= C, F, FNA, G, K, W, Y, Z; > *Chetyson pulchella* (Michaux) A. & D. Löve; > *Sedum pulchellum* – S; > *Sedum vigilimontis* Small – S; > *Chetyson vigilimontis* (Small) A. & D. Löve]

Sedum pusillum Michaux, Puck's Orpine. Pd (GA, NC, SC): in very thin soil (generally less than of vernally wet depressions on granite flatrocks, often in mats of the moss *Hedwigia ciliata*; rare. March-April; April-May. Endemic to granite flatrocks of the southeastern Piedmont, from sc. NC south to wc. GA. Superficially rather similar to *Diamorpha smallii*, and historically confused with it (see Wilbur 1988 for details). Wyatt (1983) discusses the reproductive biology of this species. [= RAB, FNA, GW, K, S, Z; = *Tetrorum pusillum* (Michaux) Rose]

* ***Sedum sarmentosum*** Bunge. Pd (GA, NC, SC, VA), Mt (GA, NC, VA), Cp (VA): xeric rock outcrops, disturbed areas; rare, native of China. May-June; June-July. [= RAB, C, F, FNA, G, K, W, Z]

Sedum ternatum Michaux, Mountain Stonecrop. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): moist forests, coves, bottomlands, shaded rock outcrops; common. April-June; May-July. NJ west to IA and AR, south to nw. GA and AL. [= RAB, C, F, FNA, G, K, S, W, Y, Z; = *Clausenellia ternata* (Linnaeus) A. & D. Löve]

* *Sedum album* Linnaeus, White Stonecrop, native of Eurasia, is introduced and naturalized as far south as se. PA and WV. [= C, F, FNA, G, K, Z; = *Oreosedum album* (Linnaeus) Grulich]

* ***Sedum lineare*** Thunberg. Pd (GA): margin of granitic flatrock; rare, native of e. Asia. Duncan (1985) discusses the establishment of this species in Columbia County, GA. [= FNA, K, Z]

* ***Sedum reflexum*** Linnaeus. Pd (GA): Reported for nc. GA (Jones & Coile 1988). [= C, K; = *Petrosedum reflexum* (Linnaeus) Grulich; ? ***S. rupestre*** Linnaeus – FNA]

Other species of *Sedum* are grown as ornamentals, especially in rock gardens; some are aggressive and rather weedy and can be expected eventually to become a naturalized part of our flora.

CUCURBITACEAE A.L. de Jussieu 1789 (Gourd Family)

A family of about 120 genera and 775 species, of tropical and subtropical areas, with a few extending to temperate areas.

1 Ovaries and fruits with prickles; fruits 1-5 cm long at maturity; tendrils present, 3-forked.
  2 Corolla 6-lobed; fruit 4-seeded, dehiscent by 2 pores; stems and leaves glabrous or glabrescent ..... ***Echinocystis***
  2 Corolla 5-lobed; fruit 1-seeded, indehiscent; stem and leaves conspicuously viscid-pubescent ..... ***Sicyos***
1 Ovaries and fruits smooth or pubescent, but not prickly; fruits 1-70 cm long at maturity; tendrils absent or present (if present either forked or simple).
  3 Leaves pinnately lobed, the divisions rounded; fruit surface green and white, the flesh red or pink ..... ***Citrullus***
  3 Leaves palmately lobed, the divisions angular and toothed; fruit surface red, green, white, black, orange, yellow, or blue, the flesh white, orange, yellow, tan, or green.
    4 Fruit < 3 cm long; tendrils present, simple; [native, mostly in moist forests or thickets].
      5 Fruit surface red at maturity; pedicel of pistillate flowers and fruits 1-3 mm long ..... ***Cayaponia***
      5 Fruit surface black or dark green at maturity; pedicel of pistillate flowers and fruits > 20 mm long ..... ***Melothria***
    4 Fruit > 5 cm long; tendrils absent or present (if present, forked); [introduced, mostly in gardens, fields, or disturbed places].
      6 Corolla white; [bottle gourd, ivy gourd].
        7 Corolla campanulate; fruit scarlet at maturity; [ivy gourd] ..... ***Coccinia***
        7 Corolla salverform; fruit not scarlet at maturity; [bottle gourd] ..... ***Lagenaria***
      6 Corolla yellow; [canteloupe, cucumber, luffa, squash, pumpkin].
        8 Corolla < 3 cm long; [cantaloupe, cucumber] ..... ***Cucumis***
        8 Corolla > 5 cm long; [squash, gourd, pumpkin].
          9 Corolla campanulate; fruit indehiscent, the interior fleshy; [squash, pumpkin] ..... ***Cucurbita***
          9 Corolla salverform; fruit dehiscent, the interior very fibrous; [luffa] ..... ***Luffa***

Cayaponia Silva Manso 1836

A genus of about 45 species, of tropical, subtropical and warm-temperate America.

Cayaponia quinqueloba (Rafinesque) Shinners. Cp (GA, SC): swamp forests, river banks; rare (GA Special Concern). June-November. E. SC south to GA, west to e. TX, north in the interior to w. TN. [= GW, K; = *C. boykinii* (Torrey & A. Gray) Cogniau – RAB, S]

Citrullus Schrader 1836 (Watermelon)

A genus of 4 species, herbaceous vines, of Africa. References: Dane & Lang (2004).

* ***Citrullus lanatus*** (Thunberg) Matsumura & Nakai *var.* ***lanatus***, Watermelon. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): gardens, fields, trash heaps; commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year, native of tropical Africa. [= K; ? *C. vulgaris* Schrader – RAB, F, G; ? *C. citrullus* (Linnaeus) Karsten – S; < *C. lanatus* – WH]

Coccinia Wight & Arnott 1834 (Ivy Gourd)

* ***Coccinia grandis*** (Linnaeus) Voigt, Ivy Gourd. Cp (FL): disturbed areas; rare, escaped from cultivation, native of the Old World. [= K, WH]

Cucumis Linnaeus 1753 (Canteloupe, Muskmelon, Cucumber)

References: Decker-Walters et al. (2002).

1 Fruit more-or-less spherical, the flesh sweet, orange, yellow, or green; [canteloupes and honeydew melons] ..... ***C. melo***
1 Fruit elongate, cylindrical, the flesh not sweet, whitish; [cucumbers] ..... ***C. sativus***

* ***Cucumis melo*** Linnaeus, Canteloupe, Honeydew Melon. Cp, Pd, Mt (GA, NC, SC, VA): gardens, fields, trash heaps; commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year, native of w. Africa. See Decker-Walters et al. (2002) for discussion of the origins of wild melons of the southeastern Gulf Coast (in LA, TX, and FL). [= RAB, F, G, K, S]

* ***Cucumis sativus*** Linnaeus, Cucumber. Cp, Pd, Mt (GA, NC, SC, VA): gardens, fields, trash heaps; commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year, native of s. Asia. [= F, G, K]

* ***Cucumis anguria*** Linnaeus *var. **longaculeatus*** J.H. Kirkbride, West Indian Gherkin, reported for GA (Jones & Coile 1988) and FL (Kartesz 1999). [= K] {not yet keyed; synonymy incomplete}

Cucurbita Linnaeus 1753 (Squash, Zucchini, Pumpkin)

* ***Cucurbita maxima*** Duchesne, Hubbard Squash, Pumpkin. Cp, Pd, Mt (GA, NC, SC, VA): gardens, fields, trash heaps; commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year, native of tropical America. [= F, K]

* ***Cucurbita moschata*** (Duchesne ex Lamarck) Duchesne ex Poiret, Butternut Squash. Cp, Pd, Mt (GA, NC, SC, VA): gardens, fields, trash heaps; commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year, native of tropical America. [= F, K; = *Pepo moschata* (Duchesne ex Lamarck) Britton – S]

* ***Cucurbita pepo*** Linnaeus, Pumpkin, Zucchini, Pattypan Squash, Yellow Squash, Crookneck Squash, Straightneck Squash, Acorn Squash. Cp, Pd, Mt (GA, NC, SC, VA): gardens, fields, trash heaps; commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year, native of tropical America. [= RAB, F; > *C. pepo* var. *pepo* – K; = *Pepo pepo* (Linnaeus) Britton ex Small – S]

Echinocystis Torrey & A. Gray 1840 (Wild-cucumber)

A monotypic genus of e. North America.

Echinocystis lobata (Michaux) Torrey & A. Gray, Wild Balsam-apple, Wild-cucumber. Mt (GA?, NC), Pd (VA): bottomland forests and thickets; rare. July-October. New Brunswick west to Saskatchewan, south to GA (?) and TX. [= RAB, C, F, G, GW, K, W; = *Micrampelis lobata* (Michaux) Greene – S]

Lagenaria Seringe 1825 (Bottle Gourd)

A genus of 6 species, Old World tropical, centered in Africa.

* ***Lagenaria siceraria*** (Molina) Standley, Bottle Gourd, Calabash Gourd. Cp, Pd, Mt (GA, NC, SC, VA): gardens, fields, trash heaps; commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year, native of the Old World. [= K; *? L. vulgaris* Seringe – RAB, F; *? L. leucantha* Rusby – G; = *Cucurbita lagenaria* Linnaeus – S]

Luffa P. Miller 1754 (Luffa)

A genus of 7 species, vines, of the tropics.

1 Fruits strongly 10-angled; leaves shallowly lobed ..... ***L. acutangula***
1 Fruits not angled; leaves deeply lobed ..... ***L. aegyptiaca***

* ***Luffa acutangula*** (Linnaeus) Roxburgh, Angled Luffa. Pd (VA): gardens, fields, trash heaps; cultivated in home gardens, sometimes volunteering from seed the following year, native of the Old World. [= K]

* ***Luffa aegyptiaca*** P. Miller, Smooth Luffa, Vegetable Sponge. Pd (GA, NC, SC, VA), Cp, Mt (GA, NC, SC): gardens, fields, trash heaps; commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year, native of the Old World. [= K; *? L. cylindrica* (Linnaeus) M. Roemer – S]

Melothria Linnaeus 1753 (Melonette)

A genus of about 10 species, New World.

Melothria pendula Linnaeus *var.* ***pendula***, Melonette, Creeping Cucumber. Cp, Pd, Mt (GA, NC, SC, VA): bottomland forests, moist roadsides and disturbed areas, marshes; common (rare in Mountains). June-November. DC, MD, and VA west to IN, south to FL and TX. [= K; < *M. pendula* – RAB, C, GW, W; = *M. pendula* – F, G, S]

Melothria pendula Linnaeus var. *aspera* Cogn. AL and FL. [= K; < *M. pendula* – GW; > *M. microcarpa* Shuttleworth – S; > *M. nashii* Small – S] {not yet keyed; synonymy incomplete}

Momordica Linnaeus 1753 (Balsam-apple, Bitter Melon)

A genus of ca. 45 species, vines, of the Old World tropics.

* ***Momordica charantia*** Linnaeus, Balsam-apple, Bitter Melon. Cp (FL): disturbed areas; rare, native of Africa. Reported for Panhandle FL by Anderson (2007). [= K, S, WH] {not yet keyed}

Sicyos Linnaeus 1753 (Bur-cucumber)

A genus of about 50 species, of Australia, Pacific Islands, tropical America.

Sicyos angulatus Linnaeus, Bur-cucumber, Nimble-Kate, Star-cucumber. Mt, Pd, Cp (GA, NC, SC, VA): {habitat}; August-November. S. ME west to MN, south to panhandle FL and c. TX. [= RAB, C, F, G, GW, K, S, W]

CYRILLACEAE Endlicher 1841 (Ti-ti Family)

A family of 2 genera and 3 or more species, ranging from se. North America to the West Indies and n. South America (following the removal of *Purdiaea* to the Clethraceae (Anderberg & Zhang 2002). References: Godfrey (1988); Anderberg & Zhang (2002); Thomas (1960)=Y; Kubitzki in Kubitzki (2004). Key adapted from Godfrey (1988).

1 Lateral veins of the leaf blades scarcely or not at all apparent on either surface; flowers in terminal and axillary racemes, the racemes solitary or several at a node, not markedly radiating; fruit 5-7 mm long, 2-5 winged ..... ***Cliftonia***

1 Lateral veins of the leaf blades readily apparent on both surfaces, the main laterals neatly pinnate, the smaller veins forming a fine reticulum; flowers in lateral racemes, the racemes clustered together at the summit of the previous year's growth and radiating outward or reflexed; fruit 2-2.5 mm long, not winged ..... ***Cyrilla***

Cliftonia Banks ex C.F. Gaertner 1807 (Black Ti-ti, Buckwheat-tree)

A monotypic genus, shrub or small tree, of se. North America. References: Thomas (1960)=Y; Kubitzki in Kubitzki (2004).

Cliftonia monophylla (Lamarck) Britton ex Sargent, Black Ti-ti, Buckwheat-tree. Cp (FL, GA, SC): acid bogs, bayheads, swamps, and streambanks; common (rare in SC). Se. SC south to n. FL, west to se. LA. [= GW, K, S, WH, Y]

Cyrilla Garden ex Linnaeus 1767 (Ti-ti)

A genus of 1-3 (or more) species, trees and shrubs, of tropical and subtropical North America, West Indies, and n. South America. References: Kurz & Godfrey (1962)=Z; Thomas (1960)=Y; Kubitzki in Kubitzki (2004).

1 Leaves mostly 1-4 cm long, mostly < 1 cm wide; inflorescences mostly 4-9 cm long; petals < 3 mm long; [mostly of flatwoods ponds, in s. GA southward) ..... ***C. parvifolia***

1 Leaves mostly 5-10 cm long, mostly > 1 cm wide; inflorescences mostly > 10 cm long; petals > 3 mm long; [of various wetland habitats, throughout our area and widely distributed beyond] ..... ***C. racemiflora***

Cyrilla parvifolia Rafinesque, Littleleaf Ti-ti. Cp (GA): flatwood pond margins and along drains through savannas; rare. S. GA south into Panhandle FL. Its taxonomy is problematic; while very distinctive in some places (such as Apalachicola National Forest, FL), apparent intermediates are seen elsewhere. [= K, S, Z; < *C. racemiflora* – GW, Y]

Cyrilla racemiflora Linnaeus, Ti-ti. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): pocosins, swamps, lake and flatwood pond margins, streambanks, pine flatwoods; common, uncommon in VA, rare in Piedmont. May-July; September-October. E. VA (Accomack County) south to FL, west to TX, and south into the West Indies, Belize, Mexico, and n. South America (Thomas 1960). The leaves are quite variable in shape and size; the venation and glossy smoothness, however, are distinctive once learned. Under various ecological conditions, titi can be anything from a small shrub to a medium tree (or large tree in the West Indies). [= RAB, C, G, K, S, Z; < *C. racemiflora* – GW, Y; > *C. racemiflora* var. *racemiflora* – F; > *C. racemiflora* var. *subglobosa* Fernald – F]

DIAPENSIACEAE (Link) Lindley 1836 (Diapensia Family)

A family of 5-6 genera and about 13-15 species, subshrubs and perennial herbs, largely arctic and north temperate. References: Nesom in FNA (in prep.); Scott & Day (1983)=X; Scott in Kubitzki (2004).

1 Leaves cauline, generally < 10 cm long and < 3 mm wide; [of Coastal Plain pinelands] ..... ***Pyxidanthera***
1 Leaves basal (or on a short caudex), generally > 50 mm long and > 30 mm wide; [throughout our area, more common in the Piedmont and Mountains].
  2 Leaves orbicular, rounded or with a slight point at the apex, finely serrate (4-8 teeth per cm), the teeth not prominently mucronate; flowers in racemes; [widespread] ..... ***Galax***
  2 Leaves broadly elliptic, generally emarginate (slightly notched) at the apex, coarsely serrate (1-4 teeth per cm), the teeth prominently mucronate; flowers solitary; [native to humid gorges along the escarpment between the Mountains and Piedmont, sometimes cultivated and becoming established elsewhere] ..... ***Shortia***

Galax Sims 1804 (Galax)

A monotypic genus, a perennial herb, endemic to eastern North America. References: Nesom in FNA (in prep.); Nesom (1983); Soltis, Bohm, & Nesom (1983); Scott in Kubitzki (2004).

Galax urceolata (Poiret) Brummitt, Galax. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): mountain forests, rock outcrops, nearly ubiquitous in the Mountains, more restricted in habitat elsewhere, moist to dry slopes in the Piedmont and Coastal Plain, often associated with *Kalmia latifolia* or *Rhododendron maximum*; common (uncommon in the Coastal Plain, absent from n. VA). May-July; August-October. The genus consists of this single species, with a range centered in the Southern Appalachians, occurring in NC, SC, GA, AL, e. TN, KY, VA, WV, and MD. Diploid and tetraploid races exist, and both are present in our area (Nesom 1983). In NC, diploids are the predominant race in the Mountains, the s. Piedmont, and the s. and c. Coastal Plain; tetraploids predominate along the Blue Ridge Escarpment, the n. Piedmont, and the n. Coastal Plain. In SC, diploids occur in the Coastal Plain and Piedmont, tetraploids in the mountains and escarpment. In GA, the pattern is similar, with diploids extending further into the Piedmont and tetraploids restricted to the Mountains and upper Piedmont. In AL, only diploids are known. In VA, however, tetraploids occupy the Coastal Plain and e. Piedmont, diploids in the upper Piedmont and Mountains. A study of the flavonoids supported the idea that the tetraploid is an autopolyploid derivative of the diploid. Because of the close morphologic similarity, substantially sympatric distributions, and apparent general absence of demonstrable ecologic differentiation between the two races, it seems best not to attempt to taxonomically distinguish them (Nesom 1983; Soltis, Bohm, & Nesom 1983). "Galax-pulling" (the gathering of the often bronze-colored evergreen leaves for the florist trade) is an important folk industry in the mountains. [= FNA, K, W, X; = *G. aphylla* Linnaeus – RAB, C, F, G, S]

Pyxidanthera Michaux 1803 (Pyxie-moss, Pyxie)

A genus of 2 species, creeping subshrubs, endemic to se. North America. Superficially, *Pyxidanthera* is reminiscent of the circumboreal, arctic-alpine *Diapensia*. References: Sorrie, Weakley, & Nesom in FNA (in prep.); Primack & Wyatt (1975)=Z; Godt & Hamrick (1995); Scott in Kubitzki (2004).

1 Leaves (3.3) 4-10 mm long; leaves lanceolate, averaging > 1.0 mm wide (oblanceolate and up to 2.5 mm wide if etiolated under leaf litter); leaves (in fresh material) herbaceous in texture, < 0.1 mm thick; leaves of sterile shoots ciliate along the margins at the base, usually also pubescent on the upper surface near the base, but the pubescence rarely extending > 1/3 of the way from the base to the tip; internodes usually > 1 mm long; [of moist sites in the outer and inner Coastal Plain, including the Sandhills] ..... ***P. barbulata***
1 Leaves 1-5 mm long (rarely to 7 mm long if etiolated under leaf litter); leaves ovate, averaging < 1.2 mm wide (lanceolate and up to 1.5 mm wide if etiolated under leaf litter); leaves (in fresh material) succulent in texture, up to 0.5 mm thick; leaves of sterile shoots lanose to densely pubescent on the upper surface at the base, the pubescence becoming sparser toward the tip of the leaf, but extending past the midpoint of the leaf and often its full length; internodes usually < 1 mm long; [in extremely xeric sites over coarse deep sand or clay in the Sandhills region of sc. NC and nc. SC] ..... ***P. brevifolia***

Pyxidanthera barbulata Michaux, Common Pyxie-moss, Big Pyxie. Cp (NC, SC, VA): pine savannas, pine flatwoods, pocosin margins, edges of sandhill seepage bogs, primarily in mesic to hydric sites, in wet sands and peaty sands, occasionally

extending to submesic sands, but generally with a permanently or seasonally high water table, often with *Sphagnum*; common (uncommon to rare in the inner Coastal Plain and Sandhills) (rare in SC and VA). March-April; May-June. NY (Long Island) south to NJ, and from se. VA south to n. SC. In the Sandhills, where its range overlaps var. *brevifolia*, var. *barbulata* is limited to seepage areas or pocosin ecotones, while *P. brevifolia* occurs in xeric situations far upslope. [= F, FNA, G, GW, K, S; = *P. barbulata* var. *barbulata* – RAB; < *P. barbulata* – X, Z]

Pyxidanthera brevifolia B.W. Wells, Sandhills Pyxie-moss, Wells's Pyxie-moss, Little Pyxie. Cp (NC, SC): on xeric sandhills, generally over deep sand or sand-clay mixtures near the summits or on the upper slopes of sandhills, restricted to the Sandhills region; rare. December-March; February-May. The variety is endemic to a six-county area of the Sandhills of NC and SC. In NC, it is nearly limited to Fort Bragg, and is puzzlingly absent from seemingly suitable habitat on the Sandhills Game Land to the west. The taxonomic status of this entity has been controversial, with different authors considering it a species, a variety, or an ecotype not worthy of taxonomic status. A combination of morphologic, embryologic, phytogeographic, ecological, and phenologic evidence favors the recognition of two taxa in *Pyxidanthera*. Recent surveys of *Pyxidanthera* in the Sandhills of NC have shown that it is ecologically distributed in a strongly bimodal manner. While ecologically intermediate situations predominate in the Sandhills, this habitat is rarely occupied by *Pyxidanthera*. Instead, *Pyxidanthera* is usually found either in very dry (hill-top) or moist (pocosin ecotones) situations. A few morphologically intermediate populations are occasionally found, in ecologically intermediate situations, but the vast majority of populations are readily assigned to one taxon or the other. Godt & Hamrick (1995) showed low levels of allozyme differentiation between the two taxa and supported varietal status. [= FNA, K, S; = *P. barbulata* Michaux var. *brevifolia* (B.W. Wells) Ahles – RAB; < *P. barbulata* – X, Z]

Shortia Torrey & Gray 1842 (Shortia, Oconee Bells)

A genus of 5-6 species, perennial herbs, of e. Asia and the Southern Appalachians. The Asian species are: *S. uniflora* (Maximowicz) Maximowicz of montane Japan (with 3 varieties), *S. rotundifolia* (Maximowicz) Makino of Japan, *S. exappendiculata* Hayata, of montane Taiwan, *S. soldanelloides* (Siebold & Zuccarini) Makino, of montane Japan (with as many as 5 varieties recognized), and *S. sinensis* Hemsley of montane Yunnan Province, China. References: Nesom in FNA (in prep.); Davies (1952)=Z; Hatley (1977)=Y; Barnes (1990); Scott in Kubitzki (2004).

1 Style 6-10 (-12) mm long; filaments generally 5-7 mm long; [native of McDowell County, NC] ..... ***Sh. galacifolia* var. *brevistyla***
1 Style (10-) 12-18 mm long; filaments generally 6-9 mm long; [native to Transylvania and Jackson counties, NC, Oconee and Pickens counties, SC, and Rabun County, GA; introduced elsewhere] ..... ***Sh. galacifolia* var. *galacifolia***

Shortia galacifolia Torrey & A. Gray *var.* ***brevistyla*** Davies, Northern Shortia. Mt (NC): on moist slopes, creekbanks, and rock outcrops in humid escarpment gorges with high rainfall, generally in deep shade under *Rhododendron maximum*, at elevations of 350-550m; rare. March-April; July-August. This variety is known only from McDowell County, NC, where it occurs on several tributaries of the Catawba River and North Fork Catawba River. It has also been reported from the gorge of the Linville River, Burke County, but this locality is questionable and has not been relocated. This area is disjunct about 100 kilometers to the northeast along the Blue Ridge Escarpment from the range of the typic variety. In addition to the characters used in the key, var. *brevistyla* differs in a variety of characters of the flowers and leaves, as discussed in Davies (1952) and Hatley (1977). Whether the recognition of infraspecific taxa is warranted is not clear; Davies argued for and Hatley against. Though the morphological characters are relatively minor and partially overlapping, their correlation with disjunct ranges and their likely influence on pollination and reproduction influence me to provisionally accept varietal status, pending further research. [= FNA, K, Z; < *Shortia galacifolia* – RAB, C, G, W, X, Y; < *Sherwoodia galacifolia* (Torrey & A. Gray) House – S]

Shortia galacifolia Torrey & A. Gray *var.* ***galacifolia***, Southern Shortia, Oconee Bells. Mt (GA, NC, SC), Pd* (NC*, VA*): on moist slopes, creekbanks, and rock outcrops in humid escarpment gorges with high rainfall, generally in deep shade under *Rhododendron maximum* and *Rh. minus*, at elevations (in NC) of 350-650m; rare. March-April; July-August. This variety occurs in Transylvania and Jackson counties, NC, Oconee and Pickens counties, SC, and Rabun County, GA, where it occurs in the remarkable escarpment gorges region, at elevations from 200-650m (formerly at lower elevations, now submerged under Lake Jocassee). Most of the population of this species, including the type locality, was destroyed in the early 1960's by the construction of Lake Jocassee (Zahner & Jones 1983). In the gorge tributaries of the Eastatoe, Toxaway, Horsepasture, and Thompson rivers, *Shortia* can sometimes form a dense groundcover covering acres. Various outlying locations, such as in NC (Swain and Macon counties), VA (Amherst County), and TN (Blount, Monroe, and McMinn counties) are not considered native, and are adventive or the result of persistence after cultivation. The species is prized by gardeners, and survives well outside its natural range. [= FNA, K, Z; < *Shortia galacifolia* – RAB, C, G, W, X, Y; < *Sherwoodia galacifolia* (Torrey & A. Gray) House – S]

DIERVILLACEAE (Rafinesque) Pyck 1998 (Bush-honeysuckle Family)

Various segregate families (or reassignments) of taxa traditionally placed in the Caprifoliaceae have been proposed, including the transfer of *Sambucus* and *Viburnum* to the Adoxaceae, placement of *Diervilla* and *Weigela* in the Diervillaceae (Backlund & Pyck 1998), placement of *Abelia* and *Linnaea* in the Linnaeaceae (Backlund & Pyck 1998, Pyck et al. 2002), and retention of *Lonicera, Symphoricarpos,* and *Triosteum* in a much more narrowly circumscribed Caprifoliaceae. Alternatively, all these taxa could be included in the Caprifoliaceae, along with Dipsacaceae and Valerianaceae, as a very broadly circumscribed Caprifoliaceae. References: Backlund & Pyck (1998); Pyck et al. (2002); Ferguson (1966a).

Diervilla P. Miller (Bush-honeysuckle)

A genus of 3 species, shrubs, of e. North America. References: Hardin (1968)=Z; Ferguson (1966a)=Y.

1 Petioles 5-8 mm long; leaves ciliate on the margins; twig terete in cross-section; [of the Mountains of VA and n. NC, south to Buncombe and McDowell counties, NC]..... ***D. lonicera***
1 Petioles 0-5 mm long; leaves not ciliate; twig more-or-less square in cross-section; [of the Mountains of SC and s. NC, north to Mitchell and Yancey cos., NC].
2 Branchlets, leaves, pedicels, and calyx densely pubescent; sepal lobes < 2 mm long..... ***D. rivularis***
2 Branchlets, leaves, pedicels, and calyx glabrous, except for hairs on the twig angles; sepal lobes 2-3 mm long..... ***D. sessilifolia***

Diervilla lonicera P. Miller, Northern Bush-honeysuckle. Mt (GA?, NC, VA) {DC, DE, MD, NJ?, TN, WV}: rock outcrops and ridges at high elevations; uncommon. June-July; August-October. Newfoundland west to Saskatchewan, south to w. NC, e. TN, IN, and IA. Reported for GA (GANHP). [= RAB, C, G, K, S, W, Y, Z; > *D. lonicera* var. *lonicera* – F; > *D. lonicera* var. *hypomalaca* Fernald – F]

Diervilla rivularis Gattinger, Hairy Southern Bush-honeysuckle. Mt (GA, NC), {AL, TN}: rock outcrops, ridges, and streambanks at moderate to high elevations; rare (NC Rare). June-August; August-October. W. NC (Yancey County) and e. TN south to nw. GA (Jones & Coile 1988) and ne. AL. [= K, S, Y, Z; = *D. sessilifolia* Buckley var. *rivularis* (Gattinger) Ahles – RAB, W]

Diervilla sessilifolia Buckley, Smooth Southern Bush-honeysuckle. Mt (GA, NC, SC), {AL, TN}: rock outcrops, ridges, landslide scars, trail margins, other rocky open places, streambanks, at moderate to high elevations; uncommon. June-August; August-October. Sw. NC and e. TN south to nw. SC, ne. GA, and ne. AL. [= F, K, S, Y, Z; = *D. sessilifolia* Buckley var. *sessilifolia* – RAB, W]

Weigela Thunberg (Weigela)

A genus of about 10 species, shrubs, of e. Asia.

* *Weigela floribunda* (Siebold & Zuccarini) K. Koch, Weigela, native of Asia, is cultivated and sometimes naturalized, as in e. TN (Chester, Wofford, & Kral 1998). [= K]

DIPSACACEAE A.L. de Jussieu 1789 (Teasel Family)

A family of about 11 genera and 300 species, herbs and shrubs, of Eurasia and Africa.

1 Stem prickly..... ***Dipsacus***
1 Stem not prickly..... ***[Knautia]***

Dipsacus Linnaeus (Teasel)

A genus of about 15 species, herbs, of Eurasia. *Dipsacus* begins flowering about halfway up the head, the flowers then opening sequentially toward both the base and the tip of the inflorescence. References: Ferguson (1965)=Z; Ferguson & Brizicky (1965); Stace (1997).

1 Principal cauline leaves laciniate-pinnatifid, cut at least halfway to the midrib..... ***D. laciniatus***
1 Principal cauline leaves entire or toothed.
2 Bracts on the receptacle with straight apical spines, these stiff but flexible; bracts of the involucre curved upward..... ***D. fullonum***
2 Bracts on the receptacle with recurved apical spines, these rigid; bracts of the involucre spreading more or less horizontally..... ***D. sativus***

* ***Dipsacus fullonum*** Linnaeus, Wild Teasel, Common Teasel. Mt (NC, VA), Pd, Cp (VA): roadsides, pastures, disturbed areas; common (rare in NC and in Coastal Plain of VA), native of Europe. July-September; September-October. The inflorescences are frequently collected for crafts and dried arrangements. [= K, W, Z; = *D. sylvestris* Hudson – RAB, C, F, G, S; = *D. fullonum* ssp. *sylvestris* (Hudson) Clapham]

* ***Dipsacus laciniatus*** Linnaeus, Cutleaf Teasel. Mt, Pd (VA): disturbed areas; uncommon, native of Europe. July-September; September-October. [= C, F, G, K, Z]

* ***Dipsacus sativus*** (Linnaeus) Honckeny, Fuller's Teasel. Mt (VA): disturbed areas; rare, native of Europe. July-September; September-October. I am here following Ferguson (1965), Ferguson & Brizicky (1965), and Stace (1997) in their determination that *D. sativus* is the correct name to apply to this plant. The occurrence of this species in our area is implied in various sources; I have not seen specimens. The dried inflorescences were used in the past for fulling cloth (raising the nap). [= K, Z; = *D. fullonum* – C, F, G, misapplied]

Knautia Linnaeus

DIPSACACEAE

A genus of about 60 species, herbs, of Europe, w. Asia, and n. Africa.

* *Knautia arvensis* (Linnaeus) Coulter, Blue Buttons. Disturbed areas. Naturalized south at least to s. PA (Rhoads & Klein 1993), MD, and WV (Kartesz 1999). June-September. [= C, F, G, K; = *Scabiosa arvensis* Linnaeus]

DROSERACEAE Salisbury 1808 (Sundew Family)

A family of 3 genera (*Drosera, Dionaea, Aldrovanda*) and about 100 species, nearly cosmopolitan. References: Schnell (2002b); Kubitzki in Kubitzki & Bayer (2003). [including *DIONAEACEAE*]

1 Leaves catching insects via "snap-trap" leaves, with stiff marginal hairs; stamens 10-20; inflorescence cymose; [endemic to the Coastal Plain of se. NC and ne. SC] ..... ***Dionaea***
1 Leaves catching insects via "flypaper" leaves, with gland-tipped hairs; stamens 5; inflorescence racemose; [collectively widespread in our area] ..... ***Drosera***

Dionaea Ellis 1768 (Venus Flytrap, Meadow Clam)

This monotypic genus is endemic to the Coastal Plain of NC and SC; it has been introduced in various places, including panhandle FL, Yancey County in the mountains of NC, and s. NJ, where it persists and spreads to varying degrees (Evert 1957). References: Roberts & Oosting (1958); Wood (1960); Schnell (2002b)=Z.

Dionaea muscipula Ellis, Venus Flytrap, Meadow Clam, Tippitiwitchet. Cp (FL*, NC, SC): wet savannas, sandhill seepages; rare. The shiny black seeds are exposed at the maturity and dehiscence of the capsule. Perhaps the most remarkable species in our flora, *Dionaea* has become increasingly rare and now receives some protection as a NC Special Concern species and a Convention on International Trade in Endangered Species "Appendix 2" species. Although collection and trade as a novelty item have contributed to the decline of *Dionaea*, its more fundamental problem is that faced by the great majority of Coastal Plain species in our area – destruction of habitat and fire suppression. In the fall-line Sandhills, *Dionaea* is now restricted to a very few sites on Fort Bragg; in the central Coastal Plain, it is also nearly extirpated. Substantial populations remain only in the Outer Coastal Plain, primarily in Brunswick, Pender, and Onslow counties. Ellis's Latin phrase describing the plant to Linnaeus (quoted in Croom 1837) is worth repeating for its succinctness: "Miraculum naturae! – folia biloba, radicalia, ciliata, sensibilia, conduplicanda, insecta incarcerantia." The colonial governor of North Carolina, Arthur Dobbs, wrote in 1759, "we have a kind of Catch Fly Sensitive which closes upon anything that touches it." Gibson (1991) shows that trap size and prey size are correlated; trap leaves of *Dionaea* primarily capture insects about 5 mm smaller than the length of the trap. Deliberately introduced and at least somewhat naturalized at other places in the Coastal Plain, notably Apalachicola National Forest, FL. [= RAB, GW, K, S, WH, Z]

Drosera Linnaeus 1753 (Sundew)

A genus of about 100 species, herbs, nearly cosmopolitan. References: Wood (1960)=Z; Shinners (1962)=Y; Wynne (1944)=X; Schnell (2002b)=Q; Schnell (1976, 1995).

1 Leaves filiform, the expanded leaf bases forming a corm-like base.
  2 Petals 7-10 (12) mm long; leaves 8-25 (-30) cm long, < 1 mm wide; glandular hairs on the leaves red to purple, drying dark brown; scape 6-26 cm long ..... ***D. filiformis***
  2 Petals 12-17 (-20) mm long; leaves 30-50 cm long, > 1 mm wide; glandular hairs on the leaves pale green, drying pale greenish brown; scape 25-60 cm long ..... ***D. tracyi***
1 Leaves spatulate or suborbicular, the leaf bases not expanded.
  3 Inflorescence stipitate-glandular; basal rosettes 0.8-3.5 cm in diameter; stipules absent or obsolete (consisting of a few hair-like segments); seeds black, crateriform ..... ***D. brevifolia***
  3 Inflorescence glabrous; basal rosettes (2-) 3-12 cm in diameter; stipules present, fimbriate; seeds light brown and longitudinally striate, or reddish brown to black and densely papillose, or brown and coarsely corrugated into 14-16 longitudinal ridges.
    4 Leaf blades wider than long, suborbicular or reniform; seeds about 6× as long as wide; [primarily of the Mountains, rarely disjunct eastward] ..... ***D. rotundifolia var. rotundifolia***
    4 Leaf blades about as wide as long, spatulate to obovate; seeds 1-2× as long as broad; [primarily of the Coastal Plain, rarely disjunct westward].
      5 Petioles with few to many long trichomes; petals pink (sometimes fading to white); plants scapose; inflorescence straight at base; seeds coarsely corrugated into 14-16 longitudinal ridges ..... ***D. capillaris***
      5 Petioles glabrous; petals white; plants usually with a leafy stem 1-10 cm long; inflorescence arching at base; seeds reddish brown to black and densely papillose ..... ***D. intermedia***

Drosera brevifolia Pursh, Dwarf Sundew. Cp (FL, GA, NC, SC, VA), Pd (GA, NC), Mt (GA, SC): pine savannas, other wet sandy sites, rarely in seepage over rock outcrops; common (rare in lower Piedmont only and Mountains, rare in VA). April-May. The species ranges from se. VA south to s. FL and west to AR, OK, and TX; disjunct in sc. TN. *D. leucantha* may be the correct name for this taxon; see Shinners (1962) and Wood (1966) for a contentious discussion of nomenclatural issues. [= C, F, GW, G, K, Q, S, WH, X, Z; = *D. leucantha* Shinners – RAB, Y]

Drosera capillaris Poiret, Pink Sundew. Cp (FL, GA, NC, SC, VA), Pd (NC, SC, VA): pine savannas, other wet sandy or peaty sites; common (rare in Piedmont, rare in VA). May-August. Se. VA south to s. FL and west to TX, rarely inland, as in TN; also extending into tropical America, in the West Indies, Mexico, and n. South America. [= RAB, C, F, G, GW, K, Q, S, W, WH, X, Y, Z]

Drosera filiformis Rafinesque, Threadleaf Sundew. Cp (FL, NC): margins of natural pools in pinelands, especially clay-based Carolina bays; rare. June; August. E. MA south to se. NC; disjunct in the FL panhandle (Bay and Washington counties) and in sw. Nova Scotia (Sorrie 1998a). Sorrie (1998a) has clarified the taxonomy and phytogeography of *D. filiformis* and *D. tracyi*. See comments about *D. tracyi* below. [= GW, K, WH, Y; < *D. filiformis* – RAB, C, G (also see *D. tracyi*); = *D. filiformis* var. *filiformis* – F, Q, X, Z; < *D. tracyi* Macfarlane in L.H. Bailey – S (also see *D. filiformis*)]

Drosera intermedia Hayne, Water Sundew, Spoonleaf Sundew. Cp (FL, GA, NC, SC, VA), Pd (NC, SC): savannas, ditches, pocosins, margins of pools or streams, often in standing water; common (rare in Piedmont and rare north of NC). July-September. *D. intermedia* is circumboreal, in North America ranging from Newfoundland and MN south to c. peninsular FL and TX, and into tropical America. [= RAB, C, F, G, GW, K, S, Q, W, WH, X, Y, Z]

Drosera rotundifolia Linnaeus *var.* ***rotundifolia***, Roundleaf Sundew. Mt (GA, NC, SC, VA), Cp (NC, VA), Pd (VA): mountain bogs and fens, seepages slopes, vertical seepages on rock (in the mountains) or clay (as along the Little River in the Sandhills of NC); uncommon (GA Special Concern). A circumboreal species ranging south in North America to SC, ne. GA, e. and nc. TN, IL, and CA. Var. *comosa* Fernald is restricted to e. Canada, New England, and n. NY. [= F, K; < *D. rotundifolia* – RAB, C, G, GW, S, Q, W, X, Y, Z]

Drosera tracyi MacFarlane in Bailey, Tracy's Sundew. Cp (FL, GA): savannas; common (rare in GA). Sc. GA and panhandle FL, west to e. LA; it has been reported for SC by various authors, including Wynne (1944), but the basis for these reports is unknown. The notion that this species is not distinguishable from *D. filiformis* (or is only varietally distinct) is erroneous (Sorrie 1998a). See Schnell (1995) for a contrary view. [= GW, K, WH, Y; = *D. filiformis* Rafinesque var. *tracyi* (MacFarlane in Bailey) Diels – Q]

EBENACEAE Gürcke 1891 (Ebony Family)

A family of 2 genera and 500-600 species, trees and shrubs, distributed in tropical and subtropical (rarely warm temperate) regions. References: Wallnöfer in Kubitzki (2004).

Diospyros Linnaeus 1753 (Persimmon)

A genus of 500-600 species, trees and shrubs, of tropical and subtropical regions (with very few exceptions). The genus includes a variety of tropical trees called ebony in the wood trade. References: Spongberg (1977)=Z; Wallnöfer in Kubitzki (2004).

Identification notes: Seedlings and fire sprouts are superficially very similar to *Nyssa sylvatica*, but can be separated in the following ways: bundle scar 1 per bud scar, narrowly crescent-shaped (vs. *Nyssa* with 3 distinct, circular, bundle scars arranged in a broad V pattern), leaves never with teeth (vs. *Nyssa* leaves sometimes with a few irregular teeth), leaves glabrate to tomentose with curly hairs (vs. glabrous or with a few straight, forward-pointing hairs), leaves with sessile to short-stipitate glands on upper surface of midrib and outer petiole, later becoming necrotic spots (vs. leaves without glands).

1 Twigs stout, reddish-pubescent; fruits to 7.5 cm in diameter; [cultivated alien] ..... ***[D. kaki]***
1 Twigs slender, glabrous or with gray pubescence; fruits to 4 cm in diameter; [native] ..... ***D. virginiana***

Diospyros virginiana Linnaeus, American Persimmon. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry woods, sandhills, disturbed places, floodplain and mesic forests, fencerows; common. May-June; September-December (and persisting). CT, PA, OH, IN, IL, MO, and e. KS south to FL and TX. East of the Mississippi River, *D. virginiana* var. *virginiana* has leaves cuneate to rounded at the base, and glabrous or glabrescent; mostly west of the Mississippi River and perhaps eastward along the Coastal Plain, *D. virginiana* var. *pubescens* (Pursh) Dippel has leaves subcordate, and persistently pubescent. Though these differences seem relatively trivial, they are consistent, geographically correlated, and may be worthy of varietal recognition. Persimmons are famous for their sweet and edible fruits, and infamous for the bitter-astringency of the not fully ripe fruit. The species is dioecious, the male trees appear to reach a greater size than the females. The wood is one of the heaviest and hardest in e. North America. [= RAB, GW, K, W, WH; > *D. virginiana* var. *virginiana* – C, F, G, Z; > *D. virginiana* – S; > *D. mosieri* Small – S].

* *Diospyros kaki* Linnaeus f., Kaki, Kaki-plum, Japanese Persimmon, is rarely grown in our area for its fruits, which are much larger than *D. virginiana* (to 9 cm in diameter). [= Z]

ELAEAGNACEAE A.L. de Jussieu 1789 (Oleaster Family)

A family of 3 genera and 30-50 species, shrubs, small trees, and lianas, of temperate Eurasia and North America, and tropical Asia and Australia. References: Bartish & Swenson in Kubitzki (2004).

Elaeagnus Linnaeus 1753 (Silverberry, Oleaster, Russian-olive)

A genus of 20-45 species, shrubs and small trees, of Asia (mostly) and North America. References: Bartish & Swenson in Kubitzki (2004).

1 Flowering in the fall (October-November) and fruiting in the spring (March-April); leaves evergreen; branches usually spiny..... ***E. pungens***
1 Flowering in the spring and fruiting in the fall; leaves deciduous (somewhat coriaceous in texture and semi-persistent); branches spiny or not.
2 Fruit yellow, lepidote with silver scales; leaves with silver scales beneath.....***E. angustifolia***
2 Fruit reddish-brown or pinkish, lepidote with silver and brown scales; leaves with a mixture of silver and bronze scales beneath.
3 Fruit 10-15 mm long; fruiting pedicel 15-25 mm long; hypanthium tube about as long as the separate calyx lobes.....***E. multiflora***
3 Fruit 6-8 mm long; fruiting pedicel 8-12 mm long; hypanthium tube about 2× as long as the separate calyx lobes.....
..... ***E. umbellata*** *var.* ***parvifolia***

* ***Elaeagnus angustifolia*** Linnaeus, Russian Olive, Oleaster. Pd (NC, VA), Mt, Cp (VA): disturbed areas; uncommon, native of Eurasia. June-July. [= C, F, G, K]

* ***Elaeagnus multiflora*** Thunberg. Mt (NC, VA): disturbed areas; rare, native of Japan and China. April. First reported for NC by Leonard (1971b). [= C, F, G, K; = *E. multiflorus* – S]

* ***Elaeagnus pungens*** Thunberg, Autumn Silverberry. Pd (GA, NC, SC, VA), Cp (NC, SC, VA): forests and woodlands in suburban areas, spread by birds; uncommon, native of Japan. October-November; March-April. [= RAB, K]

* ***Elaeagnus umbellata*** Thunberg *var.* ***parvifolia*** (Royle) Schneider, Spring Silverberry. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): forests and woodlands, spread by birds; common, native of Japan and China. April-May; August-September. This species is becoming a noxious weed shrub, still unfortunately sometimes promoted for "wildlife plantings." [= K; < *E. umbellata* – RAB, C, F, G, W; *E. umbellatus* – S]

ELATINACEAE Dumortier 1829 (Waterwort Family)

A family of 2 genera and about 35 species, herbs. References: Tucker (1986).

Elatine Linnaeus 1753 (Waterwort)

A genus of about 10 species, aquatic, tropical and temperate.

1 Seeds mostly straight, the areoles elliptic, the rounded ends not dovetailing into adjacent rows, the longitudinal ridges thus appearing straight and distinct; seeds basal-axile, extending lengthwise through the capsule, not overlapping; leaves 1-5 mm long; flowers mostly 2-merous.....
.....***E. minima***
1 Seeds mostly curved, the areoles 6-sided, the angular ends dovetailing into the adjacent rows, the longitudinal ridges thus appearing broken or irregular; seeds axile, attached along an elevated placenta at different levels, therefore overlapping; leaves 1-15 mm long; flowers mostly 3-merous.
2 Leaves obovate to broadly spatulate, rounded at the the tip, 3-8 mm long, the larger 1.5-5 mm wide; seeds with 20-30 pits in each row .....
.....***E. americana***
2 Leaves linear-lanceolate to narrowly spatulate, emarginate to truncate to rounded at the tip, 1-15 mm long, the larger 0.5-3 mm wide.
3 Leaves 1.5-4 mm long, 0.7-1.8 mm wide; seeds with 9-15 pits per row .....***E. brachysperma***
3 Leaves 2.8-15 mm long, 0.5-3 mm wide; seeds with 16-25 pits per row .....***E. rubella***

Elatine americana (Pursh) Arnott, American Waterwort. Cp (VA), Mt (NC, SC): tidal flats, lakes; rare (NC Watch List, VA Watch List). July-October. Widespread in ne. United States, s. to NC and MO. The only known site for this species in NC is an artificial lake; it is uncertain whether it should be considered native or introduced. [= F, K, S; < *E. triandra* Schkuhr – RAB, W (broadly interpreted to include *E. americana*); = *E. triandra* var. *americana* (Pursh) Fassett – C, G, GW]

Elatine brachysperma A. Gray, Shortseed Waterwort. Pd (GA): {habitat not known}; rare. It has been reported for nc. GA (Jones & Coile 1988). [= F, K; = *E. triandra* Schkuhr var. *brachysperma* (A. Gray) Fassett – C, G]

Elatine minima (Nuttall) Fischer & C.A. Meyer, Tiny Waterwort. Cp (VA), Pd (NC, SC): tidal flats, lakes; rare (NC Watch List, VA Rare). July-October. First found in NC in 1990, *E. minima* is widespread in ne. United States, south to VA, NC, and SC (Horn, pers. comm. 2004). The only known site for this species in NC is the spillway of an artificial lake (Lake Butner, Granville County); it is uncertain whether it should be considered native or exotic in NC. It may have been introduced by waterfowl or humans. [= C, F, G, K]

Elatine rubella Rydberg, Red Waterwort. Pd (SC): ponds; rare. This species occurs in AL (Fayette County) as well as north of our area (Haynes 1998). Hill & Horn (1997) reported *E. triandra* for SC, but the specimen is *E. rubella* Rydberg (Horn, pers. comm. 2004). [= K; = *E. triandra* Schkuhr – F, misapplied; = *E. triandra* var. *triandra* – C, G, misapplied]

ERICACEAE A.L. de Jussieu 1789 (Heath Family)

A family of about 107-124 genera and 3400-4100 species, primarily shrubs, small trees, and subshrubs, nearly cosmopolitan. The Ericaceae is very important in our area, with a great diversity of genera and species, many of them rather narrowly endemic. Our area is one of the north temperate centers of diversity for the Ericaceae. Along with *Quercus* and *Pinus*, various members of this family are dominant in much of our landscape. References: Kron et al. (2002); Wood (1961); Judd & Kron (1993); Kron & Chase (1993); Luteyn et al. (1996)=L; Dorr & Barrie (1993); Cullings & Hileman (1997); Stevens et al. in Kubitzki (2004).

Main Key, for use with flowering or fruiting material

1 Plant an herb, subshrub, or sprawling shrub, not clonal by underground rhizomes (except *Gaultheria procumbens* and *Epigaea repens*), rarely > 3 dm tall; plants mycotrophic or hemi-mycotrophic (except *Epigaea, Gaultheria,* and *Arctostaphylos*).
2 Plants without chlorophyll (fully mycotrophic); stems fleshy; leaves represented by bract-like scales, white or variously colored, but not green; pollen grains single; [subfamily *Monotropoideae*; tribe *Monotropeae*].
3 Petals united; fruit nodding, a berry; flower and fruit several per stem ..... ***Monotropsis***
3 Petals separate; fruit erect, a capsule; flower and fruit 1-several per stem.
4 Flowers few to many, racemose; stem pubescent, at least in the inflorescence; plant yellow, orange, or red when fresh, aging or drying dark brown ..... ***Hypopitys***
4 Flower solitary; stem glabrous; plant white (rarely pink) when fresh, aging or drying black ..... ***Monotropa***
2 Plants with chlorophyll (hemi-mycotrophic or autotrophic); stems woody; leaves present and well-developed, green; pollen grains in tetrads (single in *Orthilia*).
5 Herb with a rosette of ascending basal leaves; flowers scapose; [subfamily *Monotropoideae*; tribe *Pyroleae*].
6 Style and filaments straight; filaments straight, the anthers closely surrounding the style; inflorescence distinctly secund (1-sided) ..... ***Orthilia***
6 Style and filaments strongly declined; filaments curved, the anthers not closely surrounding the style; inflorescence slightly or not at all secund (1-sided) ..... ***Pyrola***
5 Subshrub or sprawling shrub with cauline leaves; flowers axillary (except scapose in *Chimaphila*).
7 Plant erect, the leaves clustered near the apex of the single stem.
8 Leaves lanceolate or oblanceolate, normally 2-4× as long as wide (sometimes proportionately less narrow in stunted individuals; fruit a capsule, borne 1-several on an erect scape above the leaves [subfamily *Monotropoideae*; tribe *Pyroleae*] ..... ***Chimaphila***
8 Leaves obovate, 1-2× as long as wide; fruit a red berry, borne on nodding axillary pedicels beneath the leaves; [subfamily *Vaccinioideae*; tribe *Gaultherieae*] ..... ***Gaultheria***
7 Plant creeping or sprawling, leaves scattered along the stems.
9 Flowers solitary and axillary; fruit a white berry; [subfamily *Vaccinioideae*; tribe *Gaultherieae*] ..... ***Gaultheria***
9 Flowers in axillary or terminal spikes or racemes; fruit a fleshy loculicidal capsule or red drupe.
10 Leaves glabrous, 1-3 cm long, tapered to the base; corolla urceolate; calyx not subtended by large bracts; [subfamily *Arbutoideae*] ..... ***Arctostaphylos***
10 Leaves pilose (glabrate in age), 2-10 cm long, rounded or subcordate at the base; corolla salverform, the lobes spreading; calyx subtended by 2 large bracts; [subfamily *Ericoideae*; tribe *Phyllodoceae*] ..... ***Epigaea***

1 Plant a shrub, > 3 dm tall, or 1-3 dm tall and definitely and obviously clonal by underground rhizomes; plants not mycotrophic or hemi-mycotrophic.
11 Leaves ca. 1 mm wide, 8-12 mm long, appearing opposite, alternate, or whorled (the internodes very short, thus the leaves generally appearing whorled); petals absent; fruit a subglobose, 2-stoned drupe, 2-3 mm in diameter; branches often appearing in whorls of 3-7; [subfamily *Ericoideae*; tribe *Empetreae*] ..... ***Ceratiola***
11 Leaves **either** > 2 mm wide **or** < 5 mm long, mostly alternate or whorled; petals present; fruit not as above, mostly either a capsule or 10- or many-seeded berry; branches appearing alternate or whorled; subfamily *Vaccinioideae*; tribe *Vaccinieae*].
12 Ovary inferior; fruit indehiscent, a fleshy berry.
13 Ovary 10 locular; seeds 10; leaves glandular-punctate, at least on the lower surface (except *G. brachycera*) ..... ***Gaylussacia***
13 Ovary 4-5 locular; seeds numerous; leaves not glandular-punctate ..... ***Vaccinium***
12 Ovary superior; fruit dehiscent, a dry capsule.
14 Petals separate; fruit 2-7-locular; **either** a shrub to 1 m tall with ovate to oblong, evergreen leaves, 0.6-1.2 cm long, **or** a shrub to small tree 2-6 (-9) m tall with elliptic, deciduous leaves, 4-12 cm long, **or** a shrub 1-2.5 m tall, with elliptic to ovate, evergreen leaves 2-4 cm long; [subfamily *Ericoideae*].
15 Fruit 2-3 (5)-locular; shrub to 1 m tall; leaves, 0.4-1.2 cm long; petals 2-4 mm long; [subfamily *Ericoideae*; tribe *Phyllodoceae*] ..... ***Kalmia buxifolia***
15 Fruit 4-7-locular; shrub to small tree 1-6 (-9) m tall; leaves 2-12 cm long; petals 12-30 mm long.
16 Fruit 7-locular; leaves evergreen 2-4 cm long; petals 20-30 mm long; shrub 1-2.5 m tall; [subfamily *Ericoideae*; tribe *Bejarieae*] ..... ***Bejaria***
16 Fruit 4-5-locular; leaves deciduous, 4-12 cm long; petals 12-14 mm long; shrub to small tree 2-6 (-9) m tall; [subfamily *Ericoideae*; tribe *Phyllodoceae*] ..... ***Elliottia***
14 Petals fused for part or all their lengths; fruit (4-) 5-locular; shrub or tree with leaves of various shape, evergreen or deciduous, these **either** < 6 mm long, linear and whorled, **or** > 12 mm long.
17 Leaves whorled, < 5 mm long, linear; [subfamily *Ericoideae*, tribe *Ericeae*] ..... ***Erica***
17 Leaves alternate or whorled, > 20 mm long.
18 Flowers 4-merous; fruits 4-locular; leaves with a series of fascicles of trichomes on the midrib below; [subfamily *Ericoideae*; tribe *Rhodoreae*] ..... ***Menziesia***
18 Flowers 5-merous; fruits 5-locular; leaves not as above.
19 Leaves coriaceous, evergreen, shiny and dark green above.
20 Leaves sharply and distinctly serrate.
21 Pedicels slender, 7-10 mm long; filaments strongly curved just below the anthers; pith transversely diaphragmed; [subfamily *Vaccinioideae*; tribe *Lyonieae*] ..... ***Agarista***
21 Pedicels stout, 2-6 mm long; filaments straight; pith solid; [subfamily *Vaccinioideae*; tribe *Gaultherieae*] ..... ***Leucothoe***
20 Leaves entire, or obscurely and finely crenulate-serrulate.
22 Capsules elongate, > 2× as long as broad, 8-18 mm long; [subfamily *Ericoideae*; tribe *Rhodoreae*] ..... ***Rhododendron***
22 Capsules ovoid to globose or subglobose, about as long as broad, 5-8 mm long.
23 Leaves with a prominent vein running parallel to (and about 1 mm in from) the margin; [subfamily *Vaccinioideae*; tribe *Lyonieae*] ..... ***Lyonia***
23 Leaves without a prominent marginal vein.
24 Corolla saucer-shaped, 10-30 mm across; leaves entire; [subfamily *Ericoideae*; tribe *Phyllodoceae*] ..... ***Kalmia***

24 Corolla narrowly urceolate, 4-6 mm across; leaves finely crenulate-serrulate; [subfamily *Vaccinioideae*; tribe *Lyonieae*] ..... ***Pieris***

19 Leaves membranaceous or subcoriaceous, deciduous or evergreen, if subcoriaceous and evergreen, then not shiny and dark green above.

25 Capsules elongate, > 2× as long as broad, 7-23 mm long; [subfamily *Ericoideae*; tribe *Rhodoreae*] ..... ***Rhododendron***

25 Capsules ovoid to globose or subglobose, about as long as broad, or broader than long, 2-7 mm long.

26 Leaves (at least the larger) > 2.5 cm wide.

27 Pedicels with 2 bracteoles.

28 Capsule broader than long; shrub; bracteoles just below the calyx; [subfamily *Vaccinioideae*; tribe *Gaultherieae*] ..... ***Eubotrys***

28 Capsule longer than broad; tree; bracteoles generally near the middle of the pedicel; [subfamily *Vaccinioideae*; tribe *Oxydendreae*] ..... ***Oxydendrum***

27 Pedicels without bracteoles.

29 Leaves entire to minutely serrulate; capsule sutures pale and thickened; [subfamily *Vaccinioideae*; tribe *Lyonieae*] ..... ***Lyonia***

29 Leaves crenate; capsule sutures not thickened and pale; [subfamily *Vaccinioideae*; tribe *Andromedeae*] ..... ***Zenobia***

26 Leaves < 2.5 cm wide.

30 Leaves linear to narrowly lanceolate, 8× or more as long as wide. strongly revolute, strongly whitened beneath; [subfamily *Vaccinioideae*; tribe *Andromedeae*] ..... ***[Andromeda]***

30 Leaves broader, not revolute or slightly so, not strongly whitened below.

31 Leaves whorled or alternate; corolla saucer-shaped, 10-20 mm across; [subfamily *Ericoideae*; tribe *Phyllodoceae*] ..... ***Kalmia***

31 Leaves alternate; corolla narrowly urceolate, 2-8 mm across.

32 Pedicels with 2 bracteoles near the summit; [subfamily *Vaccinioideae*; tribe *Gaultherieae*] ..... ***Chamaedaphne***

32 Pedicels with 2 bracteoles near the base; [subfamily *Vaccinioideae*; [tribe *Lyonieae*] ..... ***Lyonia***

Alternate Key to Ericaceae (including some relatives), emphasizing vegetative characters

[This key includes some related shrubs, of the Diapensiaceae, Clethraceae, and Cyrillaceae]

1 Leaves and stems lacking chlorophyll (either white or variously tinted with colors such as pink, tan, red, or violet) ..... **Key A**

1 Leaves and stems with chlorophyll (green, though some parts may have the green pigment obscured with purple or other colors).

2 Leaves membranaceous or subcoriaceous, deciduous or tardily deciduous, usually not particularly glossy (except in new foliage of some species) ..... **Key B**

2 Leaves coriaceous, more or less stiff, evergreen, usually glossy and often dark green.

3 Subshrub or sprawling shrub, 0-1 (-2) dm tall, not clonal by underground rhizomes (except *Gaultheria procumbens*), though often clonal by creeping stems, or sprawling and patch-forming (many of these species are only ambiguously shrublike and are considered herbs by the casual observer); leaves evergreen ..... **Key C**

3 Shrub, > 3 dm tall, or 1-3 dm tall and definitely and obviously clonal by underground rhizomes; leaves evergreen or deciduous ... **Key D**

Key A – Achlorophyllose plants

1 Flower solitary; stem glabrous; plant white (rarely pink) when fresh, aging or drying black ..... ***Monotropa uniflora***

1 Flowers few to many, racemose; stem glabrous (*Monotropsis*) or pubescent, at least in the inflorescence (*Hypopitys*); plant yellow, orange, or red when fresh, aging or drying dark brown.

2 Plant yellow, orange, or red when fresh, aging or drying dark brown; stem pubescent, at least in the inflorescence; petals fused at base ..... ***Hypopitys monotropa***

2 Plant lavender when fresh; stem glabrous; petals separate at base ..... ***Monotropsis odorata***

Key B – Deciduous ericaceous shrubs and trees

Gaylussacia spp., Vaccinium spp., Elliottia racemosa, Menziesia pilosa, Rhododendron spp., Kalmia cuneata, Chamaedaphne calyculata, Lyonia mariana, Lyonia ligustrina var. ligustrina, Lyonia ligustrina var. foliosiflora, Eubotrys racemosa, Eubotrys recurva, Oxydendrum arboreum, Zenobia pulverulenta, Clethra acuminata, Clethra alnifolia, Cyrilla racemiflora

Key C – Evergreen subshrubs and sprawling shrubs

1 Plant erect, the leaves few (< 10), clustered near the apex of the single stem.

2 Leaves obovate, 1-2× as long as wide; fruit a red berry, borne on nodding axillary pedicels beneath the leaves ..... ***Gaultheria procumbens***

2 Leaves lanceolate or oblanceolate, normally 2-4× as long as wide (sometimes proportionately less narrow in stunted individuals; fruit a capsule, borne 1-several on an erect scape above the leaves.

3 Leaves lanceolate (broadest below the middle), base rounded, striped with white or paler green along the major veins ..... ***Chimaphila maculata***

3 Leaves oblanceolate (broadest above the middle), base cuneate, solid dark green throughout ..... ***Chimaphila umbellata ssp. cisatlantica***

1 Plant creeping or sprawling, leaves scattered along the stems, or tufted at the base.

4 Leaves 2-15 cm wide; leaves (2-) 3.5-15 cm long, rounded or subcordate at the base.

5 Leaves dull green, with a pebbled texture, pilose (glabrate in age) ..... ***Epigaea repens***

5 Leaves bright shiny green (or prrple), with a smooth texture, glabrous.

6 Leaves orbicular, rounded or with a slight point at the apex, finely serrate (4-8 teeth per cm), the teeth not prominently mucronate; flowers in racemes; [widespread in distribution] ..... ***Galax urceolata [DIAPENSIACEAE]***

6 Leaves broadly elliptic, generally emarginate (slightly notched) at the apex, coarsely serrate (1-4 teeth per cm), the teeth prominently mucronate; flowers solitary; [native to humid gorges along the escarpment between the Mountains and Piedmont, sometimes cultivated and becoming established elsewhere] ..... ***Shortia galacifolia [DIAPENSIACEAE]***

4 Leaves 0-1.5 cm wide; leaves 0.5-3 cm long, cuneate at the base (at least widely so), glabrous (or bristly beneath in *Gaultheria hispidula*).

7 Leaves linear, < 2 mm wide.

8 Leaves (3.3) 4-10 mm long; leaves lanceolate, averaging > 1.0 mm wide (oblanceolate and up to 2.5 mm wide if etiolated under leaf litter); leaves (in fresh material) herbaceous in texture, < 0.1 mm thick; leaves of sterile shoots ciliate along the margins at the base, usually also pubescent on the upper surface near the base, but the pubescence rarely extending > 1/3 of the way from the base to the tip; internodes usually > 1 mm long ..... ***Pyxidanthera barbulata [DIAPENSIACEAE]***

8 Leaves 1-5 mm long (rarely to 7 mm long if etiolated under leaf litter); leaves ovate, averaging < 1.2 mm wide (lanceolate and up to 1.5 mm wide if etiolated under leaf litter); leaves (in fresh material) succulent in texture, up to 0.5 mm thick; leaves of sterile shoots lanose to densely pubescent on the upper surface at the base, the pubescence becoming sparser toward the tip of the leaf, but extending past the midpoint of the leaf and often its full length; internodes usually < 1 mm long ..... ***Pyxidanthera brevifolia [DIAPENSIACEAE]***

7 Leaves broader, > 2 mm wide.

9 Leaves serrate or serrulate (sometimes inconspicuously so); [of pinelands of the Coastal Plain and (very rarely) lower Piedmont of se. VA southward].

10 Leaves (2-) 3-18 (-25) mm long, generally elliptic (less commonly ovate or obovate); angle of leaf base typically > 90 degrees; margins finely glandular mucronulate-crenulate, the teeth tightly appressed and therefore often obscure, the margin superficially entire; stems mostly prostrate (ascending in areas that have been long fire-suppressed); [widespread in NC and SC, rare in se. VA and e. GA] ..... ***Vaccinium crassifolium***

10 Leaves (4-) 7-35 (-63) mm long, elliptic to obovate (less commonly elliptic-ovate); angle of leaf base typically < 90 degrees; margins glandular mucronulate-serrulate to serrulate-crenulate, the teeth apparent, especially toward the apex; stems often ascending to upright; [of Lexington County, SC] ..... ***Vaccinium sempervirens***

9 Leaves entire; [of the Mountains of VA northward, except *Vaccinium macrocarpon* of bogs, as far south as se. sc. and sw. NC].

11 Leaves 10-30 mm long; leaves oblanceolate to obovate, the widest point past the middle; primary stems 1-3 mm in diameter; [of relatively dry, rocky habitats] ..... ***Arctostaphylos uva-ursi***

11 Leaves (3-) 5-10 (-18) mm long; leaves ovate or elliptic, the widest point belowor at the middle; primary stems delicate; [of moist to distinctly boggy habitats].

12 Leaf undersurface green, sparsely bristly; [of moist habitats] ..... ***[Gaultheria hispidula]***

12 Leaf undersurface whitened, glabrous; [of saturated wetlands].

13 Leaves elliptic, broadest near middle, (5-) 7-10 (-18) mm long, (2-) 3-4 (-5) mm wide; leaves blunt-rounded and non-involute; pedicels with 2 green, leaf-like bracts 1-2 mm wide; berry 8-15 mm in diameter ..... ***Vaccinium macrocarpon***

13 Leaves ovate, broadest toward base, (3-) 5-6 (-9) mm long, (1-) 2-3 (-5) mm wide; leaves involute at least along the margins, thus making the leaf tip acute; pedicels with (0-) 2 (-5) reddish, scale-like bracts < 1 mm wide; berry 6-12 mm in diameter ... ***[Vaccinium oxycoccos]***

Key D – Evergreen ericaeous shrubs (either tall or obviously clonal) and trees

1 Leaves linear, needle-like, appearing whorled (at least in part, sometimes also with nodes appearing opposite or alternate).

2 Leaves glabrous; leaves 5-15 mm long; [native] ..... ***Ceratiola ericoides***

2 Leaves densely puberulent and ciliate with gland-tipped hairs; leaves 1.5-5 mm long; [exotic, rarely naturalized] ..... ***Erica tetralix***

1 Leaves broader, alternate (or whorled or opposite in *Kalmia*).

3 Leaves (all of them) < 2 cm long.

4 [**Either** of the Mountains, the Piedmont, **or** the Coastal Plain of ne. SC and se. NC].

5 Leaves alternate, glabrous, finely serrulate ..... ***Gaylussacia brachycera***

5 Leaves alternate or opposite, stipitate-glandular or glabrous, entire, or with a few obscure teeth ..... ***Kalmia buxifolia***

4 [Of the Coastal Plain, from se. SC southward].

6 Twigs densely hispid; leaves hispid on both surfaces ..... ***Kalmia hirsuta***

6 Twigs glabrous to puberulent; leaves glabrous or with scattered inconspicuous hairs.

7 Plant glaucous and bluish-green throughout; leaf undersurface lacking scattered glandular hairs; [of s. GA south to s. peninsular FL, west to e. TX] ..... ***Vaccinium darrowii***

7 Plant dark green throughout, generally exceeding 20 mm in length; leaf undersurface with scattered glandular hairs, these sometimes very few by late in the season (best seen in the field by folding a leaf, holding the fold up to the light, and using a 10× lens); [of se. SC southward to n. FL, west to s. AL] ..... ***Vaccinium myrsinites***

3 Leaves (at least the larger) > 3 cm long.

8 Leaves toothed, at least toward the tip of the leaf (note that fine serrations or crenations can be obscured by revolute margins).

9 Leaves elliptic to oblanceolate, widest near or above the middle, obtuse, acute, or short-acuminate, 1.5-7 cm long, 0.5-2.5 cm wide; leaf serrations fine and obscure; leaf surfaces with small stipitate glands (*Pieris*) or lepidote with scales (*Chamaedaphne*).

10 Leaves lepidote with scales; leaves oblanceolate, widest above the middle ..... ***Chamaedaphne calyculata***

10 Leaves with small stipitate glands, otherwise appearing glabrous; leaves elliptic, widest near the middle.

11 Inflorescence a many-flowered panicle of racemes, borne terminally; seeds 2.5-3 mm long; [of slopes and ridges of the Mountains and upper Piedmont] ..... ***Pieris floribunda***

11 Inflorescence a 3-9 flowered raceme, borne in the axils of upper leaves; seeds ca. 1 mm long; [of wetlands of the Coastal Plain, often associated with *Taxodium ascendens*] ..... ***Pieris phillyreifolia***

9 Leaves lanceolate or ovate, widest below the middle, short-acuminate to acuminate, 4-15 cm long, 1-5 cm wide; leaf serrations generally obvious (at least toward the acuminate leaf tip); leaf surfaces glabrous, or with non-stipitate hairs on the lower surface.

12 Pith transversely diaphragmed; [pedicels slender, 7-10 mm long]; [filaments strongly curved just below the anthers] ..... ***Agarista populifolia***

12 Pith solid; [pedicels stout, 2-6 mm long]; [filaments straight].

13 Leaves with an acute or short-acuminate apex; racemes 2-4 (5) cm long; sepals ovate, with an obtuse or rounded apex; longest petioles 3-8 mm long ..... ***Leucothoe axillaris***
13 Leaves with a long-acuminate apex; racemes 4-10 cm long; sepals lanceolate-ovate, with an acute (or subacute) apex; longest petioles 8-15 mm long ..... ***Leucothoe fontanesiana***
8 Leaves entire.
14 Leaves whitened beneath by a dense mat of white hairs; leaves linear and strongly revolute ..... ***[Andromeda polifolia var. glaucophylla]***
14 Leaves green or brown beneath, glabrous, glabrescent, or lepidote with scales.
15 Leaves densely lepidote on the under surface with brown scales.
16 Leaves planar, not revolute; petioles 7-20 mm long; twigs more-or-less terete in cross-section; [of the Mountains, Piedmont, and upper Coastal Plain].
17 Corolla mostly 15-20 mm long, the corolla tube (9-13 mm long) shorter than to as long as the corolla lobes (12-18 mm long); plant flowering early relative to Rh. minus, despite occurring at higher elevations and more northern latitudes; seeds ovoid, < 1.0 mm long, < 2.5× as long as wide (reminiscent of tiny watermelon seeds), coarsely textured, unornamented at the ends; calyx lobes deltoid; [of mountain ridges, heath balds, and rocky summits, mostly either away from the Blue Ridge Escarpment or north of the Asheville Basin] ..... ***Rh. carolinianum***
17 Corolla mostly 25-37 mm long, the corolla tube (13-22 mm long) longer than the corolla lobes (8-12 mm long); plant flowering late relative to Rh. carolinianum; seeds usually > 1.0 mm long, usually > 3× as long as wide, ornamented at one or both ends; calyx lobes ovate; [of the Coastal Plain, Piedmont, and Mountains, in the Mountains mostly of the Blue Ridge Escarpment of sw. NC and nw. SC, ranging in elevation up to the higher granitic domes in Macon and Jackson counties, NC].
18 Leaf apices mostly obtuse to rounded; petioles 2-6 (-7) mm long; branches erect and rigid; seeds moderately to elaborately ornamented with flared protrusions at both ends; [of n. FL] ..... ***Rh. chapmanii***
18 Leaf apices mostly acute to acuminate; petioles (5-) 6-20 mm long; branches spreading, not notably erect and rigid; seeds somewhat ornamented at one end; [of c. GA northward] ..... ***Rh. minus***
16 Leaves slightly to strongly revolute (or nearly planar in *Lyonia fruticosa*); petioles 1-7 mm long; twigs angled in cross-section; [of the lower Coastal Plain, from se. SC southward].
19 Ultimate branches not rigidly ascending, flowers nearly always restricted to branches of the previous year, the leaves not conspicuously reduced toward the branch tips; leaves with distal margin usually revolute, sometimes strongly so; major veins usually depressed; lower leaf surface with some scales often large and with irregular margins, others smaller and more nearly entire, at least the smaller scales more-or-less persistent; [shrub or small tree to 6 (-10) m tall] ..... ***Lyonia ferruginea***
19 Ultimate branches rigidly ascending, flowers frequent on branches of the current year (though also on older growth), the leaves conspicuously reduced toward the branch tips; leaves with distal margin at most slightly revolute; major veins not depressed; lower leaf surface with scales usually all large and with irregular margins, the scales often deciduous; [shrub to 1.5 (-3) m tall] ..... ***Lyonia fruticosa***
15 Leaves not lepidote beneath (*Lyonia lucida* with scattered minute scales on young leaves).
20 Leaves whorled or rarely opposite.
21 Calyx lobes glandular-canescent and with marginal stipitate glands; leaves glabrous beneath; bracts and bracteoles densely glandular; stomates 18 µ long and 13 µ wide, 15-24 per 0.2 square millimeter; shrub to 1 (-1.2) m tall; [of ne. NC northward] ..... ***Kalmia angustifolia***
21 Calyx lobes canescent but lacking glands; leaves short puberulent beneath; bracts and bracteoles nearly glandless; stomates 13 µ long and 9 µ wide, 35-51 per 0.2 square millimeter; shrub to 2 m tall (though often much shorter); [of se. and sw. VA southward] ..... ***Kalmia carolina***
20 Leaves alternate.
22 Leaf blades (8-) 10-30 cm long, 3-9 cm wide, rounded to obtuse at the tip.
23 Leaves rounded at base (rarely broadly cuneate or slightly cordate), obtuse at apex; leaf generally 1.5-2.5× as long as wide; [corolla usually deep pink to purple]; [sepals 0.5-1 mm long] ..... ***Rhododendron catawbiense***
23 Leaves cuneate at base, acute at apex; leaf generally 3-5× as long as wide; [corolla usually white to pale pink]; [sepals 4-6 mm long] ..... ***Rhododendron maximum***
22 Leaf blades 2-10 (-12) cm long, 1-5 cm wide, acute, short-acuminate (or obtuse or rounded in *Cyrilla*) at the tip.
24 Leaf with a prominent vein running the length of the margin, about 1 mm in; [shrub to 4 m tall] ..... ***Lyonia lucida***
24 Leaf venation not as above; [shrub to small tree] ..... ***Kalmia latifolia, Cyrilla racemiflora, Cliftonia racemosa, Bejaria racemosa***

Agarista D. Don ex G. Don 1834 (Agarista)

A genus of about 30 species, shrubs, primarily of tropical America, but also in Africa, Madagascar, and se. North America. Judd (1979, 1984) discusses the reasons for separating *Agarista* from *Leucothoe; Agarista* is more closely related to *Pieris* than *Leucothoe* (Judd & Kron 1996). References: Judd (1984, 1979)=Z; Stevens et al. in Kubitzki (2004).

Agarista populifolia (Lamarck) Judd, Agarista, Pipe-plant. Cp (FL, GA, NC?, SC): blackwater swamps, hydric hammocks, marly spring runs; rare. April-May; September-October. E. SC (or se. NC?) south to ne. and c. peninsular FL. A specimen at the University of North Carolina at Chapel Hill is labeled as coming from a nursery, originally taken from plants in a swamp in Columbus County, NC. The record is plausible and would add the species to the state's flora. [= K, L, WH, Z; = *Leucothoe populifolia* (Lamarck) Dippel – RAB, GW; = *Leucothoe acuminata* (Aiton) G. Don – S; = *Andromeda populifolia* Lamarck]

Andromeda Linnaeus 1753 (Bog-rosemary, Andromeda)

A genus of 1-2 species, shrubs, north temperate. References: Stevens et al. in Kubitzki (2004).

Andromeda polifolia Linnaeus var. *glaucophylla* (Link) A.P. de Candolle, Bog-rosemary, occurs south to ne. PA (Rhoads & Klein 1993) and e. WV (at Cranberry Glades, Pocahontas County), and NJ. [= K; = *A. glaucophylla* Link – C, F, G, L]

Arctostaphylos Adanson 1760 (Bearberry)

A genus of 50-60 species, shrubs, woody vines, or small trees, mostly in w. North America, but with 2 circumboreal species. References: Rosatti (1987b)=Z; Stevens et al. in Kubitzki (2004).

Arctostaphylos uva-ursi (Linnaeus) Sprengel, Bearberry, Kinnikinick. Mt (VA): high elevation granitic outcrop; rare (VA Rare). May-June. Following Rosatti (1987), *A. uva-ursi* is here treated inclusively, as a complex species not readily divisible into infraspecific taxa. *A. uva-ursi* is circumboreal, ranging in North America from Labrador west to AK, south to n. VA, n. IN, NM, and CA. [= C, K, L, W, Z; > *A. uva-ursi* var. *coactilis* Fernald & J.F. Macbride – F, G; > *A. uva-ursi* ssp. *coactilis* (Fernald & J.F. Macbride) A. & D. Löve & Kapoor]

Bejaria Mutis in Linnaeus 1771 (Tarflower)

A genus of 15 species, ranging from southeastern United States to Cuba, and from Mexico south into Bolivia. The spelling of the generic name has been controversial; it was originally published as '*Befaria*,' because of Linnaeus's misreading of Mutis's handwriting, but was intended to commemorate José Bejar. The spelling has now been conserved as '*Bejaria*' (Greuter et al. 2000). References: Stevens et al. in Kubitzki (2004).

Bejaria racemosa Ventenat, Tarflower, Flycatcher. Cp (FL, GA): pine flatwoods; common. E. GA (adjacent to se. SC) south to s. peninsular FL. [= L, WH; = *Befaria racemosa* – GW, K, S, orthographic variant]

Calluna R.A. Salisbury 1802 (Heather)

A monotypic genus, a shrub, of Europe. References: Stevens et al. in Kubitzki (2004).

* ***Calluna vulgaris*** (Linnaeus) Hull, Heather, Ling, Scotch Heather. Mt (NC): roadbanks; native of Europe. July-August. Also known to be naturalized in Tucker County, WV (Luteyn et al. 1996). [= C, F, G, K, L] {not yet keyed}

Ceratiola Michaux 1803 (Florida Rosemary)

A monotypic genus, a shrub, of se. North America. *Ceratiola* has been traditionally placed in the Empetraceae. Many workers have expressed doubt about the naturalness of the Empetraceae and its distinction from the Ericaceae. Molecular data have corroborated that concern, and shown *Ceratiola* and the rest of the Empetraceae to be better included in a broader Ericaceae (Kron & Chase 1993); the affinities of *Ceratiola* may actually be with other southeastern United States genera, *Kalmia, Elliottia,* and *Bejaria* (Kron & Chase 1993). References: Kron & Chase (1993); Judd & Kron (1993); Johnson (1982); Stevens et al. in Kubitzki (2004).

Ceratiola ericoides Michaux, Rosemary, Florida Rosemary, Sandhill Rosemary, Sand Heath. Cp (FL, GA, SC): xeric sandhills, usually in white "sugar sand"; uncommon. October-November. Ne. SC south to s. FL and west to s. MS. Its content of aromatic compounds makes it very flammable. [= RAB, K, L, S, WH]

Chamaedaphne Moench 1794 (Leatherleaf, Cassandra)

A monotypic genus, a shrub, circumboreal in distribution. References: Stevens et al. in Kubitzki (2004).

Chamaedaphne calyculata (Linnaeus) Moench, Leatherleaf, Cassandra. Cp (NC, SC), Mt (NC): pocosins in the Coastal Plain, bogs in the Mountains; uncommon (nearly extirpated in the Mountains). March-April; June-October. Circumboreal; in North America from Newfoundland to Alberta to Newfoundland, south to WV (Tucker County) (T.F. Wieboldt, pers.comm., 2007), MD, OH, n. IL, WI, n. IA, Alberta, and British Columbia; disjunct to the mountains of NC (where now nearly extirpated, known only from a single bog of less than 1 hectare) and to the Coastal Plain of NC and ne. SC. The Coastal Plain occurrences in our area are mainly in the centers of large peat dome or Carolina Bay pocosins, the insufficiently famous southern blanket bogs or "southern muskeg." In these areas, *Chamaedaphne* is sometimes dominant (or codominant with *Zenobia pulverulenta* or *Sarracenia flava*) over expanses of 25 square kilometers. The southern occurrences of *Chamaedaphne* are certainly the result of Pleistocene distributions. A number of varieties have been named (the Eurasian var. *calyculata*, var. *latifolia* in Maritime Canada, south to n. New England, and var. *angustifolia*, to which our material would presumably be referred). The validity of the varieties is doubtful. [= C, G, K, L, S, W; = *Cassandra calyculata* (Linnaeus) D. Don – RAB, GW; > *Chamaedaphne calyculata* var. *angustifolia* (Aiton) Rehder – F]

Chimaphila Pursh 1814 (Pipsissewa)

A genus of 4-5 species, subshrubs, of temperate and tropical America, and Eurasia. References: Stevens et al. in Kubitzki (2004).

1 Leaves lanceolate (broadest below the middle), base rounded, striped with white or paler green along the major veins ..... ***C. maculata***
1 Leaves oblanceolate (broadest above the middle), base cuneate, solid dark green throughout..... ***C. umbellata ssp. cisatlantica***

Chimaphila maculata (Linnaeus) Pursh, Pipsissewa, Striped Wintergreen. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): forests and woodlands, mostly rather xeric and acid; common (rare in FL). May-June; July-October. ME west to MI, south to GA, FL Panhandle, and AL. [= RAB, C, F, G, K, L, S, W, WH]

Chimaphila umbellata (Linnaeus) W. Barton *var.* ***cisatlantica*** Blake, Prince's-pine. Pd, Cp (NC, VA), Mt (VA): forests and woodlands, mostly rather xeric and acid; uncommon. May-June; July-October. Circumboreal, extending (in the interpretation of some) south into Central America. Var. *cisatlantica* is widespread in ne. North America, from Nova Scotia and Québec west to MN, south to NC and IN. [= C, F, G, L; < *Ch. umbellata* – RAB, W; = *Ch. umbellata* ssp. *cisatlantica* (Blake) Hultén – K; *? Ch. corymbosa* Pursh – S]

Corema D. Don 1826

A genus of 2 species, shrubs, one of ne. North America and one of Spain and the Azores. References: Stevens et al. in Kubitzki (2004).

Corema conradii (Torrey) Torrey ex Loudon, Broom-crowberry. Cp (NJ): dunes; rare. April-May. Nova Scotia, Québec, New Brunswick, and Prince Edwards Island south to ME, MA, NY, and s. NJ. [= C, F, G, K] {add to family key}

Elliottia Muhlenberg ex Elliott 1817 (Elliottia, Southern-plume)

A genus of 4 species (as here circumscribed), shrubs to small trees, of se. North America, nw. North America, and Japan. As discussed by Wood (1961), the generic limits of *Elliottia* have been controversial. The closest relatives of *E. racemosa* are *E. paniculata* (Siebold & Zuccarini) Bentham & Hooker and *E. bracteata* (Maximowicz) Bentham & Hooker, both of Japan, and *E. pyroliflorus* (Bong.) S.W. Brim & P.F. Stevens [*Cladothamnus pyroliflorus* Bong.], of AK, British Colombia, WA, and OR; these have sometimes been placed in other genera. References: Stevens et al. in Kubitzki (2004).

Elliottia racemosa Muhlenberg ex Elliott, Elliottia, Southern-plume, Georgia-plume. Cp (GA, SC), Pd (GA): xeric sandy ridges, sandhills, river bluffs; serpentine woodlands; rare. June-August. Endemic to e. GA and s. SC (Aiken County, where considered to have been extirpated). *Elliottia* extends barely into the Piedmont in Georgia, occurring on Burks Mountain on serpentine in a *Pinus palustris* woodland. [= K, L, S]

Epigaea Linnaeus 1753 (Trailing Arbutus)

A genus of 3 species, subshrubs, in e. North America and Eurasia; the other 2 species of the genus occur in the Caucasus and Asia Minor, and in Japan. References: Stevens et al. in Kubitzki (2004).

Epigaea repens Linnaeus, Trailing Arbutus. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): a wide variety of acidic forests, xeric to mesic, sandy, rocky, and loamy; common (rare in FL). Late February-early May; April-June. Newfoundland and Québec west to Saskatchewan, south to FL panhandle, MS, and IA. At maturity, the fruits split along the sutures, exposing tiny brown seeds embedded in "sticky, white, placental tissue" which is "distinctly sweet to the taste;" ants are strongly attracted to the placental tissue, and in carrying it away disperse the seeds (Clay 1983). [= RAB, C, G, K, L, S, W, WH; > *E. repens* var. *glabrifolia* Fernald – F; > *E. repens* var. *repens* – F]

Erica Linnaeus 1753 (Heath)

A genus of 735-860 species, shrubs and trees, of Africa and Eurasia (mostly s. Africa). References: Stevens et al. in Kubitzki (2004).

* ***Erica tetralix*** Linnaeus, Cross-leaved Heath. Cp (NC): sandy thickets; rare, native of Europe. July-August; September-October. [= RAB, C, F, G, K, L]

Eubotrys Nuttall 1842 (Deciduous Fetterbush)

A genus of 2 species, shrubs to small trees, of e. North America. Recent molecular evidence supports the recognition of *Eubotrys* as a genus separate from *Leucothoe*, supporting the views, based on morphological grounds, of many earlier authors (Kron et al. 2002). References: Kron et al. (2002); Stevens et al. in Kubitzki (2004).

1 Anthers with 4 awns; capsule rounded on the sutures; sepals broadly lanceolate; seeds not winged, shaped like a section of an orange..... ***E. racemosa***
1 Anthers with 2 awns; capsule angled on the sutures; sepals ovate; seeds winged, oblanceolate, flat..... ***E. recurva***

Eubotrys racemosa (Linnaeus) Nuttall, Coastal Fetterbush. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): swamps, pocosins, streambanks, and other wet places; common (uncommon in Piedmont, rare in Mountains). Late March-early June; September-October. E. MA south to c. peninsular FL and west to LA, primarily on the Coastal Plain; disjunct inland, as in c. TN (Chester, Wofford, & Kral 1997). [= C, G; = *Leucothoe racemosa* (Linnaeus) A. Gray – RAB, GW, K, L, W, WH; > *L. racemosa* var. *projecta* Fernald – F; > *L. racemosa* var. *racemosa* – F; > *Eubotrys racemosa* – S; > *Eubotrys elongata* Small – S]

Eubotrys recurva (Buckley) Britton, Mountain Fetterbush. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): heath balds, high elevation ridges and granitic domes, bogs; common (rare in Piedmont, rare in GA and SC). April-early June (rarely sporadically in the fall); August-October. A Southern Appalachian endemic: sw. VA, s. WV, and se. KY south through w. NC and ne. TN to ne. GA (Rabun County) and nw. SC. [= C, G, S; = *Leucothoe recurva* (Buckley) A. Gray – RAB, F, K, L, W]

Gaultheria Kalm ex Linnaeus 1754 (Wintergreen, Teaberry)

A genus of 130-135 species, shrubs and subshrubs, of Asia, Australia and New Zealand, South America, Central America, and North America (primarily Asian). References: Stevens et al. in Kubitzki (2004).

1 Stems creeping, the leaves 5-10 mm long, well-distributed along the stem; berries white; flowers 4-merous..... ***[G. hispidula]***
1 Stems erect, the leaves 15-50 mm long, clustered at the tip of the stem; berries red; flowers 5-merous..... ***G. procumbens***

Gaultheria procumbens Linnaeus, Wintergreen, Teaberry. Mt (GA, NC, SC, VA), Pd, Cp (NC, SC, VA): heath balds, woodlands, and openings, usually acidic and xeric; common (uncommon in Piedmont and Coastal Plains) (SC Rare). June-August; September-November. Newfoundland west to Manitoba, south to e. NC, ne. GA, AL, c. TN, KY, n. IN, and MN. [= RAB, C, F, G, K, L, S, W]

Gaultheria hispidula (Linnaeus) Muhlenberg ex Bigelow, Creeping Snowberry, Moxie, has been attributed to NC by C, F, G, and S; the documentation is unknown. It is known from as far south as e. WV and MD and its occurrence in our area is plausible. [= C, F, G, K; = *Chiogenes hispidula* (Linnaeus) Torrey & A. Gray – S]

Gaylussacia Kunth 1819 (Huckleberry)

A genus of ca. 50 species, shrubs, of North and South America (centered in South America). The sections and subsections follow Sleumer (1967a). A study of the phylogeny of the genus *Gaylussacia* provided some evidence for the treatment of *Gaylussacia brachycera* as a monotypic genus or within *Vaccinium*; additional study is needed. References: Sleumer (1967a)=Z; Camp (1935)=Y; Godfrey (1988)=X; Duncan & Brittain (1966)=V; Sorrie & Weakley (2007a)=U; Tucker, Sorrie, & Weakley in FNA (in prep.); Fernald (1911); Stevens et al. in Kubitzki (2004).

1 Leaves 0.7-2.2 cm long, serrulate, leathery, evergreen, lacking punctate glands; [section *Vitis-idaea*]..... ***G. brachycera***
1 Leaves 1.5-10 cm long, entire (or minutely glandular-crenate), membranaceous to subcoriaceous, deciduous, with punctate glands.
  2 Leaves subcoriaceous, upper surface shining, dark green, 1.5-4 cm long; bracts of the inflorescence equal to or longer than the pedicels (5-12 mm long), persistent; sepals, pedicels, bracts, and leaves stipitate-glandular and pubescent; [section *Gaylussacia*].
    3 Plant < 3 dm high.
      4 Corollas averaging 7.0 mm long; anthers averaging 3.7 mm long; glandular hairs on hypanthium dense, 0.3-0.5 mm long; plants usually 4-10 dm high, rarely less than 3 dm; plants of wet boggy habitats; [northeastern, south to DE, disjunct to NC and SC]..... ***G. bigeloviana***
      4 Corollas averaging 5.8 mm long; anthers averaging 3.0 mm long; glandular hairs on hypanthium moderately dense to relatively sparse, 0.2-0.3 mm long; plants occasionally up to 4 dm high; [plants of xeric to moist habitats; southeastern range, north to VA and scattered inland to n. AL, n. GA, c. TN, w. SC, w. NC, and s. WV]..... ***G. dumosa***
    3 Plant 4-10 (-15 dm) tall.
      5 Sessile glands on upper leaf surface absent; glandular hairs on hypanthium 1.0-1.5 mm long; [East Gulf Coastal Plain endemic, sw. GA, n. FL, s. AL, s. MS, and se. LA]..... ***G. mosieri***
      5 Sessile glands on upper leaf surface numerous; glandular hairs on hypanthium 0.3-0.5 mm long; ranging from SC northward.
        6 Corollas averaging 7.0 mm long; anthers averaging 3.7 mm long; plants of peat bogs, raised bogs, peat-based pocosins, and Atlantic white cedar-red maple swamps; [from Newfoundland to DE, and as a rare disjunct in the Coastal Plain of NC and SC]..... ***G. bigeloviana***
        6 Corollas averaging 6.0 mm long; anthers averaging 2.9 mm long; plants of montane bogs, seepage over rock, and possibly drier forests; [rare endemic of southern Appalachians of w. NC]..... ***G. orocola***

2 Leaves membranaceous to subcoriaceous, upper surface dull, yellow-green to medium-green, 2-10 cm long; bracts of the inflorescence shorter than the pedicels, early deciduous; sepals, pedicels, bracts, and leaves with sessile glands, pubescent or not pubescent; [section *Decamerium*].
7 Leaves glandular on both surfaces; racemes 0.5-1.5 cm long; [section *Decamerium*, subsection *Baccatae*] ..... ***G. baccata***
7 Leaves glandular on the lower surface only; racemes 1-5 cm long.
8 Leaves membranaceous, medium-green, with acuminate apices; [section *Decamerium*, subsection *Ursinae*] ..... ***G. ursina***
8 Leaves subcoriaceous, yellow-green to glaucous, with obtuse to emarginate apices; [section *Decamerium*, subsection *Frondosae*].
9 Young twigs glabrous; leaves glabrous or pubescent beneath, often glaucous; shrub to 20 dm tall; [widespread in our area] ..... ***G. frondosa***
9 Young twigs densely pubescent with short, curled hairs; leaves sparsely to densely pubescent beneath, glaucous or not; shrub to 10 dm tall; [of se. NC and southward in the Coastal Plain].
10 Larger leaves mostly 2-4 cm long and 1-2 cm wide, the lower surface sparsely short-pubescent with the longer hairs ca. 0.13 mm long, usually strongly glaucous; floral tube and calyx glaucous; shrub 2-6 (-10) dm tall ..... ***G. nana***
10 Larger leaves mostly 3-6 cm long and 2-3.5 cm wide, the lower surface sparsely to densely short-pubescent with the longer hairs ca. 0.25 mm long, not glaucous; floral tube and calyx not glaucous; shrub to 10 dm tall ..... ***G. tomentosa***

Gaylussacia baccata (Wangenheim) K. Koch, Black Huckleberry, Crackleberry. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (NC, VA): xeric, acidic forests and woodlands, rock outcrops, to 1600m elevation; common (uncommon in Piedmont and Coastal Plain of NC and SC, rare in SC). April-June; July-August. Newfoundland and Québec west to Ontario and Manitoba, south to ne. NC, nw. SC, n. GA, AL, and MO; in GA, NC, and SC it is primarily montane in distribution, but in VA it occurs throughout the state. [= RAB, C, F, G, K, L, V, W, Y, Z; = *Decachaena baccata* (Wangenheim) Small – S]

Gaylussacia bigeloviana (Fernald) Sorrie & Weakley, Northern Dwarf Huckleberry. Cp (NC, SC, VA): peat dome pocosins (in NC and VA), sandhill seepage bogs (SC), generally growing in peat, forms transitional to var. *dumosa* in wet pinelands and disturbed pocosins; rare (NC Watch List). April-June; June-October. Var. *bigeloviana* ranges from Newfoundland south to NJ, with forms transitional to var. *dumosa* as far south as se. VA, and disjunct in Carteret, Dare, and Pender counties, NC (in low pocosins of large peat domes with *Chamaedaphne* and *Zenobia*), in a Sandhill seepage bog in Lexington County, SC. [= U; = *G. dumosa* (Andrews) Torrey var. *bigeloviana* Fernald – C, F, G, Y; < *G. dumosa* – RAB, GW, K, L, W, X, Z]

Gaylussacia brachycera (Michaux) A. Gray, Box Huckleberry. Mt (VA, WV), Pd (NC): dry, acidic ridgetops and upper slopes; uncommon (but locally forming large clones) (rare in NC and VA). May-June. Sc. PA and DE south to e. KY and ec. TN, primarily on the Cumberland and Alleghany Plateaus; also disjunct on a steep, xeric, west-facing bluff in Durham Co. NC, where evidently native. Treatment of this species in a monotypic genus may be warranted, but the genus name *Buxella* (as used by Small) is unavailable, as it had already been used prior to Small in a different application (Wilbur & Bloodworth 2004). [= C, F, G, K, L, W, Y, Z; = *Buxella brachycera* (Michaux) Small – S (but *Buxella* is preoccupied); = *Vaccinium brachycerum* Michaux; note that the report in RAB is based on a misidentification]

Gaylussacia dumosa (Andrews) Torrey & A. Gray, Southern Dwarf Huckleberry. Cp, Pd, Mt (GA, NC, SC, VA): xeric to mesic, acidic forests and woodlands; common (uncommon in Piedmont and Mountains of NC and SC, rare in Piedmont and Mountains of VA). March-June; June-October. This variety is one of the most common shrubs of the Southeastern Coastal Plain, with an overall range from NJ south to FL and west to e. LA, primarily in the Coastal Plain, less commonly inland (as in sc. TN and se. WV). [= U; = *G. dumosa* (Andrews) Torrey var. *dumosa* –C, F, G, Y; < *G. dumosa* – RAB, GW, K, L, V, W, WH, X, Z; = *Lasiococcus dumosus* (Andrews) Small – S]

Gaylussacia frondosa (Linnaeus) Torrey & A. Gray ex Torrey, Dangleberry. Cp, Mt, Pd (NC, SC, VA): mesic, acidic woodlands, especially in sandhill-pocosin and savanna-pocosin ecotones, also in xeric chestnut oak forests in the lower Piedmont; common (uncommon in Piedmont and Mountains). Late March-May; June-August. Primarily a Southeastern Coastal Plain species: s. NH south to s. SC, less commonly inland to w. NY, c. and w. PA, w. VA, and w. SC. [= C, F, G, K, L, W, V; = *G. frondosa* var. *frondosa* – RAB, GW, X, Y, Z; = *Decachaena frondosa* (Linnaeus) Torrey & Gray – S]

Gaylussacia mosieri Small, Mosier's Huckleberry, Hirsute Huckleberry. Cp (FL, GA): savannas and seepages; uncommon (rare in GA). S. GA and Panhandle FL and west to e. LA. Material from Lexington County, SC originally identified as this taxon has been reassigned to *G. dumosa* var. *bigeloviana*. [= GW, K, L, U, V, X, Y, Z; = *Lasiococcus mosieri* (Small) Small – S]

Gaylussacia nana (A. Gray) Small, Dwarf Dangleberry. Cp (GA, NC, SC): xeric sandhills; rare (NC Rare). This species is disjunct at several sites in xeric sandhills of se. NC (on the Carolina Beach peninsula and the 421 Sandhills nw. of Wilmington), and otherwise is known to range from se. SC (Beaufort Co.) south and west to n. and c. peninsular FL, panhandle FL, and sw. AL. It is common in e. GA (such as Glascock and Bryan counties), and may also be found in se. SC. *G. nana* has a diploid chromosome complement (n=12), compared to tetraploid for *G. tomentosa* (n=12) (Luteyn et al. 1996). [= K, L, V, Y; = *G. frondosa* (Linnaeus) Torrey & A. Gray ex Torrey var. *nana* A. Gray – GW, X, Y; = *Decachaena nana* (A. Gray) Small – S; < *G. frondosa* (Linnaeus) Torrey & A. Gray ex Torrey var. *tomentosa* A. Gray – WH]

Gaylussacia orocola (Small) Camp, Blue Ridge Bog Huckleberry. Mt (NC): bogs, seepages over granite; rare. Endemic to the sw. NC mountains. The montane plants named *Lasiococcus orocola* by Small are closely allied to northern *G. dumosa* var. *bigeloviana*, and occur with other notable northern disjuncts, such as *Myrica gale* and *Chamaedaphne calyculata* (often associated with var. *bigeloviana* in northern peat bogs); they differ in several respectes however, and are here given taxonomic standing. [= U, Y, Z; < *G. dumosa* – RAB, GW, K, L, W, X; = *Lasiococcus orocola* (Small) Small – S]

Gaylussacia tomentosa (A. Gray) Pursh ex Small, Hairy Dangleberry. Cp (GA, SC): pine flatwoods, sandhills, xeric coastal fringe sandhills; rare. March-May; June-August. Se. SC (spodosolic flatwoods in Beaufort County) south to c. peninsular FL, west to s. GA and sw. AL. As discussed by Godfrey (1988) and Duncan & Brittain (1966), probably better treated as a species than as a variety of *G. frondosa*. *G. tomentosa* has a tetraploid chromosome complement (n=24), compared to diploid for *G. nana* and *G. frondosa* (n=12) (Luteyn et al. 1996). [= K, L, V, Y; = *G. frondosa* (Linnaeus) Torrey & A. Gray ex

Torrey var. *tomentosa* A. Gray – RAB, GW, X, Z; = *Decachaena tomentosa* (Pursh ex Small) Small – S; < *G. frondosa* (Linnaeus) Torrey & A. Gray ex Torrey var. *tomentosa* A. Gray – WH]

Gaylussacia ursina (M.A. Curtis) Torrey & A. Gray ex A. Gray, Bear Huckleberry, Mountain Huckleberry. Mt (GA, NC, SC): mesic to xeric forests, frequently dominant, but limited to areas southwest of the Asheville Basin; common. May-June; July-September. A narrow Southern Appalachian endemic: sw. NC, nw. SC, ne. GA, and se. TN. On mountain slopes and summits in that area it is often the dominant shrub, forming large clonal patches. [= RAB, K, L, V, W, Y, Z; = *Decachaena ursina* (M.A. Curtis) Small – S]

Hypopitys Crantz 1766 (Pinesap)

A genus of 1-several species, herbs, of circumboreal distribution. Recent molecular evidence supports its separation as a genus distinct from *Monotropa* (as has often been done in the past) (Neyland & hennigan 2004). References: Stevens et al. in Kubitzki (2004).

Hypopitys monotropa Crantz, Pinesap. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): forests; uncommon (rare in FL). May-October; July-November. Circumboreal, south nearly throughout North America, to c. peninsular and Panhandle FL. [= *Monotropa hypopithys* Linnaeus – RAB, C, F, G, K, L, W, WH; > *Hypopitys americana* (A.P. de Candolle) Small – S; > *Hypopitys lanuginosa* (Michaux) Nuttall – S]

Kalmia Linnaeus 1753 (Wicky, Sheepkill, Mountain Laurel, Ivy, Sand-myrtle)

A genus of 9-11 species, shrubs, of North America and Cuba, except the circumboreal *K. procumbens* (formerly *Loiseleuria*). *Leiophyllum*, traditionally treated as a monotypic or small genus of se. United States, is better treated as a part of *Kalmia* along with the northern *Loiseleuria*, based on molecular and morphological studies (Kron & King 1996, Kron et al. 2002). While this idea may initially seem outlandish (particularly to those whose concept of *Kalmia* is based only on *Kalmia latifolia*), the morphological and habital similarities of *Leiophyllum* to *Kalmia* are striking. The foliage and wood of all species (and the smoke from burning them) are poisonous. References: Southall & Hardin (1974)=Z; Ebinger (1974)=Y; Strand & Wyatt (1991)=Q; Wilbur & Racine (1971)=R; Camp (1938)=P; Kron & King (1996); Kron et al. (2002)=V; Stevens et al. in Kubitzki (2004).

1 Petals separate; fruit 2-3 (-7)-locular ..... ***K. buxifolia***
1 Petals fused; fruit 5-locular.
  2 Leaves whorled or opposite; inflorescence **either** an axillary raceme **or** a terminal corymbiform raceme.
    3 Leaves opposite, 1-4 cm long, subsessile; inflorescence a terminal corymbiform raceme ..... ***K. polifolia***
    3 Leaves whorled in 3s (rarely opposite), 2-5 cm long, the petioles 4-12 mm long; inflorescence an axillary raceme.
      4 Calyx lobes glandular-canescent and with marginal stipitate glands; leaves glabrous beneath; bracts and bracteoles densely glandular; stomates 18 μ long and 13 μ wide, 15-24 per 0.2 square millimeter; shrub to 1 (-1.2) m tall; [of ne. NC northward] ..... ***K. angustifolia***
      4 Calyx lobes canescent but lacking glands; leaves short puberulent beneath; bracts and bracteoles nearly glandless; stomates 13 μ long and 9 μ wide, 35-51 per 0.2 square millimeter; shrub to 2 m tall (though often much shorter when growing in burned situations); [of se. and sw. VA southward] ..... ***K. carolina***
  2 Leaves alternate; inflorescence an axillary fascicle or a terminal panicle.
    5 Leaves 0.5-1.5 cm long, 2-8 mm wide; twigs densely persistently hispid; [of the Coastal Plain of s. SC southward] ..... ***K. hirsuta***
    5 Leaves 2.5-12 cm long, 7-50 mm wide; twigs glabrous or puberulent (glabrescent in age); [collectively widespread in our area].
      6 Leaves deciduous, dull, and subcoriaceous, 1.5-3 cm wide; inflorescence a fascicle of 1-3 flowers, axillary to leaf scars near the tips of the previous year's growth; petiole 1-4 mm long; [of the Coastal Plain of NC and SC] ..... ***K. cuneata***
      6 Leaves evergreen, glossy, and coriaceous, (1) 3-5 cm wide; inflorescence a terminal panicle; petiole 7-45 mm long; [widespread] ..... ***K. latifolia***

Kalmia angustifolia Linnaeus, Northern Sheepkill. Cp (NC, VA): sandy, xeric to mesic hillsides and moist areas; rare (VA Rare). April-May; September-October. Labrador west to MN, south to se. VA and extreme ne. NC, s. Ontario, and MI, reaching its southern limit in the Coastal Plain of extreme ne. NC. See *Kalmia carolina* for discussion of the taxonomy of these two taxa. [= K, S, Z; = *K. angustifolia* var. *angustifolia* – C, F, G, L, Y]

Kalmia buxifolia (P.J. Bergius) Gift, Kron, & Stevens, Sand-myrtle. Mt (GA, NC, SC), Cp (NC, SC), Pd (NC): locally abundant but very restricted in wet (spodosol) pinelands of the outer Coastal Plain (in Brunswick and Carteret counties, NC), locally common in relatively dry sandhills in a few locations in the Sandhills, disjunct in the Piedmont on a few quartzite monadnocks, fairly common in the mountains on rock outcrops at high to moderate elevations (on a wide variety of rock types); uncommon (GA Special Concern). Late March-June (sporadically to October); September-October. The species is curiously distributed, both in its overall range and within NC. *Kalmia buxifolia* is found in the Pine Barrens of NJ, the outer Coastal Plain of se. NC, the inner Coastal Plain (fall-line sandhills) of sc. NC and nc. SC, monadnocks of the upper Piedmont of NC, mountain peaks of NC and immediately adjacent nw. SC, ne. GA, and e. TN, and isolated in extreme e. PA (Monroe County) and in se. KY (on sandstone in Whitley County, in the Cumberland Plateau). Populations in the high mountains consist of very old, prostrate krummholz, the stems to 6 cm in diameter at the base, the branches spreading to cover at least a square meter. The disjunct distribution, various habitats, and subtle morphological variation between populations has led to periodic attempts to divide the species into two or more varieties or species, but the variability apparently cannot be successfully described taxonomically; it is here treated as a single species, the genus therefore monotypic. See X, Y, and Q for detailed discussion of the various taxa recognized by various authors (within the genus *Leiophyllum*). Strand & Wyatt (1991) found a population from Hanging Rock,

Stokes County, NC to be the most distinctive, but did not choose to give it formal taxonomic status. [= V; = *Leiophyllum buxifolium* (P.J. Bergius) Elliott – C, K, L, Q, R, W; > *Leiophyllum buxifolium* var. *buxifolium* – RAB; > *Leiophyllum buxifolium* var. *prostratum* (Loudon) Gray – RAB; > *Leiophyllum buxifolium* var. *hugeri* (Small) Schneider – F, G, P; > *Leiophyllum lyonii* Sweet – S, P; > *Leiophyllum hugeri* (Small) K. Schumann – S; = *Dendrium buxifolium* (Bergius) Desvaux]

Kalmia carolina Small, Southern Sheepkill, Carolina Wicky, Carolina Bog Myrtle. Cp (GA, NC, SC, VA), Mt (GA, NC, VA): moist to wet pinelands of the Coastal Plain, pocosin margins (or seemingly in pocosins or swamps because of fire suppression), mountain bogs and fens (and less commonly in rocky areas at high elevations) in the Mountains; common (rare in the Mountains and rare in GA and VA). April-May (sporadically to September, especially in response to fire); September-October. This species, a close relative of the more widespread and northern *K. angustifolia*, occurs in two disjunct areas: the Coastal Plain, from se. VA south through NC to wc. GA (Taylor County), and the Southern Appalachians from sw. VA south through w. NC and ne. TN to ne. GA. Southall & Hardin (1974) favored species status for *K. carolina* because of its essentially allopatric distribution relative to *K. angustifolia* (the 2 meet in Southampton County, VA), the near absence of intermediates or hybrids in nature, and because "significant morphological and anatomical differences have developed and remain constant between these two species when grown together." [= GW, K, S, W, Z; = *K. angustifolia* Linnaeus var. *caroliniana* (Small) Fernald – RAB (an orthographic error); = *K. angustifolia* var. *carolina* (Small) Fernald – C, F, G, L, Y]

Kalmia cuneata Michaux, White Wicky. Cp (NC, SC): pocosins and pocosin-savanna or pocosin-sandhill ecotones; rare. Late May-June; September-October. This species is a narrow endemic of the Coastal Plain of se. NC and e. SC. It is not closely related to other species in the genus. It is most easily distinguished from other pocosin shrubs by the combination of the following characters: leaves deciduous, alternate, oblanceolate (cuneate-attenuate at base, obtuse at apex), revolute, dark green above, paler and prominently stipitate-glandular beneath, woody capsule rounded, stipitate-glandular, persistent through the winter, borne on delicate, recurved pedicels usually 2-3 cm long. [= RAB, GW, K, L, S, Y, Z]

Kalmia hirsuta Walter, Hairy Wicky. Cp (FL, GA, SC): pine savannas and pine flatwoods; common (rare in SC). June-July; September-October. Se. SC (Beaufort, Jasper, Hampton, and Colleton counties) south to nc. peninsular FL, west to s. AL. The closest relatives of *K. hirsuta* are 3 Cuban species: *K. aggregata* (Small) Copeland, *K. ericoides* Wright ex Grisebach, and *K. simulata* (Britton & Wilson) Southall. [= RAB, GW, K, L, WH, Y, Z; = *Kalmiella hirsuta* (Walter) Small – S]

Kalmia latifolia Linnaeus, Mountain Laurel, Ivy, Calico-bush. Mt, Pd (FL, GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): acidic forests, bluffs, bogs, along sandhill steams, and in a wide range of other habitats, nearly ubiquitous in the mountains, up to at least 1600m, more restricted in habitat in the lower Piedmont and Coastal Plain; common (rare in FL). April-June; September-October. ME and OH south to FL and extreme e. LA. Unlike our other species, which are strictly shrubs, *K. latifolia* reaches the stature and diameter of a small tree. [= RAB, C, K, L, S, W, WH, Y, Z; > *K. latifolia* var. *laevipes* Fernald – F, G; > K. latifolia var. *latifolia* – F, G]

Kalmia polifolia Wangenheim, Swamp Laurel, Bog Laurel. Mt (WV): bogs; rare. Labrador and Mackenzie south to n. NJ, ne. PA, MI, WI, MN, and MT; disjunct in Tucker County, WV (where discovered by T.F. Wieboldt in 2007). [= C, F, G, K, Y, Z]

Leucothoe D. Don 1834 (Fetterbush, Leucothoe)

A genus of about 6 species, shrubs, of Japan, Himalayan Asia, and e. North America. References: Stevens et al. in Kubitzki (2004). [also see *Agarista* and *Eubotrys*]

1 Leaves deciduous, dull, membranaceous ..... *[see **Eubotrys**]*
1 Leaves evergreen, glossy, coriaceous.
  2 Leaves with an acute or short-acuminate apex; racemes 2-4 (5) cm long; sepals ovate, with an obtuse or rounded apex; longest petioles 3-8 mm long ..... ***L. axillaris***
  2 Leaves with a long-acuminate apex; racemes 4-10 cm long; sepals lanceolate-ovate, with an acute (or subacute) apex; longest petioles 8-15 mm long ..... ***L. fontanesiana***

Leucothoe axillaris (Lamarck) D. Don, Coastal Doghobble. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): pocosins, blackwater swamp forests, and moist and acid slopes; common (rare in Piedmont, uncommon in VA). Late March-May; September-October. A Southeastern Coastal Plain endemic: se. VA south to FL and west to extreme e. LA. [= C, G, GW, K, L, S, WH; = *L. axillaris* var. *axillaris* – RAB; > *L. axillaris* var. *axillaris* – F; > *L. axillaris* var. *ambigens* Fernald – F]

Leucothoe fontanesiana (Steudel) Sleumer, Mountain Doghobble, Switch-ivy. Mt (GA, NC, SC, VA), Pd (GA, NC, SC): moist slopes, streambanks, ravines, often associated with *Rhododendron maximum* thickets; common (VA Rare). April-May; September-October. A Southern Appalachian endemic: sw. VA south through w. NC and e. TN to nw. GA. [= GW, K, L, W; = *L. axillaris* var. *editorum* (Fernald & Schubert) Ahles – RAB; = *L. walteri* (Willdenow) Melvin – C; = *L. editorum* Fernald & Schubert – F, G; = *L. catesbaei* (Walter) Gray – S]

Lyonia Nuttall 1818 (Staggerbush, Maleberry, Fetterbush)

A genus of about 35 species, shrubs and small trees, of e. and se. Asia, e. North America, Mexico, and the West Indies. References: Judd (1981)=Z; Stevens et al. in Kubitzki (2004).

1 Lower leaf surfaces stipitate-peltate with rusty scales; [of s. SC southward].
  2 Ultimate branches not rigidly ascending, flowers nearly always restricted to branches of the previous year, the leaves not conspicuously reduced toward the branch tips; leaves with distal margin usually revolute, sometimes strongly so; major veins usually depressed; lower

leaf surface with some scales often large and with irregular margins, others smaller and more nearly entire, at least the smaller scales more-or-less persistent; [shrub or small tree to 6 (-10) m tall] ..... ***L. ferruginea***

2 Ultimate branches rigidly ascending, flowers frequent on branches of the current year (though also on older growth), the leaves conspicuously reduced toward the branch tips; leaves with distal margin at most slightly revolute; major veins not depressed; lower leaf surface with scales usually all large and with irregular margins, the scales often deciduous; [shrub to 1.5 (-3) m tall] ..... ***L. fruticosa***

1 Lower leaf surfaces glabrous or pubescent; [collectively widespread].

3 Leaves evergreen (some leaves present on wood of the previous year), coriaceous, and shining ..... ***L. lucida***

3 Leaves deciduous (no leaves present on wood of the previous year), subcoriaceous, and dull.

4 Young twigs angled; leaf margin entire; corolla 7-14 mm long; inflorescence umbellate-racemose, in fascicles along previous year's (leafless) growth; capsule 4-6 mm long; leaf surfaces with tiny, red, short-stalked capitate glands (also often with spreading, translucent hairs on the main veins) ..... ***L. mariana***

4 Young twigs terete; leaf margin minutely serrulate; corolla 3-5 mm long; inflorescence a terminal panicle; capsule 2.5-3 mm long; leaf surfaces with appressed, strigillose hairs, pale with a red base.

5 Inflorescences naked, or with only a few leafy bracts; [of the Mountains, Piedmont, and (less commonly) Coastal Plain] ..... ***L. ligustrina* var. *ligustrina***

5 Inflorescences (at least the lower) with conspicuous bracts; [of the Coastal Plain and lower Piedmont] ... ***L. ligustrina* var. *foliosiflora***

Lyonia ferruginea (Walter) Nuttall, Crookedwood, Dragonwood, Staggerbush. Cp (FL, GA, SC): pocosins; common (rare but locally common in spodosolic flatwoods of Jasper and Beaufort counties, SC). April-May; September-October. Se. SC south to sc. peninsular FL, west to panhandle FL. See discussion under *L. fruticosa*. [= GW, K, L, WH, Z; < *Lyonia ferruginea* – RAB (also see *L. fruticosa*); = *Xolisma ferruginea* (Walter) Heller – S]

Lyonia fruticosa (Michaux) G.S. Torrey, Staggerbush, Poor-grub. Cp (FL, GA, SC): pocosins; common (rare in SC). Se. SC (at least formerly) south to s. peninsular FL, west to e. panhandle FL. Though not included in RAB for our area, Judd (1981) cites several old specimens from SC. The species is definitely known from immediately adjacent GA, and there seems no reason to doubt its (at least historical) occurrence in SC. This species is difficult to distinguish from *L. ferruginea*, with which it often co-occurs. [= GW, K, L, WH, Z; < *L. ferruginea* – RAB; = *Xolisma fruticosa* (Michaux) Nash – S]

Lyonia ligustrina (Linnaeus) A.P. de Candolle *var.* ***foliosiflora*** (Michaux) Fernald, Southern Maleberry, He-huckleberry. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): pocosins, seepage bogs, and other wet habitats; common (rare in the Piedmont) (uncommon in VA). Late April-June; September-October. Se. VA south to c. FL, west to e. TX and e. OK, and (west of the mountains) north to TN and AR. Rather nondescript when sterile, the gray-green hue of the leaves is a useful character. Var. *foliosiflora* is the usual variety on the Coastal Plain (including the fall-line sandhills). [= GW, K, L, W, Z; < *L. ligustrina* – RAB, C, G; > *L. ligustrina* var. *capreaefolia* (Watson) A.P. de Candolle – F; > *L. ligustrina* var. *foliosiflora* – F; > *L. ligustrina* var. *salicifolia* (Watson) A.P. de Candolle – F; = *Arsenococcus frondosus* (Pursh) Small – S; = *Xolisma foliosiflora* (Michaux) Small]

Lyonia ligustrina (Linnaeus) A.P. de Candolle *var.* ***ligustrina***, Northern Maleberry, He-huckleberry. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (NC, SC): mountain bogs, shrub balds, bottomlands, other moist to wet habitats, "dry" ridges at high elevations; common. May-June; September-October. S. ME, s. NH, s. VT, s. and e. NY, s. OH, WV, and KY south to w. and c. SC, n. GA, and ne. AL, primarily in the mountains and adjacent provinces. Var. *ligustrina* is the usual variety in the Mountains and Piedmont, but extends as well into the Coastal Plain in NC and SC. This variety is very variable in leaf shape and size, some populations having leaves about 3 cm long and 1.3 cm wide, others with leaves to as large as 8 cm long and 5 cm wide. The plants with smaller leaves occur in bogs and other distinctly wet habitats, while plants with large leaves occur in thin soils in high elevation heath balds and thin soils around rock outcrops (as, for instance, on Grandfather Mountain, NC). [= F, GW, K, L, W, Z; < *L. ligustrina* – RAB, C, G; = *Arsenococcus ligustrinus* (Linnaeus) Small – S; = *Xolisma ligustrina* (Linnaeus) Britton]

Lyonia lucida (Lamarck) K. Koch, Shining Fetterbush. Cp (FL, GA, NC, SC, VA), Pd (GA): pocosins, wet woodlands, blackwater swamp forests, other acidic wetlands, especially if peaty; common (uncommon in VA). April-early June; September-October. Se. VA south to s. FL and west to e. and c. LA; also in w. Cuba. Readily distinguished by the glossy, coriaceous leaves with a prominent vein running along the margins. When in flower in large numbers, the odor is cloyingly sweet. [= RAB, C, F, G, GW, K, L, WH, Z; = *Desmothamnus lucidus* (Lamarck) Small – S; = *Neopieris nitida* (Bartram ex Marshall) Britton]

Lyonia mariana (Linnaeus) D. Don, Staggerbush. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): pine flatwoods, savannas, pocosin-sandhill ecotones, dry rocky woodlands in the lower Piedmont (especially with chestnut oak); common (uncommon in Piedmont). April-May; September-October. RI (formerly) and NY (Long Island) south to c. peninsular and e. Panhandle FL; disjunct west of the Misssissippi River in sc. MO, c. AR, nw. LA, se. OK, and e. TX. Readily distinguished by the broadly elliptic leaves borne at an ascending 45 degree angle, with bright pink axillary buds. [= RAB, C, F, G, GW, K, L, WH, Z; = *Neopieris mariana* (Linnaeus) Britton – S]

Menziesia J.E. Smith 1791 (Minniebush)

A genus of about 7-10 species, shrubs, of e. Asia (mostly), w. North America, and se. North America. *Menziesia ferruginea* J.E. Smith of w. North America is closely related; the other species of the genus are e. Asian. Molecular evidence suggests that *Menziesia* should be included in *Rhododendron*, and is actually closely related within *Rhododendron* to *Rh. vaseyi* (Goetsch, Eckert, & Hall 2005; Kurashige et al. 2001). References: Stevens et al. in Kubitzki (2004).

Menziesia pilosa (Michaux ex Lamarck) Antoine Laurent de Jussieu ex Persoon, Minniebush. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): heath balds, bogs, rocky summits, and rocky woodlands, mostly at high elevations; common (uncommon in NC Mountains, rare in GA Mountains, rare in SC and NC Piedmont) (GA Special Concern). May-July; August-October. A Southern

and Central Appalachian endemic: sc. PA, sw. PA, e. WV, w. VA, e. TN, w. NC, and ne. GA. The very prominent mucro on the leaves and the series of fascicles of trichomes along the leaf midrib below readily distinguish the species in sterile condition from superficially somewhat similar *Rhododendron* and *Vaccinium*. [= RAB, C, F, G, K, L, S, W; = ***Rhododendron species 1***]

Monotropa Linnaeus 1753 (Indian Pipes, Pinesap)

A monotypic genus, an herb, of North America, Central America, South America, and e. Asia. The segregation of *Monotropa, Hypopitys,* and *Monotropsis* into the Monotropaceae or their inclusion in the Ericaceae has been controversial. Recent studies suggest that their inclusion in the Ericaceae is warranted (Kron & Chase 1993, Judd & Kron 1993). References: Stevens et al. in Kubitzki (2004). [also see *Hypopitys*]

1 Flowers few to many, racemose; stem pubescent, at least in the inflorescence; plant yellow, orange, or red when fresh, aging or drying dark brown ..... ***[Hypopitys monotropa]***
1 Flower solitary; stem glabrous; plant white (rarely pink) when fresh, aging or drying black ..... ***Monotropa uniflora***

Monotropa uniflora Linnaeus, Indian Pipes. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): a wide variety of forests; common. June-October; August-November. Widespread in North America, from Labrador and AK south to s. FL, TX, CA, and Mexico; also in South America and e. Asia. A preliminary molecular study suggests that splitting of worldwide *Monotropa uniflora* into several geographic species or varieties may be warranted (Neyland & Hennigan 2004). [= RAB, C, F, G, K, L, W, WH; > *M. uniflora* – S; > *M. brittonii* Small – S]

Monotropsis Schweinitz in Elliott 1817 (Sweet Pinesap)

A monotypic genus, an herb, of e. North America. References: Stevens et al. in Kubitzki (2004).

Monotropsis odorata Schweinitz ex Elliott, Sweet Pinesap. Pd, Mt (GA, NC, SC, VA), Cp (VA): dry to mesic upland woods under oaks and/or pines (*Pinus virginiana* or *P. echinata*), especially slopes or bluffs with abundant heaths, often *Rhododendron maximum*; rare. September-November and February-April; October-November and May-June. Centered in the Appalachians: DE, MD, and WV south to GA and AL; disjunct in ne. and c. peninsular FL. The flowers are very fragrant, the odor variously described as similar to cloves, nutmeg, cinnamon, and violets. Since the diminutive plants (3-10 cm tall) are often covered by leaf litter, fragrance is often the key to finding this species. *Monotropsis* is mycotrophic, receiving its nutritrion by association with a mycorrhizal fungus, the intertwined root mass and fungal mantle about 1-2 cm in diameter. [= C, F, G, K, L, W, WH; > *M. odorata* var. *lehmaniae* (Burnham) Ahles – RAB; > *M. odorata* var. *odorata* – RAB; > *M. lehmaniae* Burnham – S; > *M. odorata* – S; > *M. reynoldsiae* (A. Gray) A. Heller]

Orthilia Rafinesque 1840 (One-sided Shinleaf)

A monotypic genus, a subshrub, circumboreal in distribution. The recognition of *Orthilia* as separate from *Pyrola* is supported by molecular data (Freudenstein 1999a). References: Stevens et al. in Kubitzki (2004).

Orthilia secunda (Linnaeus) House, One-sided Shinleaf, One-sided Pyrola. Pd, Cp (VA): forests under *Pinus virginiana*, other forests?; rare. June-July; July-September. Circumboreal, in North America south to VA, IN, MN, and NM. [= K, L; = *Pyrola secunda* Linnaeus – C, G, W; > *P. secunda* var. *secunda* – F]

Oxydendrum A.P. de Candolle 1839 (Sourwood)

A monotypic genus, a tree, of se. North America. The genus *Oxydendrum* is "isolated ... among the Ericaceae, apparently with no close relatives" (Wood 1961): the only member of tribe Oxydendreae. References: Stevens et al. in Kubitzki (2004).

Oxydendrum arboreum (Linnaeus) A.P. de Candolle, Sourwood, Sorrel-tree. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): mesic to xeric deciduous forests, especially dry-mesic to xeric oak-hickory and oak-pine forests, also in the fall line sandhills in sandhill/pocosin ecotones; common (becoming uncommon to rare in n. VA). Se. and sw. PA west to IL, south to n. FL and se. and c. LA. It is an especially characteristic understory tree of upland forests of the Piedmont and lower Mountains. The bark is dark grayish-brown and fairly deeply furrowed; the tree nearly always has a characteristic lean (toward a former canopy light-gap). The finely serrate, elliptic leaves are distinctive, with the sour taste of garden sorrel (*Rumex acetosa* Linnaeus), sheep sorrel (*Rumex acetosella*), or wood sorrel (*Oxalis*). [= RAB, C, F, G, K, L, S, W, WH]

Pieris D. Don 1834 (Evergreen Fetterbush)

A genus of 7 species, shrubs, of e. Asia, e. North America, and Cuba. Judd (1982) treats *Pieris* as a genus of 7 species, 4 in e. Asia, 1 in the Southern Appalachian Mountains, 1 in the se. United States Coastal Plain, and 1 in w. Cuba. References: Judd (1982)=Z; Judd (1979); Stevens et al. in Kubitzki (2004).

1 Inflorescence a many-flowered panicle of racemes, borne terminally; seeds 2.5-3 mm long; [of slopes and ridges of the Mountains and upper Piedmont]; [subgenus *Pieris*, section *Pieris*] ..... ***P. floribunda***
1 Inflorescence a 3-9 flowered raceme, borne in the axils of upper leaves; seeds ca. 1 mm long; [of wetlands of the Coastal Plain, often associated with *Taxodium ascendens*]; [subgenus *Pieris*, section *Phillyreoides*] ..... ***P. phillyreifolia***

Pieris floribunda (Pursh) Bentham & Hooker f., Mountain Andromeda, Evergreen Mountain Fetterbush. Mt (GA?, NC, VA), Pd (NC, VA): acid wooded slopes, heath balds at high elevations, summits of Piedmont monadnocks; common (uncommon and local in NC, rare in Piedmont). May-June; August-October. A Southern Appalachian endemic: e. WV, w. VA, w. NC, e. TN, and n. GA. The type locality is supposedly in n. GA. The range in NC is peculiar, the species occurring at high elevations southwest of Asheville, absent from apparently suitable habitats to the northeast (such as the Craggies, Blacks, Roan Mountain, and Grandfather Mountain), yet reappearing in a few disjunct populations at low elevations in the upper Piedmont. In w. VA (and adjacent e. WV), *P. floribunda* occurs on rather dry sandstone ridges and upper slopes, often under an oak canopy, especially in the front ranges of the Cumberland Mountains. *P. floribunda* is placed in subgenus *Pieris*, section *Pieris*, along with *P. japonica* (see below) and another Asian species. [= RAB, C, F, G, K, L, S, W, Z]

Pieris phillyreifolia (Hooker) A.P. de Candolle, Vine-wicky, Climbing Fetterbush. Cp (FL, GA, SC): swamp forests; common (rare in GA and SC). E. SC south to c. peninsular FL west to s. AL. This southeastern species has the remarkable habit of often growing as a creeping vine under the bark of *Taxodium ascendens*, the branches exserted through the cypress bark, sometimes ascending into the upper canopy with the main stem never visible except at the very base of the tree; it also sometimes grows as a low shrub. Godfrey (1969) documents the occurrence of this species in our area. See GW and Godfrey (1989) for excellent decriptions and illustrations of this curious "shrub-vine." It is apparently most closely related to the other two members of subgenus *Pieris*, section *Phillyreoides*, *P. cubensis* (Grisebach) Small, endemic to w. Cuba, and *P. swinhoei* Hemsley, of se. China, neither of which shares its unusual habit. [= GW, K, L, WH, Z; = *Ampelothamnus phillyreifolius* (Hooker) Small – S]

* *Pieris japonica* (Thunberg) D. Don ex G. Don, Japanese Andromeda or Lily-of-the-valley Bush, rather closely related to our *P. floribunda*, is frequently grown as an ornamental. [= Z] {not keyed}

Pyrola Linnaeus 1753 (Shinleaf, Pyrola)

A genus of 30-35 species, subshrubs, circumboreal and also in Sumatra and Guatemala. The inclusion of this group of species in the Ericaceae or its recognition as a separate family has been controversial. Recent studies (Judd & Kron 1993, Kron & Chase 1993) suggest that it is best resubmerged in the Ericaceae. References: Stevens et al. in Kubitzki (2004).

1 Calyx lobes distinctly longer than broad, 3-4 mm long; leaves coriaceous, more or less glossy ..... ***P. americana***
1 Calyx lobes about as broad as long, 1.5-2 mm long; leaves not coriaceous, dull.
2 Leaves mostly 1-3 cm long, the blade < 2.5 cm wide; calyx lobes broadly ovate, the apex subacute to obtuse ..... ***P. chlorantha***
2 Leaves mostly 3-9 cm long, the blade > 2.5 cm wide; calyx lobes triangular, the apex acute to acuminate ..... ***P. elliptica***

Pyrola americana Sweet, Rounded Shinleaf. Mt, Pd (NC, VA), Cp (VA): xeric to mesic woodlands and forests; common (uncommon in NC). May-August; July-October. Widespread in ne. North America, south to NC, ne. TN, KY, IN, and MN. [= K, S, W; = *P. rotundifolia* Linnaeus var. *americana* (Sweet) Fernald – RAB, C, F, G, L]

Pyrola chlorantha Swartz. Mt, Pd (VA): dry forests; rare (VA Rare). June-August; August-October. Circumboreal, in North America south to VA, WV, IN, and NE. [= C, K, L, W; > *P. virens* var. *virens* – F, G; > *P. virens* var. *convoluta* (Bart.) Fernald – F, G]

Pyrola elliptica Nuttall, Elliptic Shinleaf. Mt (NC, VA): moist to dry forests, including rich northern hardwood forests; rare (NC Rare, VA Rare). June-August; July-October. Newfoundland and Québec, west to British Columbia, south to WV, nw. NC, and IA. Known in NC only from Ashe County, in Long Hope Valley (McDowell 1984) and on Phoenix Mountain. [= C, F, G, K, L, S, W]

Rhododendron Linnaeus 1753 (Rhododendron, Azalea)

A genus of about 850 species, shrubs and trees, mostly north temperate (centered in Himalayan Asia). References: Kron (1993)=Z; Judd & Kron (1995)=Y; Chamberlain (1982)=X; Cullen (1980)=Q; Davidian (1982)=D; Duncan & Pullen (1962)=V; Goetsch, Eckert, & Hall (2005); Towe (2004); Kron & Creel (1999); Stevens et al. in Kubitzki (2004).

1 Leaves evergreen, coriaceous, entire; stamens 10; **[rhododendrons]**.
2 Lower surface of leaves not punctate with brown scales; larger leaves 10-30 cm long; [subgenus *Hymenanthes*, section *Ponticum*, subsection *Pontica*].
3 Leaves rounded at base (rarely broadly cuneate or slightly cordate), obtuse at apex; leaf generally 1.5-2.5× as long as wide; corolla usually deep pink to purple; sepals 0.5-1 mm long ..... ***Rh. catawbiense***
3 Leaves cuneate at base, acute at apex; leaf generally 3-5× as long as wide; corolla usually white to pale pink; sepals 4-6 mm long ..... ***Rh. maximum***

2 Lower surface of leaves punctate with brown scales; larger leaves 6-12 cm long; [subgenus *Rhododendron*, section *Rhododendron*, subsection *Caroliniana*].
4 Corolla mostly 15-20 mm long, the corolla tube (9-13 mm long) shorter than to as long as the corolla lobes (12-18 mm long); plant flowering early relative to *Rh. minus*, despite occurring at higher elevations and more northern latitudes; seeds ovoid, < 1.0 mm long, < 2.5× as long as wide (reminiscent of tiny watermelon seeds), coarsely textured, unornamented at the ends; calyx lobes deltoid; [of mountain ridges, heath balds, and rocky summits, mostly either away from the Blue Ridge Escarpment or north of the Asheville Basin]. ..... ***Rh. carolinianum***
4 Corolla mostly 25-37 mm long, the corolla tube (13-22 mm long) longer than the corolla lobes (8-12 mm long); plant flowering late relative to *Rh. carolinianum*; seeds usually > 1.0 mm long, usually > 3× as long as wide, ornamented at one or both ends; calyx lobes ovate; [of the Coastal Plain, Piedmont, and Mountains, in the Mountains mostly of the Blue Ridge Escarpment of sw. NC and nw. SC, ranging in elevation up to the higher granitic domes in Macon and Jackson counties, NC].
5 Leaf apices mostly obtuse to rounded; petioles 2-6 (-7) mm long; branches erect and rigid; seeds moderately to elaborately ornamented with flared protrusions at both ends; [of n. FL] ..... ***Rh. chapmanii***
5 Leaf apices mostly acute to acuminate; petioles (5-) 6-20 mm long; branches spreading, not notably erect and rigid; seeds somewhat ornamented at one end; [of c. GA northward] ..... ***Rh. minus***

1 Leaves deciduous, membranaceous, ciliate or serrulate; stamens 5-7; [**azaleas**]; {also see Alternate Key to azaleas emphasizing vegetative characters}.
6 Corolla tube 2-5 mm long, much shorter than the corolla lobes; stamens (5-) 7; leaves elliptic, often broadly so (commonly 3-6 cm wide), acuminate; capsule ellipsoid-ovoid, 10-14 mm long; [subgenus *Azaleastrum*, section *Sciadorhodion*] ..... ***Rh. vaseyi***
6 Corolla tube 13-25 mm long, equal to or longer than the corolla lobes; stamens 5; leaves generally oblanceolate to narrowly elliptic, generally < 3 cm wide, acute to obtuse, mucronate; capsule cylindroid-ellipsoid, 10-25 mm long; [subgenus *Hymenanthes*, section *Pentanthera*].
7 Corolla yellow, orange, or red.
8 Flowers appearing after the leaves have expanded.
9 Twigs pubescent with multicellular hairs; [north of ec. AL and wc. GA] ..... ***Rh. cumberlandense***
9 Twigs glabrous; [south of ec. AL and wc. GA] ..... ***Rh. prunifolium***
8 Flowers appearing before or with the leaves.
10 Corolla limb shorter than the length of the corolla tube, the tube gradually expanding into the limb ..... ***Rh. austrinum***
10 Corolla limb nearly as broad as the tube is long, the tube abruptly expanding into the limb.
11 Floral bud-scales with glandular margins, the outer surface glabrous; corolla tube glandular-pubescent on its outer surface; sepals 2.0-3.0 mm long ..... ***Rh. calendulaceum***
11 Floral bud-scales with ciliate margins, the outer surface glabrous to sparsely pubescent; corolla tube pubescent (not glandular or rarely very weakly so) on the outer surface; sepals 0.5-3.0 mm long ..... ***Rh. flammeum***
7 Corolla white or pink (white marked with yellow in *Rh. eastmanii* and *Rh. alabamense*).
12 Sepals 1.5-5 mm long.
13 Young stems glabrous (rarely very sparsely pubescent); nonclonal shrub or small tree, to 7 m tall ..... ***Rh. arborescens***
13 Young stems densely pubescent, generally with a mixture of glandular and nonglandular hairs; clonal shrub, the upright stems up to 1.5 m tall ..... ***Rh. atlanticum***
12 Sepals 0.1-1 mm long.
14 Leaves glabrous beneath, except for strigose bristles along the midrib and major veins.
15 Pedicels strigose to puberulent, not stipitate-glandular; flowers appearing with or before the leaves ..... ***Rh. periclymenoides***
15 Pedicels densely stipitate-glandular; flowers appearing after the leaves ..... ***Rh. viscosum***
14 Leaves densely and softly pubescent beneath.
16 Corolla lobes about as long as the corolla tube; capsule densely glandular-pubescent; [of northern distribution, of montane areas of w. NC, w, VA, and northward] ..... ***Rh. prinophyllum***
16 Corolla lobes much shorter than the corolla tube; capsule sparsely pubescent, the pubescence not glandular (or with some of the hairs glandular in *Rh. eastmanii* and *Rh. alabamense*); [of southern distribution, from c. SC and se. TN southward].
17 Corolla pale to deep pink, without yellow markings; scales of the winter buds pubescent on the outer surface.. ***Rh. canescens***
17 Corolla white, with a blotch of yellow on the upper lobe; scales of the winter buds glabrous on the outer surface.
18 Flowers opening before the leaves have expanded; flower buds with non-glandular margins ..... ***Rh. alabamense***
18 Flowers opening after the leaves have expanded; flower buds with margins glandular along their lower 2/3s ..... ***Rh. eastmanii***

Alternate Key to Azaleas

Identification notes: this key makes as much use as possible of vegetative characters, geography, and capsule characters; capsules are generally available for longer during the year than flowers, and even when plants are in flower, last year's capsules can often be found.

1 Corolla tube 2-5 mm long, much shorter than the corolla lobes; stamens (5-) 7; leaves elliptic, often broadly so (commonly 3-6 cm wide), acuminate; capsule ellipsoid-ovoid, 10-14 mm long; [subgenus *Pentanthera*, section *Rhodora*] ..... ***Rh. vaseyi***
1 Corolla tube 13-25 mm long, equal to or longer than the corolla lobes; stamens 5; leaves generally oblanceolate to narrowly elliptic, generally < 3 cm wide, acute to obtuse and usually also noticeably mucronate; capsule cylindroid-ellipsoid or ovoid, 10-29 mm long; [subgenus *Pentanthera*, section *Pentanthera*].
2 Outer (abaxial) surface of the vegetative bud scales densely pubescent; flowers appearing before or with the leaves (at least some of the leaves still folded or the vegetative bud scales still present) (except *Rh. viscosum*).
3 Capsule cylindroid, (3-) 4-5× as long as broad.
4 Corolla yellow-orange to orange-red; upper corolla lobe with a contrasting blotch; [of s. GA west to se. MS] ..... ***Rh. austrinum***
4 Corolla white to pink; upper corolla lobe uniform in color (lacking a contrasting blotch); [collectively widespread in our area].
5 Corolla tube narrow and somewhat abruptly expanding into the lobes, the lobes distinctly shorter than the tube; pedicels usually eglandular (occasionally glandular), (4-) 5-10 (-13) mm long; leaves inconspicuously ciliate, the cilia appressed to the leaf margin; capsule densely covered with nonglandular hairs; flowering March-May; [widely distributed from s. NC and n. TN southward] ..... ***Rh. canescens***

5 Corolla tube broader, gradually expanding into the lobes, the lobes about as long as or longer than the tube; pedicels usually glandular, (7-) 10-16 (-26) mm long; leaves conspicuously ciliate, the cilia diverging from the leaf margin; capsule glabrous or sparsely pubescent, the hairs at least partly gland-tipped; flowering May-June; [of the Mountains and upper Piedmont from n. NC (and rarely ne. AL) northward] ..... ***Rh. prinophyllum***

3 Capsule ovoid, 2-3 (-4)× as long as broad (if capsules absent, try both leads).

6 Corolla yellow-orange to orange-red; upper corolla lobe with a contrasting blotch; hairs of the capsule not gland-tipped; [of the Piedmont and Coastal Plain of GA and w. SC] ..... ***Rh. flammeum***

6 Corolla white to pink; upper corolla lobe uniform in color (lacking a contrasting blotch); hairs of the capsule gland-tipped (at least in part; nonglandular hairs also present); [collectively widespread in our area].

7 Flowers appearing after the leaves have expanded (essentially all of the leaves unfolded, and the vegetative bud scales absent), typically May (Coastal Plain, low elevation, or south) to August (mountains, high elevation, or north) ..... ***Rh. viscosum***

7 Flowers appearing before or with the leaves (at least some of the leaves still folded or the vegetative bud scales still present), typically April-May (unless stimulated by fire or weather).

8 Leaf blade (3.2-) 3.4-4.7 (-5.2) cm long, (0.8-) 1.1-1.9 (-2.0) cm wide; plant typically strongly rhizomatous; [of the Coastal Plain from s. NJ south to sc. GA] ..... ***Rh. atlanticum***

8 Leaf blade (3.9-) 5.0-7.3 (-8.7) cm long, (1.2-) 1.8-3.0 (-3.7) cm wide; plant typically nonrhizomatous; [of the Mountains and upper Piedmont] ..... ***Rh. prinophyllum***

2 Outer (abaxial) surface of the vegetative bud scales glabrous or sparsely pubescent.

9 Capsule cylindric, (3-) 4-5 × as long as broad; corolla white to pink; flowers appearing before or with the leaves (at least some of the leaves still folded or the vegetative bud scales still present).

10 Corolla white, with a contrasting yellowish blotch on the upper lobe; [of se. TN and w. GA westward] ..... ***Rh. alabamense***

10 Corolla deep pink (rarely white or nearly so), lacking a contracting blotch on the upper lobe; [widespread in our primary and secondary area] ..... ***Rh. periclymenoides***

9 Capsule ovate, 2-3.5× as long as broad; corolla yellow, orange, or orange-red (except white or pink in *Rh. arborescens* and *Rh. viscosum*); flowers appearing before, with, or after the leaves.

11 Corolla white to pink ..... ***Rh. arborescens, Rh. eastmanii, Rh. viscosum***

11 Corolla yellow, orange, or orange-red ..... ***Rh. calendulaceum, Rh. flammeum, Rh. cumberlandense, [Rh. prunifolium]***

Rhododendron alabamense Rehder, Alabama Azalea. Cp (FL, GA), Pd, Mt (GA): moist slopes, blufs, streambanks; uncommon. March-April. W. GA and Panhandle FL west through AL to e. MS. *Rh. alabamense* is reported by RAB to occur Calhoun County, SC; this record actually represents *Rh. eastmanii*. [= K, L, WH, Z; = *Azalea alabamensis* (Rehder) Small – S]

Rhododendron arborescens (Pursh) Torrey, Sweet Azalea, Smooth Azalea. Mt, Pd (GA, NC, SC, VA), Cp (GA, NC, SC): rocky riversides, wooded stream banks, swamps, high elevation forests, shrub balds; common (rare in VA) (VA Rare). Late May-July; July-October. Primarily Appalachian: ne. PA and se. KY south to sc. NC, w. SC, c. GA, and c. AL. [= RAB, C, F, G, K, L, W, Z; = *Azalea arborescens* Pursh – S]

Rhododendron atlanticum (Ashe) Rehder, Dwarf Azalea. Cp (GA, NC, SC, VA): pocosins, savannas, pine flatwoods, sandhill-pocosin ecotones; common. April-May (sporadically later, particularly in response to fire); August-October. An Atlantic Coastal Plain endemic: s. NJ and se. PA south to sc. GA. [= RAB, C, F, G, GW, K, L, Z; = *Azalea atlantica* Ashe – S]

Rhododendron austrinum (Small) Rehder, Florida Flame Azalea. Cp (FL, GA): {habitat}; rare. Sc. GA and ne. FL west to se. MS (Kron 1993); also reported for e. GA (Jones & Coile 1988). [= K, L, WH, Z; = *Azalea austrina* Small – S]

Rhododendron calendulaceum (Michaux) Torrey, Flame Azalea. Mt (GA, NC, SC, VA), Pd (GA, NC, SC): deciduous forests, particularly on mountain slopes, grassy balds; common (rare in Piedmont, absent from n. VA). May-June; June-September. Largely Appalachian: s. PA and s. OH to c. GA and e. TN. This is the only species of azalea in our area with a tetraploid chromosome number; various theories have been advanced about the origin of this polyploid chromosome complement. Kron (1993) argues that the evidence best fits an allopolyploid derivation of *Rh. calendulaceum*, involving hybridization between ancestors of *Rh. cumberlandense* and *Rh. prinophyllum*. [= RAB, C, F, G, K, L, W, Z; = *Azalea calendulacea* Michaux – S]

Rhododendron canescens (Michaux) Sweet, Piedmont Azalea, Southern Pinxterbloom Azalea, Wild Azalea. Cp (FL, GA, NC, SC), Pd (GA, NC, SC), Mt (GA): swamps, pocosins, and savannas; uncommon. March-early May; September-October. Se. and sc. NC, n. TN, se. KY, s. IL, and e. OK, south to n. peninsular FL and se. TX. [= RAB, C, F, G, GW, L, W, WH, Z; > *Rh. canescens* var. *canescens* – K; > *Rh. canescens* var. *candidum* (Small) Rehder – K; > *Rh. canescens* var. *subglabrum* Rehder – K; > *Azalea candida* Small – S; > *Azalea canescens* Michaux – S]

Rhododendron carolinianum Rehder, Carolina Rhododendron, Punctatum. Mt (NC, SC): rocky summits, heath balds, high elevation forests, moist slopes; uncommon. Late April-May; September-October. A Southern Appalachian endemic: w. NC, e. TN, ne. GA, and nw. SC, from the Linville Gorge area south and west to the Great Smoky Mountains; its precise southern limit uncertain. *Rh. carolinianum* is phenologically separated from *Rh. minus*, flowering earlier than *Rh. minus*, despite its occurrence at higher elevations and with a more northerly distribution. Morphological distinctions between the two taxa are subtle and inconsistent, as discussed by Duncan & Pullen (1962). From a horticultural perspective, Davidian (1982) supports recognition of *Rh. carolinianum* and *Rh. minus* as distinct. Gensel (1988, and pers.comm.) did detailed studies of the complex and supported the recognition of 3 taxa (*Rh. carolinianum*, *Rh. minus*, and *Rh. chapmanii*). [= D, K, S; < *Rh. minus* – RAB, W; < *Rh. minus* var. *minus* – L, Q, V]

Rhododendron catawbiense Michaux, Pink Laurel, Catawba Rhododendron, Mountain Rosebay. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): rocky summits, shrub balds, acid ridges and slopes (mostly at high elevations), north-facing bluffs in the Piedmont; common (rare in Piedmont and Coastal plain) (rare in SC). April (in the Piedmont and Coastal Plain)-June; July-October. A Southern Appalachian endemic: VA and KY south to GA and AL, with scattered disjunct populations in the Piedmont and extreme upper Coastal Plain. The disjunct populations in central NC are discussed by Coker (1919), who named them forma *insularis* on the basis of "the larger and broader leaves and ... the longer flowers." *Rh. catawbiense* is apparently most closely related to *Rh. macrophyllum* D. Don ex G. Don of nw. North America (Milne 2004). [= RAB, C, F, G, K, L, S, W, X]

Rhododendron chapmanii A. Gray, Chapman's Rhododendron. Cp (FL): {habitat}; rare. Endemic to Panhandle FL, with an isolated disjunction in ne. FL (Clay County). [= D, K, S; = *Rh. minus* Michaux var. *chapmanii* (A. Gray) Duncan & Pullen = L, V, WH; = *Rh. minus* var. *champanii* – Q, orthographic error]

Rhododendron cumberlandense E.L. Braun, Cumberland Azalea. Mt (GA, NC, VA), Pd (SC): balds and exposed or moist slopes; rare (NC Rare, VA Rare). June-July; July-October. A Southern Appalachian endemic, primarily west of the Blue Ridge: e. KY and w. VA south to ec. TN, n. GA, and ne. AL; apparently disjunct in the Piedmont of SC (Kron 1993). [= F, G, K, L, W, Z; = *Rh. bakeri* (Lemmon & McKay) Hume – C, misapplied]

Rhododendron eastmanii Kron & Creel, May White Azalea, Eastman's Azalea. Pd (SC): rich slopes, rare. Early-mid May. This species is known only from Calhoun, Laurens, Newberry, Orangeburg, Richland, Union counties, South Carolina (Kron & Creel 1999; C. Horn pers. comm. 2000). It is locally fairly common, in the Broad River drainage (C. Horn, pers. comm. 2000). It should be sought in NC and GA, approaching with 4 miles of the NC border in Cherokee County, SC (M. Creel, pers. Comm.., 2007). Previous reports of *Rh. alabamense* in SC (RAB0 are based on this species. [< *Rhododendron alabamense* Rehder – RAB, misapplied]

Rhododendron flammeum (Michaux) Sargent, Oconee Azalea. Cp, Pd (GA, SC), Mt (GA): sandhills, upland forests on slopes, ridges, stream bluffs; rare (SC Rare). April. W. SC west to w. GA. [= K, L, Z; = *Azalea speciosa* Willdenow – S; = *Rhododendron speciosum* (Willdenow) Sweet]

Rhododendron maximum Linnaeus, Great Laurel, White Rosebay, Great Rhododendron. Mt, Pd (GA, NC, SC, VA), Cp (VA): moist slopes, wet flats, bogs, swamps, north-facing bluffs in the Piedmont; common (uncommon in Piedmont, rare in VA Coastal Plain). Apparently most closely related to *Rh. ponticum* Linnaeus of Turkey and vicinity (Milne 2004). June-August; September-October. Largely Appalachian: Nova Scotia and s. Ontario south to GA and AL, primarily in the mountains. [= RAB, C, F, G, K, L, S, W, X]

Rhododendron minus Michaux, Gorge Rhododendron, Punctatum. Mt, Pd, Cp (GA, NC, SC): rocky slopes, escarpment gorges, rocky areas in the Piedmont, sandhill bluffs in the Coastal Plain; common (rare in Piedmont and Coastal Plain). Late April (in the Piedmont and Coastal Plain)-June (at the higher elevations along the Blue Ridge escarpment); September-October. GA and AL north to the Blue Ridge escarpment of n. GA, nw. SC, and sw. NC, and the Piedmont and inner Coastal Plain (fall-line sandhills) of sc. NC. This species ranges up to granite domes along the Blue Ridge Escarpment (such as Whiteside Mountain, Macon and Jackson counties, NC). [= D, K, S; < *Rh. minus* – RAB, W (also see *Rh. carolinianum)*; < *Rh. minus* var. *minus* – L, Q, V]

Rhododendron periclymenoides (Michaux) Shinners, Wild Azalea, Pinxterflower, Pinxterbloom Azalea, Election Pink. Mt, Pd, Cp (GA, NC, SC, VA): moist to dry slopes and streambanks; common. Late March-May; September-October. Fairly widespread in e. United States, ranging from MA, NY, and s. OH, south to GA and AL. See Shinners (1962) for explanation of the change from the name *Rh. nudiflorum*. [= C, K, L, W, Z; = *Rh. nudiflorum* (Linnaeus) Torrey – RAB, F, G, GW; = *Azalea nudiflora* Linnaeus – S]

Rhododendron prinophyllum (Small) Millais, Election Pink, Early Azalea, Roseshell Azalea. Mt (NC, VA), Pd (VA): upland forests (especially under *Quercus montana* and *Quercus rubra*), xeric pine and oak woodlands; common in VA, rare in NC, rare in VA Piedmont (NC Rare). May-June; August-October. NH, NY, and ne. OH, south to w. NC, nc. KY, and s. OH; disjunct in ne. AL and c. TN; also disjunct from s. IL and s. MO south to AR and e. OK. The only known location in NC is on Bluff Mountain, Ashe County (on a rocky plateau over amphibolite at about 1300m elevation); Kron (1993) also cites a collection from Transylvania County. See Shinners (1962) for explanation of the change from the name *Rh. roseum*. [= C, K, L, W, Z; = *Rh. roseum* (Loiseleur) Rehder – RAB, F, G; = *Azalea prinophylla* Small – S]

Rhododendron prunifolium (Small) Millais, Plumleaf Azalea. Cp, Pd (GA): mesic ravine forests and streambanks; rare (GA Threatened). Endemic to a small area along the AL-GA border, in se. AL (Kron 1993) and sw. and wc. GA (Jones & Coile 1988). [= K, L, Z; = *Azalea prunifolia* Small – S]

Rhododendron vaseyi A. Gray, Pinkshell Azalea. Mt (GA?, NC): moist slopes, bogs, high elevation rocky summits, cliffs, high elevation heath balds; rare. May-June; August-October. Endemic to the mountains of NC, though approaching very close to SC and GA in the vicinity of Cashiers and Highlands, NC and reported for Rabun Bald (Rabun Co. GA) without definite documentation; *Rh. vaseyi* occurs primarily southwest of the Asheville Basin, but is found at scattered locations farther north and is locally abundant on Grandfather Mountain (at the junction of Avery, Watauga, and Caldwell counties, NC), its northernmost outpost. Judd & Kron (1995) treat *Rh. vaseyi* and *Rh. canadense* (Linnaeus) Torrey (of ne. North America) as the only two members of section *Rhodora*. When not in flower, *Rh. vaseyi* is readily distinguished from our other azaleas by its distinctive foliage (see key). [= RAB, F, K, L, W, Y; = *Biltia vaseyi* (A. Gray) Small – S]

Rhododendron viscosum (Linnaeus) Torrey, Swamp Azalea, Clammy Azalea. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC, VA): bogs, pocosins, moist streambanks, shrub balds, and other moist habitats; common (uncommon in VA Piedmont and VA Mountains). Late May-July; July-October. ME and OH south to c. peninsular FL and LA. *Rh. serrulatum* (*Rh. viscosum* var. *serrulatum*) may well deserve recognition at some taxonomic level. [= GW, K, L, W, WH, Z; > *Rh. viscosum* var. *serrulatum* (Small) Ahles – RAB; > *Rh. viscosum* var. *viscosum* – RAB; > *Rh. serrulatum* (Small) Millais – C, F, G; > *Rh. viscosum* – C, F, G; > *Azalea viscosa* Linnaeus – S; > *Azalea serrulata* Small – S]

Vaccinium Linnaeus 1753 (Blueberry)

A genus of 140 species, shrubs, lianes, and small trees, semicosmopolitan. *Vaccinium* in our area is divided into 6 strongly differentiated sections, sometimes, as by Small, treated as separate genera. The taxonomy of *Vaccinium* remains unclear – past divergence of opinion is obvious in the synonymy. For instance, Small (1933) recognizes 6 genera and 25 species for our area, Ahles in RAB (1968) recognizes 1 genus and 14 species (one with 2 varieties) (not including VA), and Vander Kloet (1988) recognizes 1 genus and 9 species. The highbush blueberries of section *Cyanococcus* are particularly difficult. Vander Kloet's

extremely broad concept of the highbush blueberries as consisting of a single species, *V. corymbosum*, including *V. fuscatum* (*V. atrococcum* – RAB), *V. simulatum* ("*V. constablaei*" – RAB), *V. virgatum* (*V. amoenum* – RAB), *V. elliottii*, *V. formosum* (*V. australe*), and *V. caesariense* (and many other named taxa not recognized here) has been adopted by some recent authors, at least partly for its ease of application. I agree with Godfrey (1988), though, that *V. elliottii* has "such distinctiveness as to be recognizable in the field at a glance." The other taxa are less easily recognizable, but seem to have substantial morphological and phytogeographic integrity. The fairly frequent presence of hybrid individuals and populations can make identification frustrating, but I agree with Ward (1974) that "the genus *Vaccinium* ... is difficult but not in any way an irresolvable tangle of intergrading populations. The vast bulk of individuals encountered in the field may be assigned, as with any non-apomict genus, to a relatively few, discrete, and wholly recognizable species". Many of the taxa included in *V. corymbosum* by Vander Kloet (1988) and Luteyn et al. (1996) occur together in combinations of two to four, are immediately recognizable in the field, bloom at different times, and have different flower, fruit, and leaf morphology. Failure to recognize multiple entities within the highbush blueberries results in the taxonomic homogenization of the diversity of the group and obscures important phytogeographic patterns. Our area, with 20 species (24 taxa) in 6 sections, has a greater diversity of *Vaccinium* than any other comparably sized area in North America. References: Vander Kloet (1988)=Z; Uttal (1987)=Y; Camp (1945)=X; Ashe (1931)=V; Ward (1974)=Q; Luteyn et al. (1996)=L; Vander Kloet & Hall (1981); Vander Kloet (1977, 1978a, 1978b, 1980, 1982, 1983a, 1983b); Uttal (1986a, 1986b); Stevens et al. in Kubitzki (2004). Key based in part on Uttal (1987).

1 Trailing vines, erect shoots (if present) borne on horizontal stems; leaves evergreen, glossy and dark green above, rarely exceeding 20 mm in length.
  2 Leaves narrowly elliptic, glabrous above, glaucous-white below; leaf margin entire and eglandular; berry red when ripe, 8-15 mm long; [**cranberries**, section *Oxycoccus*] ..... **Key A**
  2 Leaves elliptic, puberulent above, pale green below; leaf margin obscurely to fairly strongly serrate and glandular; berry black when ripe, 6-8 mm long; [**creeping blueberries**, section *Herpothamnus*] ..... **Key B**
1 Erect shrubs, the growth form various (single-stemmed, multi-stemmed and clump-like, or clonal with numerous erect shoots from a network of subterranean rhizomes); leaves deciduous to semi-evergreen (evergreen in *V. myrsinites*), dull to somewhat glossy and medium green above (dark green and glossy in *V. myrsinites*), generally exceeding 20 mm in length (5-30 mm long in *V. myrsinites*).
  3 Twigs of the season verrucose (the surface abundantly covered with small bumps, readily visible without magnification); [**blueberries**, section *Cyanococcus*] ..... **Key C**
  3 Twigs of the season not verrucose.
    4 Corolla lobes 4, strongly recurved, 7-10 mm long; calyx lobes 4 (also visible on the berry); leaves lanceolate to ovate, the apex acuminate, the margin regularly and finely serrate with glandular teeth; [of high elevations in the Mountains]; [**mountain cranberry**, section *Oxycoccoides*] ..... **Key D**
    4 Corolla lobes 5, not or only slightly recurved, 1-8 mm long; calyx lobes 5 (also visible on the berry); leaves elliptic, obovate, oblanceolate, or nearly round, the apex generally obtuse to rounded, the margin entire to obscurely and irregularly serrate; [collectively widespread in our area, but not at high elevations].
      5 Mature leaves green (or glaucous), glandular beneath, mostly elliptic to round, generally 1.5-4.5 cm long; corolla broad-urceolate to narrow-campanulate, the stamens included; berry black, lustrous, 5-9 mm long; [**farkleberry**, section *Batodendron*] ..... **Key E**
      5 Mature leaves pale and glaucous, eglandular beneath, mostly elliptic, 3-10 cm long; corolla campanulate, the stamens long-exserted; berry green, yellow, pink, or purple, usually glaucous, 7-18 mm long; [**deerberries**, section *Polycodium*] ..... **Key F**

Key A – cranberries, section *Oxycoccus*

1 Leaves elliptic, broadest near middle, (5-) 7-10 (-18) mm long, (2-) 3-4 (-5) mm wide; leaves blunt-rounded and non-involute; pedicels with 2 green, leaf-like bracts 1-2 mm wide; berry 8-15 mm in diameter ..... ***V. macrocarpon***
1 Leaves ovate, broadest toward base, (3-) 5-6 (-9) mm long, (1-) 2-3 (-5) mm wide; leaves involute at least along the margins, thus making the leaf tip acute; pedicels with (0-) 2 (-5) reddish, scale-like bracts < 1 mm wide; berry 6-12 mm in diameter ..... ***[V. oxycoccos]***

Key B – creeping blueberries, section *Herpothamnus*

1 Leaves (2-) 3-18 (-25) mm long, generally elliptic (less commonly ovate or obovate); angle of leaf base typically >90 degrees; margins finely glandular mucronulate-crenulate, the teeth tightly appressed and therefore often obscure, the margin superficially entire; stems mostly prostrate (ascending in areas that have been long fire-suppressed); [widespread in NC and SC, rare in se. VA and e. GA] ..... ***V. crassifolium***
1 Leaves (4-) 7-35 (-63) mm long, elliptic to obovate (less commonly elliptic-ovate); angle of leaf base typically <90 degrees; margins glandular mucronulate-serrulate to serrulate-crenulate, the teeth apparent, especially toward the apex; stems often ascending to upright; [of Lexington County, SC] ..... ***V. sempervirens***

Key C – blueberries, section *Cyanococcus*

Note: Hybrids and apparent local races in this section are frequent, and will key poorly. Hybrids are particularly frequent among the taxa of the highbush blueberries, somewhat less so among lowbush blueberries and between lowbush and highbush. In the Coastal Plain, *V.* ×*marianum* (*formosum* × *fuscatum*) is the most common, and will be responsible for most difficulties encountered in the key from lead 10 on. Uttal (1987) presents a complicated key with *V.* ×*marianum* (but not other hybrids) included.

1 Shrubs rhizomatous, forming clonal colonies, the upright stems < 1 m tall (and often < 0.5 m tall); ["lowbush blueberries"].
  2 Leaves evergreen, 5-15 mm long (rarely to 30 mm long on fire sprouts), subcoriaceous, glossy dark-green or dull blue-green; [restricted in our area to the Coastal Plain of se. SC southward].
    3 Plant glaucous and bluish-green throughout; leaf undersurface lacking scattered glandular hairs; [of s. GA south to s. peninsular FL, west to e. TX] ..... ***V. darrowii***

3 Plant dark green throughout; leaf undersurface with scattered glandular hairs, these sometimes very few by late in the season (best seen in the field by folding a leaf, holding the fold up to the light, and using a 10× lens); [of se. SC southward to n. FL, west to s. AL] ..... ***V. myrsinites***

2 Leaves deciduous to semi-evergreen, herbaceous, generally > 20 mm in length, dull to somewhat glossy and medium green; [collectively widespread in our area].

3 Lower surfaces of the leaves with red stipitate glands (sometimes pubescent as well when young); berry usually black and lustrous; [of the Coastal Plain and lower Piedmont] ..... ***V. tenellum***

3 Lower surfaces of the leaves eglandular, pubescent or glabrous; berry either blue and glaucous, or black and glandular-hirsute; [collectively widespread in our area].

4 Leaves sharply serrulate (each tooth with a small glandular tip), 20-32 mm long, 6-16 mm wide, green and shiny below (rarely glaucous), glabrous or nearly so ..... ***V. angustifolium***

4 Leaves entire or obscurely serrulate (if obscurely serrulate then 30-50 mm long and 13-25 mm wide), either glaucous and glabrous (or nearly so) beneath, or green and densely pubescent beneath.

5 Leaves pale and glaucous, glabrous on both sides or pubescent on the underside only; berry blue and glaucous; [plants collectively widespread].

6 Plants mostly 0.5-1.0 (-1.4) m tall, stems brown for much of their length; leaves entire; fruit 7-12 mm in diameter; [of moderate to high elevations of the Mountains] ..... ***V. altomontanum***

6 Plants mostly 0.2-0.6 (-1.0) m tall, stems green to the base (or brown at the very base); leaves serrulate (rarely entire); fruit 4-7 (-8) mm in diameter; [widespread, at low to moderate elevations] ..... ***V. pallidum***

5 Leaves green, pilose on both sides; berry either blue and glaucous, or black and glandular-hirsute; [of the Mountains].

7 Berry black and glandular-hirsute; calyx and corolla hirsute and stipitate-glandular; leaves mostly > 3 cm long; [of the mountains of sw. NC and adjacent TN and GA] ..... ***V. hirsutum***

7 Berry blue and glaucous; calyx and corolla glabrous; leaves mostly < 3.5 cm long; [of the mountains of n. NC and north] ..... ***V. myrtilloides***

1 Shrubs crown-forming, single-stemmed or several-stemmed from the base, the upright stems generally > 1 m tall (often 2-3 m tall, and rarely to 7 m); ["highbush blueberries"].

8 Leaves with stipitate glands on the lower surface; [of the Coastal Plain of SC and s. NC] ..... ***V. virgatum***

8 Leaves lacking stipitate glands on the lower surface (variously glabrous to pubescent with eglandular hairs); [collectively widespread].

9 Leaves 0.7-3.5 cm long, 0.3-1.5 cm wide, with serrulate margins; twigs slender, numerous ..... ***V. elliottii***

9 Leaves 3-10 cm long, 1.5-4.5 cm wide, with entire, ciliate, or serrulate margins; twigs stouter, fewer.

10 Young twigs glabrous; leaf surfaces glabrous; leaf margins eciliate or ciliate.

11 Leaves 4-10 cm long, 2.5-4.5 cm wide, most of them widest below the middle, eciliate; leaf bud scales reddish, 2-4 mm long, including the elongated (1.5-3 mm long), slender awnlike tips; corollas 8-12 mm long, cylindrical; berry 7-12 mm in diameter, dark blue with a glaucous bloom; [primarily of the Coastal Plain, very rarely disjunct in Coastal Plain like habitats in the Mountains or Piedmont] ..... ***V. formosum***

11 Leaves 3-8 cm long, 1.5-3 cm wide, most of them widest at or above the middle, ciliate or not; leaf bud scales flesh-colored or pink to reddish, 1-3 mm long, including the short (to 1.5 mm long) awnlike tips; corollas 4-10 mm long, cylindrical, subglobose, subcampanulate, or urceolate; berry 5-10 mm in diameter, blue with a glaucous bloom; [collectively widely distributed in our area].

12 Leaves 3-6 cm long, 1.5-2 cm wide, eciliate; corolla 4-6 mm long; [primarily of the Coastal Plain, very rarely disjunct in Coastal Plain like habitats in the Piedmont] ..... ***V. caesariense***

12 Leaves 3-8 cm long, 2-3 cm wide, usually ciliate-margined, at least basally; corolla 5-10 mm long; [of the Mountains and montane sites in the upper Piedmont] ..... ***V. corymbosum***

10 Young twigs puberulent, at least in lines; leaf surfaces more-or-less pubescent; leaf margins ciliate (rarely eciliate).

13 Puberulence of the young twigs merely in 2 lines; [of the Mountains and montane sites in the upper Piedmont].

14 Leaves elliptic to elliptic-obovate, broadest at or beyond the middle, the apex acute to short-acuminate; leaf margins entire to obscurely serrulate; corolla 5-10 mm long; berry blue, glaucous ..... ***V. corymbosum***

14 Leaves narrowly ovate, broadest below the middle, the apex acuminate; leaf margins distinctly serrulate; corolla 5-7 mm long; berry purple-black, not glaucous (sometimes drying so as to appear somewhat glaucous blue) ..... ***V. simulatum***

13 Puberulence of the young twigs extending around their circumference (not merely in 2 lines); [collectively widely distributed in our area].

15 Hairs of the twigs and leaf surfaces whitish; leaves medium to pale green, not darkening on drying; berry blue, glaucous; twigs and bud scales flesh-colored to reddish; corolla 5-10 mm long, usually not narrowed to the tip; blooming May; [of the Mountains and montane sites in the upper Piedmont] ..... ***V. corymbosum***

15 Hairs of the twigs and leaf surfaces dingy, brownish, or dark; leaves dark green, darkening on drying; berry black; twigs and bud scales brownish-green to black; corolla 5-8 mm long, often narrowed to the tip; blooming February-April; [widely distributed in our area, though most common in the Coastal Plain] ..... ***V. fuscatum***

Key D – mountain cranberry, section *Oxycoccoides*

One species in our area ..... ***V. erythrocarpum***

Key E – farkleberry, section *Batodendron*

One species in our area ..... ***V. arboreum***

Key F – deerberries, section *Polycodium*

[This key and treatment provisional]

1 Leaves strongly white-glaucous beneath; stamens 4-6 mm long.
2 Bracts of the inflorescence nearly as large as normal foliage leaves; [of the Coastal Plain from se. NC southward]..... ***V. stamineum* var. *caesium***
2 Bracts of the inflorescence much smaller than normal foliage leaves; [of the Mountains and Piedmont] ..... ***V. stamineum* var. 2**
1 Leaves green beneath (often slightly paler but not at all glaucous); stamens 5-8 mm long.
3 Bracts of the inflorescence nearly as large as normal foliage leaves; plants short, 2-5 (-10) dm tall, distinctly clonal; [primarily of Coastal Plain pinelands]..... ***V. stamineum* var. 1**
3 Bracts of the inflorescence much smaller than normal foliage leaves; plants short to taller, 3-50 dm tall, either clonal or crown-forming; [primarily of rocky or submesic habitats of the Piedmont and Mountains].
4 Hypanthium and fruit pubescent..... ***V. stamineum* var. *sericeum***
4 Hypanthium and fruit glabrous ..... ***V. stamineum* var. *stamineum***

Vaccinium altomontanum W.W. Ashe, Blue Ridge Blueberry. Mt (GA, NC, SC, VA): grassy balds, heath balds, high elevation forests and woodlands; uncommon. May-June; July-September. The tetraploid *V. altomontanum* occurs primarily in the Mountains at moderate to high elevations (the type collection is from the Fodderstacks, Macon County, NC); it differs from the diploid *V. pallidum* in forming tighter (often circular) clones, with taller plants (to 1 m tall), the leaves thick in texture, often revolute, strictly glaucous and glabrous, and with excellent berries. [< *V. corymbosum* – RAB; = *V. alto-montanum* – G, X, orthographic variant; < *V. pallidum* – K; > *Cyanococcus subcordatus* Small – S; > *Cyanococcus liparis* Small – S, as to type]

Vaccinium angustifolium Aiton, Northern Lowbush Blueberry, Sugarberry, Low Sweet Blueberry. Mt (VA): acidic forests and woodlands, cliffs and talus (especially sandstone and quartzite), usually at high elevations; common. Labrador and Newfoundland west to Manitoba, south to NJ, PA, sw. VA, IL, and MN. [= C, K, W, Y, Z; > *V. angustifolium* var. *angustifolium* – F; > *V. angustifolium* var. *laevifolium* House – F; > *V. angustifolium* var. *hypolasium* Fernald – F; > *V. angustifolium* var. *nigrum* (Wood) Dole – F; > *V. angustifolium* – G, X; > *V. lamarckii* Camp – G, X; > *V. brittonii* Porter ex Bicknell – X]

Vaccinium arboreum Marshall, Farkleberry, Sparkleberry. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): rocky or sandy woodlands, bluffs, and cliffs, usually xeric and often fire-maintained, and unlike most other *Vaccinium*, often on mafic, ultramafic, or calcareous rocks; common (uncommon in Piedmont, rare in Mountains). Late April-June; September-October. This species is widely distributed in se. North America, from TX and FL north to MO, IN, KY, and VA. It can be a small tree, to 30 cm DBH and 10 m tall. The leaves are coriaceous and semi-evergreen, often being retained for much or all of the winter. Var. *glaucescens* (Greene) Sargent may be worthy of recognition; it differs from var. *arborescens* in its subglaucous to conspicuously blue-green leaves (vs. dark green leaves) and the bracts at the base of the pedicels nearly equal in size and shape to the leaves (vs. bracts distinctly smaller and often also different in shape than the leaves). [= RAB, C, G, K, L, W, WH, Y, Z; > *V. arboreum* var. *arboreum* – F; > *V. arboreum* var. *glaucescens* (Greene) Sargent – F; = *Batodendron arboreum* (Marshall) Nuttall – S]

Vaccinium caesariense Mackenzie, New Jersey Highbush Blueberry. Cp (FL, GA, NC, SC, VA), Pd (GA?, SC): swamps, bogs, moist ground; rare. Late February-May; June-August. S. ME south to n. FL. This species is diploid. [= C, F, G, K, X, Y; < *V. corymbosum* – RAB, L, WH, Z]

Vaccinium corymbosum Linnaeus, Smooth Highbush Blueberry. Mt (GA, NC, SC, VA), Pd (NC): bogs, wet swamp forests, moist high elevation bogs, balds, and forests; common (rare in Piedmont). May; August. Nova Scotia west to MI, south to WV, OH, and IN, south in the Appalachians (and rarely on Piedmont monadnocks) to w. NC, nw. SC, n. GA, and e. TN. In our area, *V. corymbosum* (sensu stricto) appears to be limited to the Mountains, except for occurrences on Piedmont monadnocks and outlier ridges, such as Hanging Rock, Stokes County, NC, and the Brushy Mountains, NC. See the end of the genus treatment for discussion of taxonomic controversy involving this species and its allies. Note that this treatment recognizes 2 species (*V. formosum* and *V. caesariense*) included within *V. corymbosum* by RAB. *V. formosum* is the common "*corymbosum*" type blueberry of the Coastal Plain. *V. corymbosum* is primarily tetraploid; *V. constablaei* A. Gray (misapplied to *V. simulatum* by RAB) is correctly applied to hexaploid plants of the high elevation Blue Ridge of NC and TN, especially on heath balds and grassy balds. Camp (1945) considered *V. constablaei* to be an allopolyploid derivative of *V. simulatum* and *V. altomontanum* (itself a tetraploid apparently related to diploid *V. pallidum*, and of uncertain derivation). The appropriate taxonomic treatment of these plants is unclear; they are apparently not reliably identifiable based on morphology. [= K, X, Y; < *V. corymbosum* – RAB, G, L, W, Z (also see *V. simulatum*); > *V. corymbosum* var. *corymbosum* – F; > *V. corymbosum* var. *albiflorum* (Hooker) Fernald – F; > *V. corymbosum* var. *glabrum* Gray – F; < *V. corymbosum* – C (also see *V. fuscatum* and *V. simulatum*); < *V. constablaei* A. Gray – G, X; = *Cyanococcus corymbosus* (Linnaeus) Rydberg – S]

Vaccinium crassifolium Andrews, Creeping Blueberry. Cp (GA, NC, SC, VA), Pd (NC): savannas, pine flatwoods, pocosin-sandhill ecotones, upland sandhills over clay pans; common (rare in VA, rare in lower Piedmont only of NC and SC). April-May; June-July. This species is nearly endemic to the Carolinas, barely extending into immediately adjacent VA and GA. See Kirkman, Wentworth, & Ballington (1989) and Kirkman & Ballington (1990) for discussion of the systematics and ecology of this species and the closely related *V. sempervirens*. [= RAB, C, F, G, GW, Y; = *V. crassifolium* ssp. *crassifolium* – K; < *Herpothamnus crassifolius* (Andrews) Small – S; < *V. crassifolium* – L, Z (also see *V. sempervirens*)]

Vaccinium darrowii Camp, Darrow's Blueberry. Cp (GA): pine flatwoods; common (uncommon in GA). S. GA south to s. peninsular FL and west to se. TX. [= K, L, WH, X, Z; = *V. darrowi* – GW, orthographic variant; = *Cyanococcus myrsinites* (Lamarck) Small var. *glaucum* A. Gray – S]

Vaccinium elliottii Chapman, Mayberry. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): bottomlands, slopes, sandy river terraces, natural levees; common (rare in Piedmont, uncommon in VA). March-April; May-June. Primarily a Coastal Plain species, *V. elliottii* ranges from se. VA south to FL, west to se. TX and AR; disjunct in Coffee County, TN (Chester, Wofford, & Kral 1997). [= RAB, C, F, G, GW, K, X, Y; = *Cyanococcus elliottii* (Chapman) Small – S; < *V. corymbosum* – L, WH, Z]

Vaccinium erythrocarpum Michaux, Bearberry, Highbush Cranberry, Mountain Cranberry. Mt (GA, NC, VA): rocky ridges, shrub or grassy balds, bogs, spruce-fir forests, usually at high elevations; uncommon. Late May-July; August-September.

A Southern and Central Appalachian endemic, *V. erythrocarpum* ranges from WV through VA to w. NC, e. and ec. TN, and ne. GA. The only other member of Section *Oxycoccoides* is *V. japonicum* Miguel of montane Japan, so similar as to be sometimes regarded as only a subspecies or variety of our species. [= RAB, C, F, G, K, L, W, Y, Z; = *Hugeria erythrocarpa* (Michaux) Small – S]

Vaccinium formosum H.C. Andrews, Southern Highbush Blueberry, Swamp Highbush Blueberry. Cp (FL, GA, NC, SC, VA), Mt (VA): bogs, swamps (especially blackwater, or at least where away from strong alluvial influence), seepages, depression ponds (dolines), other moist ground; common (rare in Mountains). Late February-May; June-August. Apparently ranging from NJ south to n. FL and e. TX, primarily on the Coastal Plain. This species is the primary source of the cultivated highbush blueberries. It has the largest and arguably the highest quality fruit of the native highbush blueberries. [= K, Y; < *V. corymbosum* – RAB, C, L, WH, Z; = *V. australe* Small – G, GW, X; = *Cyanococcus virgatus* (Aiton) Small – S, misapplied]

Vaccinium fuscatum Aiton, Hairy Highbush Blueberry, Black Highbush Blueberry. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): bogs, pocosins, swamps, also in uplands; common. Late February-May; June-August. The species is apparently widespread in e. United States. [= GW, K, W, X, Y; = *V. atrococcum* (Gray) Heller – RAB, F, G, X; < *V. corymbosum* – C, L, WH, Z; *? V. marianum* S. Watson – G; > *Cyanococcus fuscatus* (Aiton) Small – S; > *Cyanococcus atrococcus* (A. Gray) Small – S]

Vaccinium hirsutum Buckley, Woollyberry, Hairy Blueberry. Mt (GA, NC): mountain slopes, primarily in pine-oak and oak forests; rare. April-May; June-July. *V. hirsutum* is a narrow Southern Appalachian endemic, occurring only in a few counties of sw. NC, se. TN, and n. GA. It is the only species in our area with pubescent fruit. [= RAB, K, L, W, X, Z; = *Cyanococcus hirsutus* (Buckley) Small – S]

Vaccinium macrocarpon Aiton, Cranberry, Large Cranberry. Mt, Cp (NC, VA): mountain bogs, low pocosins with deep peat, interdunal swales; rare. May-July; August-November. Unlike the circumboreal *V. oxycoccus* Linnaeus, *V. macrocarpon* is limited to North America. This is the familiar edible cranberry, raised commercially in artificial bogs, primarily in MA, WI, and NJ. It ranges as a native plant from Newfoundland west and south to s. Ontario, MN, ne. IL, n. IN, n. and c. OH, PA, and NJ, extending south along the Appalachians as a disjunct rarity through WV, w. VA, and ne. and se. TN to w. NC, and south along the outer Coastal Plain as a disjunct rarity in e. MD, se. VA, and ne. and se. NC. The occurrence in the inner Coastal Plain (fall-line sandhills) along the Little River in Cumberland County, NC is questionably native. [= RAB, C, F, G, GW, K, L, W, Y, Z; = *Oxycoccus macrocarpus* (Aiton) Persoon – S]

Vaccinium myrsinites Lamarck, Southern Evergreen Blueberry. Cp (FL, GA, SC): pine flatwoods; common (rare in SC, but locally dominant in spodosolic flatwoods in Beaufort and Jasper counties, SC and very locally common as far north as Horry County); common. March-April; May-June. Se. SC south to s. peninsular FL, west to s. AL. *V. myrsinites* is readily distinguished from all our species by the following combination of characteristics: clonal shrub with upright stems usually < 50 cm tall, the young twigs verrucose, leaves evergreen, mostly 5-15 mm long and 2-10 mm wide, lower surface of young leaves with stout glandular hairs. Further south, it can be difficult to distinguish from the closely related *V. darrowii* Camp (see key), with which it often co-occurs in their area of overlap. [= RAB, GW, K, L, WH, X, Z; = *Cyanococcus myrsinites* (Lamarck) Small var. *myrsinites* – S]

Vaccinium myrtilloides Michaux, Velvetleaf Blueberry, Sourtop, Canada Blueberry. Mt (NC, VA): acidic, high elevation slopes and cliffs; rare. May-July. Labrador west to British Columbia, south to PA, VA, w. NC, WV, IN, and MN. Reported for the NC side of Great Smoky Mountains National Park (Haywood County) (K. Langdon, pers. comm.. 2006). The possible occurrence of this species on Grandfather Mountain is based on somewhat ambiguous specimens and needs additional confirmation. See Vander Kloet & Hall (1981) for a summary of information on this diploid species. [= C, F, G, K, W, X, Y, Z]

Vaccinium pallidum Aiton, Hillside Blueberry, Dryland Blueberry. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): forested slopes, usually rather xeric; common. March-April; June-July. Widespread in e. United States, *V. pallidum* is centered in the Appalachians and Ozarks. Vander Kloet (1978, 1988) and Uttal (1987) do not favor Camp's (1945) separation of *V. pallidum* and *V. vacillans*. If the two taxa are combined (as here), *V. pallidum* has nomenclatural priority. *V. pallidum* is primarily diploid. See *V. altomontanum* for discussion of its relationship to *V. pallidum*. [= C, K, L, W, Y, Z; = *V. vacillans* Kalm ex Torrey – RAB; > *V. vacillans* Torrey var. *vacillans* – F; > *V. vacillans* var. *crinitum* Fernald – F; > *V. pallidum* – F, G, X; > *V. vacillans* – G, X; > *Cyanococcus pallidus* (Aiton) Small – S; > *Cyanococcus vacillans* (Kalm ex Torrey) Rydberg – S]

Vaccinium sempervirens Rayner & Henderson, Rayner's Blueberry. Cp (SC): seepage bogs in the fall-line Sandhills, longleaf pine woodlands over sandstone and gravel outcrops; rare. Endemic to Lexington County, SC, known from only a few sites. This species is clearly closely allied to *V. crassifolium*. Kirkman & Ballington (1990) reduce it to a subspecies. Because it is allopatric and relatively discrete morphologically, despite occurring in similar habitats, I prefer to retain it as a species. See Kirkman, Wentworth, & Ballington (1989) and Kirkman & Ballington (1990) for further discussion of the systematics and ecology of this species and *V. crassifolium*. [= *V. crassifolium* Andrews ssp. *sempervirens* (Rayner & Henderson) Kirkman & Ballington – K; < *V. crassifolium* – L, Z]

Vaccinium simulatum Small, Mountain Highbush Blueberry. Mt (GA, NC, SC, VA): forested slopes (northern hardwoods, spruce-fir forests), ridges, and shrub balds, at moderate and high elevations; common. Late April-early June; July-August. A Southern and Central Appalachian endemic, *V. simulatum* ranges from e. KY and sw. VA south through w. NC and e. TN to n. GA and n. AL. The name *V. constablaei* has been misapplied to this species, as by RAB; see *V. corymbosum* for a discussion of the correct application of *V. constablaei*. [= G, K, X, Y; = *V. constablaei* Gray – RAB, G, misapplied; < *V. corymbosum* – C, L, W, Z; = *Cyanococcus simulatus* (Small) Small – S]

Vaccinium stamineum Linnaeus *var. 1*, Dwarf Deerberry. Cp (GA, NC, SC): pinelands; common. April-June; August-October. This dwarf taxon is characteristic of Coastal Plain pinelands; its stature is not the result of fire; it never achieves greater height, even following decades of fire suppression. Se. NC south to GA. [< *V. stamineum* var. *stamineum* – RAB; < *Vaccinium stamineum* – C, K, L, W, Y, Z; = *Polycodium arenicola* W.W. Ashe – V]

Vaccinium stamineum Linnaeus *var. 2*, Appalachian Deerberry. Mt, Pd (GA, NC, SC, VA): xeric to submesic woodlands and forests, including pine-oak/heath and shrub balds; common. April-June; August-October. PA south to GA, in the

Appalachians and adjacent provinces. [< *V. stamineum* var. *stamineum* – RAB, F; < *V. stamineum* – C, K, L, W, Y, Z; = *Polycodium candicans* Small – S, V; = *V. candicans* (C. Mohr) Sleumer]

Vaccinium stamineum Linnaeus *var.* ***caesium*** (Greene) D.B. Ward, Florida Deerberry, Whiteleaf Deerberry. Cp (FL, GA, NC, SC): xeric woodlands; rare. April-May; August-October. Se. NC south to c. peninsular FL, and west to s. AL. [= Q; < *V. stamineum* var. *stamineum* – RAB; < *V. stamineum* – C, K, L, W, WH, Y, Z; ? *V. caesium* Greene – F (probably misapplied); > *Polycodium floridanum* (Nuttall) Greene – S; > *Polycodium ashei* Harbison – S; > *Polycodium floridanum var. floridanum* – V; > *Polycodium floridanum var. caesium* – V]

Vaccinium stamineum Linnaeus *var.* ***sericeum*** (C. Mohr) D.B. Ward, Southern Deerberry. Cp (FL, GA, SC), Mt (GA, NC), Pd (GA): xeric woodlands; rare. April-June; August-October. S. SC, w. NC, TN, and AR south to Panhandle FL and TX; disjunct in Mexico. [= Q; ? *V. stamineum* var. *melanocarpum* C. Mohr – RAB, F, misapplied; < *V. stamineum* – C, K, L, W, WH, Y, Z; ? *V. melanocarpum* (C. Mohr) C. Mohr ex Kearney – G, misapplied; ? *Polycodium melanocarpum* (C. Mohr) Small – S, misapplied; = *Polycodium sericeum* (C. Mohr) C.B. Robinson – V]

Vaccinium stamineum Linnaeus *var.* ***stamineum***, Common Deerberry. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): xeric to submesic woodlands, forests, and rock outcrops (unlike most *Vaccinium*, often on mafic, ultramafic, or calcareous rocks); common. April-June; August-October. MA, NY, s. Ontario, and MO south to Panhandle FL and TX. [= Q; < *V. stamineum* var. *stamineum* – RAB; < *Vaccinium stamineum* – C, K, L, W, Y, Z; > *V. stamineum* var. *stamineum* – F; > *V. stamineum* var. *interius* (Ashe) Palmer & Steyermark – F; > *V. stamineum* var. *neglectum* (Small) Deam – F; > *Vaccinium neglectum* (Small) Fernald – G; > *Polycodium stamineum* (Linnaeus) Greene – S, V; >< *Polycodium candicans* Small – S; > *Polycodium neglectum* Small – S, V]

Vaccinium tenellum Aiton, Southern Blueberry, Small Cluster Blueberry. Cp, Pd (GA, NC, SC, VA): sandhills, pine flatwoods, other xeric woodlands; common (uncommon in Piedmont and VA Coastal Plain, rare in VA Piedmont). Late March-early May; June-July. Though abundant in the Carolinas, *V. tenellum* is rather restricted, occurring as a common species from se. VA to c. GA, with a range extension (where it is scattered and rare) south and west to n. FL, s. AL, and se. MS. [= RAB, C, F, G, K, L, X, Y, Z; = *Cyanococcus tenellus* (Aiton) Small – S]

Vaccinium virgatum Aiton, Swamp Blueberry, Rabbiteye Blueberry. Cp (FL, GA, NC, SC): pocosins and *Chamaecyparis* swamps, also in various drier habitats, including turkey oak sandhills; common (uncommon in SC, rare in NC). March-April; May-June. A Southeastern Coastal Plain species, *V. virgatum* occurs from se. NC south to FL and west to e. TX. [= GW, K; = *V. amoenum* Aiton – RAB; = *Cyanococcus amoenus* (Aiton) Small – S; < *V. corymbosum* – L, WH, Z; > *V. virgatum* – X; > *V. amoenum* – X; > *V. ashei* Reade – X]

Vaccinium oxycoccos Linnaeus, Small Cranberry. Bogs. Circumboreal, south in North America to NJ, PA, WV (Grant, Mineral, Pendleton, Pocahontas, Preston, Randolph, and Tucker counties), IN, and MN. This species has been reported for NC, by Fernald (1950) as *V. oxycoccos* var. *ovalifolium* Michaux, by Scoggan (1979) as *Oxycoccus ovalifolius* (Michaux) Porsild, and by Kartesz (1999). Most likely, ambiguous collections of *V. macrocarpon* are the basis for this record. [= C, G, K; > *V. oxycoccos* Linnaeus var. *ovalifolium* – F; = *Oxycoccus palustris* Persoon; > *Oxycoccus palustris* Persoon var. *ovalifolius* (Michaux) Seymour; > *Oxycoccus ovalifolius* (Michaux) Porsild]

Vaccinium stamineum Linnaeus *var.* ***glandulosum*** (Ashe) D.B. Ward. Cp (FL): {habitat}; {rarity}. Supposedly endemic to the FL Panhandle, probably in GA. [= *Polycodium glandulosum* Ashe; < *Vaccinium stamineum* – L, WH] {not yet keyed; synonymy incomplete}

Some of the hybrids known to occur in our area are listed below. Nearly every combination of co-occurring species in section *Cyanococcus* may be expected to form hybrids.

V. ×***atlanticum*** Bicknell (pro sp.) [*angustifolium* × *corymbosum*]
V. ×***dobbinii*** Burnham (pro sp.) [*angustifolium* × *pallidum*]
V. ×***margarettae*** Ashe (pro sp.) [*fuscatum* × *pallidum*]
V. ×***marianum*** S. Watson (pro sp.) [*formosum* × *fuscatum*]

Zenobia D. Don 1834 (Zenobia, Honey-cups)

A monotypic genus, a shrub, of se. North America (endemic to the flora area). References: Stevens et al. in Kubitzki (2004).

Zenobia pulverulenta (Bartram ex Willdenow) Pollard, Zenobia, Honey-cups. Cp (GA, NC, SC, VA): pocosins, margins of pineland ponds; common (rare in GA and VA) (VA Rare). April-June; September-October. This monotypic genus is a narrow endemic of the Coastal Plain of se. VA, NC, SC, and e. GA (Bryan Co.). It was considered by Wood (1961) to have "no close relatives," but molecular phylogeny suggests that it is sister to *Andromeda*. The crenate leaves help distinguish *Zenobia* from other pocosin shrubs. The flowers are extremely fragrant. The species is remarkably variable in leaf glaucescence. Many plants in the fall-line sandhills and upper Coastal Plain have the lower leaf surface, pedicels, and capsules covered in wax to the point that they are bright white; outer Coastal Plain plants generally lack any glaucescence. The division into two species listed below in synonymy was based largely on this character; further study appears warranted. In the centers of major peat domes in the Outer Coastal Plain and in large Carolina bays in the Bladen Lakes region, where peat depths reach 3-5 meters, occur areas of up to 25 square kilometers dominated by *Zenobia* (sometimes codominant with *Chamaedaphne* or *Sarracenia flava*). This community has been referred to as "deciduous low pocosin," to distinguish it from the dominance of evergreen shrubs found in most pocosins. [= RAB, C, F, G, GW, K, L; > *Z. pulverulenta* – S; > *Z. cassinefolia* (Ventenat) Pollard – S]

EUPHORBIACEAE A.L. de Jussieu 1789 (Spurge Family)

EUPHORBIACEAE

A family of about 313-322 genera and 8100-9000 species, trees, shrubs, vines, and herbs, nearly cosmopolitan in distribution, as defined broadly. Molecular systematics suggests that various units traditionally included in the Euphorbiaceae should be segregated (Soltis et al. 2000, Chase et al. 2002). In our flora, this includes *Phyllanthus* (in Phyllanthaceae). References: Webster (1967), Webster (1994); Govaerts, Frodin, & Radcliffe-Smith (2000). [also see *PHYLLANTHACEAE*]

1 Shrub or tree (woody).
  2 Leaves entire.
    3 Leaf blades 2-5× as long as wide; petioles 0.2-1.0 cm long; plant a native shrub; [subfamily *Euphorbioideae*] ..... ***Ditrysinia***
    3 Leaf blades 1-1.5× as long as wide; petioles 2-6 cm long; plant an alien tree; [subfamily *Acalyphoideae*] ..... ***Triadica***
  2 Leaves crenate, serrate, or palmately lobed.
    4 Leaves elliptic or lanceolate, with crenate or serrate margins.
      5 Petiole lacking glands; [subfamily *Acalyphoideae*] ..... ***Sapium***
      5 Petilole with 2 glands at summit; [subfamily *Euphorbioideae*] ..... ***Stillingia***
    4 Leaves ovate or orbicular in outline, palmately lobed.
      6 Inflorescence a panicle; petals absent; [subfamily *Acalyphoideae*] ..... ***Ricinus***
      6 Inflorescence a dichasium; petals present; [subfamily *Crotonoideae*] ..... ***Vernicia***
1 Herb.
  7 Leaves palmately or ternately lobed or divided.
    8 Leaves peltate; calyx green or purple; plant glabrous; stamens 100-1000; [subfamily *Acalyphoideae*] ..... ***Ricinus***
    8 Leaves cordate at base; calyx petaloid, white; leaves cordate at base; stamens 8-10; [subfamily *Crotonoideae*].
      9 Plant with stinging trichomes; stamens connate ..... ***Cnidoscolus***
      9 Plant lacking stinging trichomes; stamens separate ..... ***Manihot***
  7 Leaves generally not lobed, entire or serrate (rarely pinnately lobed in *Euphorbia*).
    10 Plant with copious white latex; flowers enclosed in a cyathium; [subfamily *Euphorbioideae*].
      11 Leaves strictly opposite, oblique or inequilateral at base; branches often prostrate ..... ***Chamaesyce***
      11 Leaves alternate or opposite, not oblique or asymmetric at base; branches usually erect ..... ***Euphorbia***
    10 Plant without white latex (the sap clear), or slightly milky in Stillingia; flowers not enclosed in a cyathium.
      12 Pubescence of stellate trichomes and/or scales; [subfamily *Crotonoideae*] ..... ***Croton***
      12 Pubescence of simple trichomes, or glabrous.
        13 Flowers in terminal spikes; stout perennial with several to many stems arising from a subterranean crown [subfamily *Euphorbioideae*] ..... ***Stillingia***
        13 Flowers strictly axillary or both axillary and terminal, in small clusters, racemes, or spikes; finer perennial or annual, not typically with > 1 stem arising from a subterranean crown.
          14 Ovules and seeds 2 per locule (the capsule thus 6-seeded); flowers in small axillary clusters of 2-4 ..... ***[see Phyllanthus – PHYLLANTHACAE]***
          14 Ovules and seeds 1 per locule (the capsule thus 3-seeded, or fewer by abortion); flowers in axillary spikes or in racemes borne in leaf axils or opposite the leaves; [subfamily *Acalyphoideae*].
            15 Pistillate flowers subtended by a conspicuous leafy bract; plant lacking stinging trichomes ..... ***Acalypha***
            15 Pistillate flowers lacking a leafy bract; plant with stinging trichomes ..... ***Tragia***

Acalypha Linnaeus 1753 (Copperleaf, Three-seeded Mercury)

A genus of about 430-462 species, shrubs and herbs, of tropical, subtropical, and warm temperate regions. References: Levin (1999b)=Z; Levin (1999a); Govaerts, Frodin, & Radcliffe-Smith (2000)=Y.

1 Pistillate flowers all or chiefly in terminal spikes, the staminate flowers in axillary clusters.
  2 Leaves cordate at base; fruit tuberculate, but not pubescent ..... ***A. ostryifolia***
  2 Leaves rounded to widely cuneate at base; fruit pubescent with pustular-based trichomes ..... ***A. setosa***
1 Pistillate and staminate flowers all in axillary inflorescences, the staminate flowers above and pistillate flowers below in each inflorescence.
  3 Bracts subtending the pistillate flowers (5-) 7-9 (-11) lobed, usually stipitate-glandular; petiole 0.5-1.5× as long as the leaf blade; stems with only short, incurved trichomes.
    4 Fruit 2-seeded; seeds 2.2-3.2 mm long ..... ***A. deamii***
    4 Fruit 3-seeded; seeds 1.2-2.0 mm long ..... ***A. rhomboidea***
  3 Bracts subtending the pistillate flowers 9-15 (-16) lobed, stipitate-glandular or merely pubescent; petiole 0.2-0.5× as long as the leaf blade; stems with short incurved trichomes, with or without longer, straight, spreading trichomes as well.
    5 Bracts subtending the pistillate flowers usually stipitate-glandular, the bract lobes ovate to deltoid, the longest <2 mm long ..... ***A. gracilens***
    5 Bracts subtending the pistillate flowers usually with non-stipitate, pointed hairs, the bract lobes linear to oblong, the longest usually > 3 mm long ..... ***A. virginica***

Acalypha deamii (Weatherby) Ahles, Big-seeded Copperleaf, Two-seeded Copperleaf. Pd (VA): alluvial forests, especially on sandy levees; rare (VA Watch List). W. PA (Rhoads & Klein 1993), s. OH, and s. IN south to w. TN (Chester, Wofford, & Kral 1997) and AR; apparently disjunct in c. VA (Chesterfield, Powhatan, Buckingham, Fluvanna, and Cumberland counties on the James River; Pittsylvania, Halifax, and Campbell counties on the Staunton River; Rappahannock River), but perhaps only overlooked elsewhere. This plant is up to a meter tall and occurs in moist bottomland forests. [= C, K, Z; = *A. rhomboidea* var. *deamii* (Weatherby) Weatherby – F; = *A. virginica* Linnaeus var. *deamii* Weatherby – Y] {G synonymy?}

Acalypha gracilens A. Gray, Shortstalk Copperleaf. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): woodlands, disturbed ground; common. Late June-November. ME west to WI, south to FL and TX. The related *A. monococca* (Engelm. ex A. Gray) Lill. W. Miller & Gandhi is of Ozarkian distribution and warrants specific status (Levin 1999a, 1999b). Var. *fraseri* is generally more southern and is considered to differ in having more elongate staminate spikes, to 3-4 cm long (vs. 0.5-1.5 cm

long). It may have merit, but was not recognized by Levin (1999a, 1999b). [= RAB, K, S, W, Z; > *A. gracilens* var. *gracilens* – C, F, G; > *A. gracilens* var. *fraseri* (Müller of Aargau) Weatherby – C, F, G; = *A. virginica* Linnaeus var. *gracilens* (A. Gray) Müller of Aargau – Y; = *A. gracilens* ssp. *gracilens*]

Acalypha ostryifolia Riddell, Rough-pod Copperleaf. Pd (GA, NC, SC, VA), Mt (GA, NC, VA), Cp (FL, GA, SC): disturbed ground; uncommon (VA Watch List). Late June-November. NJ west to IN and NE, south to FL, TX, Mexico, and the West Indies. [= K, W, Y; = *A. ostryaefolia* – RAB, C, F, G, S, orthographic variant]

Acalypha rhomboidea Rafinesque, Rhombic Copperleaf. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): woodlands, disturbed ground; common. Late June-November. Nova Scotia and ME west to ND, south to panhandle FL and e. TX. [= RAB, C, G, GW, K, S, W, Z; *A. rhomboidea* var. *rhomboidea* – F; = *A. virginica* Linnaeus var. *rhomboidea* (Rafinesque) Cooperrider – Y]

* ***Acalypha setosa*** A. Richard, Cuban Copperleaf. Cp (FL, GA, SC): disturbed ground; rare, native of Cuba. June-November. [= RAB, K, S, Y]

Acalypha virginica Linnaeus, Virginia Copperleaf. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): woodlands and disturbed ground; common. Late June-November. ME west to IN, IL, MO, and KS, south to c. GA and TX. [= RAB, C, F, G, GW, K, S, W, Z; = *A. virginica* Linnaeus var. *virginica* – Y]

* ***Acalypha arvensis*** Poeppig & Endlicher. Cp (FL): disturbed ground; rare, native of West Indies, Mexico, and Central America. [= K] {add to synonymy and key}

Chamaesyce S.F. Gray 1821

In our area, *Chamaesyce* is largely weedy and the original distributions of some of the species are difficult to assess. Only 3 of our species are definitely native, occurring characteristically in natural habitats: *Ch. bombensis* and *Ch. polygonifolia* of dunes, and *Ch. cordifolia* of sandhills. Other species are often found in shallow soils of rock outcrops, cliffs, glades, and barrens, perhaps reflecting their pre-Columbian habitats. References: Herndon (1993)=Z; Govaerts, Frodin, & Radcliffe-Smith (2000)=Q.

1 Young stems and leaves glabrous; leaves entire or serrulate, at least at the apex (use 10× magnification).
  2 Leaves serrulate, at least at the apex (use 10× magnification); seeds with 2-4 transverse ridges.
    3 Seeds 1.0-1.3 mm long, with 3-4 transverse ridges ..... *[Ch. glyptosperma]*
    3 Seeds 0.8-1.0 mm long, with 2-3 (-4) transverse ridges ..... ***Ch. hyssopifolia***
  2 Leaves absolutely entire; seeds smooth.
    4 Stipules united into a triangular scale-like structure (this often lobed or fringed), thus appearing as 2 stipules at each node. *[Ch. serpens]*
    4 Stipules separate, lacerate, appearing as 4 stipules at each node.
      5 Leaves 1.5-2× as long as wide, not fleshy; mature seeds 1.0-1.2 (-1.4) mm long, angled; [of inland sandhills] ..... ***Ch. cordifolia***
      5 Leaves 2-3× as long as wide, often somewhat fleshy; mature seeds (1.3-) 1.5-2.6 mm long, rounded; [of barrier island dunes and other sandy coastal habitats].
        6 Mature seeds (1.3-) 1.5-1.9 mm long; cyathia terminal on the stems and also axillary ..... ***Ch. bombensis***
        6 Mature seeds (2.0-)2.2-2.6 mm long; cyathia terminal on the stems ..... ***Ch. polygonifolia***
1 Young stems and leaves pubescent (at least in lines along the stems); leaves serrulate, at least at the apex (use 10× magnification).
  7 Ovary and capsule glabrous.
    8 Seeds 0.8-1.0 mm long, light gray, the faces with 2-3 (-4) horizontal, low, blunt ridges, sometimes connected by 1-2 cross ridges; stems glabrous when young (uncommonly puberulent along 1 side of the branchlets); capsule 1.5-2.0 mm long ..... ***Ch. hyssopifolia***
    8 Seeds 1.0-1.3 mm long, dark gray, faces without ridges, though irregularly and finely wrinkled; stems puberulent when young on 1 side only; capsule 2.0-2.5 mm long.
      9 Stems ascending or suberect, puberulent when young ..... ***Ch. nutans***
      9 Stems prostrate or widely spreading, spreading-hirsute ..... ***Ch. vermiculata***
  7 Ovary and capsule pubescent.
    10 Stems with 2 types of trichomes, the longer 3-5 mm long; cyathia in axillary and terminal cymes, at least some of the peduncles > 10 mm long ..... ***Ch. hirta***
    10 Stems with 1 type of trichome, these < 2 mm long; cyathia solitary or several in axils, the peduncles < 5 mm long.
      11 Capsules spreading-villous, especially or solely on the angles; styles 0.2-0.3 mm long, bifid nearly to the base; seeds sharply quadrangular-angled, the faces with 3-4 transverse ridges ..... ***Ch. prostrata***
      11 Capsules minutely appressed-puberulent, on the entire surface (though sometimes primarily on the lower portion); styles 0.3-0.7 mm long, bifid only in the upper half or third; seeds quadrangular but not angled, the faces with inconspicuous transverse ridges or nearly smooth.
        12 Involucre cleft on 1 side half its length; leaves mostly obovate, 1.5-2× as long as wide; styles 0.5-0.7 mm long, filiform; seed faces nearly smooth; adventitious roots formed at middle nodes along the stem ..... ***Ch. humistrata***
        12 Involucre cleft on 1 side a fourth to a third its length; leaves mostly oblong, 2-3× as long as wide; styles 0.3-0.4 mm long, clavate; seed faces transversely ridged; adventitious roots not formed ..... ***Ch. maculata***

Chamaesyce bombensis (Jacquin) Dugand, Southern Seaside Spurge, Dixie Sandmat. Cp (GA, NC, SC, VA): open sands of dunes, dune blowouts and overwashes, often growing with perennial grasses such as *Uniola paniculata*, but preferring open sands with little competition, sometimes mixed with the more common *Ch. polygonifolia*; uncommon (VA Rare). June-October. E. VA south to s. FL along the Atlantic, from s. FL to TX and Mexico along the Gulf of Mexico, and south into n. South America. Johnson (1992) contrasts the habitat of this species with that of the closely similar *Ch. polygonifolia*; *Ch. bombensis* prefers areas behind the foredune, while *Ch. polygonifolia* prefers the pioneer situation on the upper beach and foredune front. [= K, Z; = *Euphorbia ammannioides* Kunth – RAB, C, F, G; > *Ch. ingallsii* Small – S; = ***Euphorbia bombensis*** Jacquin – Q]

Chamaesyce cordifolia (Elliott) Small, Heartleaf Sandmat. Cp (GA, NC, SC): open sands of very dry sandhills; rare (NC Rare). July-October. Se. NC south to s. FL and west to s. TX. [= K, S, Z; = ***Euphorbia cordifolia*** Elliott – RAB, Q]

Chamaesyce hirta (Linnaeus) Millspaugh, Pillpod Sandmat. Cp (GA, SC), Pd (GA): fields, disturbed ground; rare. June-October. SC south to FL, west to TX, and south into Central and South America. [= K, S, Z; = ***Euphorbia hirta*** Linnaeus – RAB, C, G, Q]

* ***Chamaesyce humistrata*** (Engelmann) Small, Spreading Sandmat. Cp, Mt (VA), Pd (GA, VA): exposed river shores, rocky riverside gravel bars, disturbed areas; rare, apparently adventive from further west, but possibly native in some areas. [= GW, K, S, Z; = ***Euphorbia humistrata*** Engelmann – C, F, G, Q]

Chamaesyce hyssopifolia (Linnaeus) Small, Hyssopleaf Sandmat. Cp (GA, SC): disturbed ground; uncommon? May-October. SC south to FL, west to LA; also in w. TX, s. NM, and n. Mexico, and south to s. South America. Its status in our area has been muddled by confusion with *C. nutans*. [= GW, K, Z; = ***Euphorbia hyssopifolia*** Linnaeus – Q]

Chamaesyce maculata (Linnaeus) Small, Milk-purslane, Spotted Spurge. Pd, Cp, Mt (GA, NC, SC, VA): gardens, fields, disturbed places, crevices in pavement or sidewalks; common. January-December. Québec west to ND, south to FL and TX; introduced in various places worldwide. [= GW, K, S, Z; > *Euphorbia supina* Rafinesque – RAB, F; = ***Euphorbia maculata*** Linnaeus – C, G, Q, W]

Chamaesyce nutans (Lagasca y Segura) Small, Eyebane. Pd, Cp, Mt (GA, NC, SC, VA): fields, gardens, waste places, disturbed ground; common. May-October. NH west to MI and ND, south to FL and TX; introduced in various places worldwide. [= GW, K, Z; = *Euphorbia maculata* Linnaeus – RAB, F, misapplied; = ***Euphorbia nutans*** Lagasca y Segura – C, Q, W; = *Euphorbia preslii* Guss. – G; = *Ch. hyssopifolia* (Linnaeus) Small – S, in part, misapplied]

Chamaesyce polygonifolia (Linnaeus) Small, Northern Seaside Spurge, Northern Sandmat. Cp (GA, NC, SC, VA): open sands of dunes, upper beach, dune blowouts and overwashes, sometimes growing with perennial grasses such as *Uniola paniculata*, but preferring open sands with little competition, sometimes mixed with the less common *Ch. bombensis*; common. May-October. Québec to ne. FL along the Atlantic Ocean; disjunct to the Great Lakes. See *Ch. bombensis* for discussion of the habitats of these related species. [= K, S, Z; = ***Euphorbia polygonifolia*** Linnaeus – RAB, C, F, G, Q]

* ***Chamaesyce prostrata*** (Aiton) Small, Prostrate Sandmat. Pd (GA, NC, SC, VA), Cp, Mt (NC, SC, VA): crevices of pavement or sidewalks, disturbed places; rare, naturalized from tropical America. January-December. Probably native to South America, introduced and naturalized in se. United States. [= C, K, S, Z; = *Euphorbia chamaesyce* Linnaeus – RAB, F, G, misapplied; = ***Euphorbia prostrata*** Aiton – Q]

Chamaesyce vermiculata (Rafinesque) House. (VA). Widespread and common in PA (Rhoads & Klein 1993). [= K; = ***Euphorbia vermiculata*** Rafinesque – C, F, G, Q]

Chamaesyce glyptosperma (Engelmann) Small, Ridge-seed Spurge, east to sc. TN (Chester, Wofford, & Kral 1997). In VA, WV, LA (Q). [= K; = ***Euphorbia glyptosperma*** Engelmann – C, F, G, Q]

Chamaesyce hypericifolia (Linnaeus) Millspaugh, reported for SC (Kartesz 1999), FL, GA, LA (Q). {Investigate} [= K, S; = ***Euphorbia hypericifolia*** Linnaeus – Q] {not yet keyed}

Chamaesyce ophthalmica (Persoon) Burch. GA and PA (Kartesz 1999), but not in North America (Q). [= K; = ***Euphorbia ophthalmica*** Persoon – Q] {not yet keyed}

Chamaesyce serpens (Kunth) Small. Cp (GA): In se. PA (Rhoads & Klein 1993) and e. GA. [= K; = ***Euphorbia serpens*** Kunth – C, F, G, Q]

Chamaesyce serpyllifolia (Persoon) Small *ssp. serpyllifolia*. In GA, PA, and DE (Kartesz 1999). In NC, GA, SC (Q) {Investigate} [= K; = ***Euphorbia serpyllifolia*** **var.** ***serpyllifolia*** – Q] {not yet keyed}

Cnidoscolus Pohl 1827 (Spurge-nettle)

A genus of about 75 species, herbs, of America. References: McVaugh (1944)=Y; Govaerts, Frodin, & Radcliffe-Smith (2000)=Z.

Cnidoscolus stimulosus (Michaux) Engelmann & A. Gray, Spurge-nettle, Tread-softly, Finger-rot, Bull-nettle. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC, SC): sandhills, dry sandy woodlands, other dry sandy soils; common (rare in Piedmont and Mountains). Late March-August; May-September. Se. VA south to FL, west to e. LA, mostly on the Coastal Plain, but further inland southward. Beset with stinging trichomes. Allied to *Cn. urens* of Mexico, central America, and n. South America, and sometimes treated as a variety of it. [= RAB, C, F, G, K, W, Y; = *Bivonea stimulosa* (Michaux) Rafinesque – S; = *Cn. urens* (Linnaeus) Arthur var. *stimulosus* (Michaux) Govaerts – Z]

Croton Linnaeus 1753 (Croton, Doveweed, Rushfoil)

A genus of about 750-1225 species, herbs, shrubs, and (rarely) trees, of nearly cosmopolitan distribution. Webster (1992, 1993) considers the 2 species traditionally treated as *Crotonopsis* to be closely related to sections within *Croton*, such as section *Gynamblosis*. His reasoning is followed here. References: Webster (1992)=Z; Webster (1993)=Y; Govaerts, Frodin, & Radcliffe-Smith (2000).

1 Evergreen shrub, (1-) 2-3 m tall; pistillate flowers with petals; [section *Lamprocroton*]..... ***[C. alabamensis var. alabamensis]***
1 Herbaceous or suffrutescent, 0.1-1.2 m tall; pistillate flowers lacking petals.
  2 Leaves with coarsely serrate margins; 1-2 glands present near the junction of the petiole and the leaf-blade; [section *Geiseleria*]..... ***C. glandulosus var. septentrionalis***

2 Leaves with entire margins; glands absent.
3 Leaves sessile or with short petioles (to 3.2 mm long), the petiole < 1/5 the length of the leaf blade; fruit 1-locular, indehiscent; seed 1 per fruit, 2-2.5 mm long; [section *Crotonopsis*].
4 Branches monopodial; stellate hairs of the upper leaf surface with arms to 0.3 mm long, not overlapping the arms of the nearby stellae ..... ***C. michauxii***
4 Branches dichotomous and trichotomous; stellate hairs of the upper leaf surface with arms to 1.0 mm long, overlapping the arms of nearby stellae ..... ***C. willdenowii***
3 Leaves with relatively long petioles (5-90 mm long), at least some of the petioles 1/2 or more the length of the leaf blades; fruit 3-locular (2-locular in *C. monanthogynus*), dehiscent; seeds 3 per fruit (1 per fruit in *C. monanthogynus*, the second locule aborting), 2.5-5 mm long.
5 Stem leaves mostly 2× or more as long as wide); lobes of the calyx of the pistillate flowers 5-9 (-12); [section *Pilinophytum*].
6 Leaves (the larger) 4-15 cm long, 1.5-6 cm wide (generally 2-3× as long as wide), lanceolate to elliptic, cordate at the base; hairs of 2 colors, the shorter gray, the longer tan; lobes of the calyx of the pistillate flowers (6-) 7-9 (-12); [alien, of disturbed habitats] .. ***C. capitatus var. capitatus***
6 Leaves (the larger) 2.5-6 cm long, 0.7-1.5 cm wide (generally 3-6× as long as wide), linear to linear-lanceolate, cuneate at the base; hairs of 1 color, all gray; lobes of the calyx of the pistillate flowers 5-6; [native, of Coastal Plain pondshores] ..... ***C. elliottii***
5 Stem leaves mostly < 2× as long as wide, 1-8 cm long, broadly cuneate to rounded at the base (a few rarely subcordate); lobes of the calyx of the pistillate flowers 5.
7 Styles 3, each 4-lobed, the style branches thus 12; capsule erect, 5-7 mm long; seeds 4.5-5.0 mm long; lower leaf surface silvery; plant an annual or perennial; [of coastal dunes]; [section *Drepadenium*] ..... ***C. punctatus***
7 Styles 2 or 3, each 2-lobed, the style branches thus 4 or 6; capsule pendulous, 3-6 mm long; seeds 2.5-4.0 mm long; lower leaf surface white to silvery; plant an annual; [of limestone outcrops, fields, or weedy situations].
8 Fruit 2-locular; seeds 1 per fruit; styles 2, each 2-lobed; [of limestone outcrops or weedy situations]; [section *Gynamblosis*] ..... ***C. monanthogynus***
8 Fruit 3-locular; seeds 3 per fruit; styles 3, each 2-lobed or 4-lobed; [of fields or weedy situations]; [section *Velamea*] ..... ***C. lindheimerianus var. lindheimerianus***

* ***Croton capitatus*** Michaux *var.* ***capitatus***, Woolly Croton, Hogwort, Capitate Croton. Pd, Mt (GA, NC, SC, VA), Cp (GA, NC, SC): fields, disturbed areas; uncommon, adventive from further west (VA Watch List). July-October. [= C, G, K; < *Croton capitatus* – RAB, W; = *Croton capitatus* - F, S]

Croton elliottii Chapman, Pondshore Croton, Elliott's Croton. Cp (GA, SC): shores and exposed drawdown zones of clay-based Carolina bays and limesink ponds (dolines); rare (GA Special Concern, SC Rare). Se. SC south to panhandle FL, west to se. AL. [= K, S]

* ***Croton glandulosus*** Linnaeus *var.* ***septentrionalis*** Müller of Aargau, Doveweed, Tooth-leaved Croton, Sand Croton. Cp, Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common. May-October. *C. glandulosus* is widespread in tropical and subtropical America; var. *septentrionalis* is the northernmost variety, but its pre-Columbian range is obscure because of its weedy nature. [= RAB, C, F, G, K, S, W]

* ***Croton lindheimerianus*** Scheele *var.* ***lindheimerianus***, Lindheimer's Croton. Pd (NC): fields and other disturbed soils; rare, adventive from further west. June-October. [= K; < *Croton lindheimerianus* – RAB]

Croton michauxii Webster, Sand Rushfoil, Michaux's Croton. Cp (GA, SC, VA?): sandhills, disturbed sandy soils; rare (SC Rare). June-October. SC south to FL, west to TX, north in the interior to MO, IL, and IA. Fernald (1950) alleges that this species extends as far north as VA, but the documentation is unknown to me. [= K, Z; = *Crotonopsis linearis* Michaux – RAB, C, F, G, S]

Croton monanthogynus Michaux, Prairie-tea, One-seed Croton. Mt (GA, NC, VA), Pd (GA, SC, VA), Cp (GA, VA): limestone outcrops, blackland prairies, disturbed dry soil; rare (NC Rare, VA Rare). June-October. Sw. VA, OH, IN, IA, NE, and CO, south to nw. GA, FL, TX, and Mexico; adventive as a weed at scattered locations east of the Blue Ridge. [= RAB, C, F, G, K, S, W]

Croton punctatus Jacquin, Silverleaf Croton, Beach-tea, Gulf Croton. Cp (GA, NC, SC): beach dunes, coastal grasslands, usually with *Uniola paniculata* and/or *Spartina patens*; common. Late May-November. NC (Dare County) south to s. FL, west to TX, and south into Central and South America. [= RAB, K, S]

Croton willdenowii Webster, Glade Rushfoil, Outcrop Rushfoil, Willdenow's Croton. Pd, Cp (GA, NC, SC, VA), Mt (GA, NC, SC): granitic flatrocks, diabase barrens, thin soils around other rock outcrops, disturbed sandy soil; common (uncommon in VA). June-October. CT, se. PA (Rhoads & Klein 1993), IL, and se. KS, south to FL and TX. [= K, Z; = *Crotonopsis elliptica* Willdenow – RAB, C, F, G, S, W]

Croton alabamensis E.A. Smith ex Chapman var. *alabamensis*, Alabama Croton, is endemic to scattered populations in c. AL; alleged populations in sc. TN (Chester, Wofford, & Kral 1997) are apparently based on mislabeled specimens (Wurdack 2006). *C. alabamensis* var. *texensis* S. Ginzbarg is endemic to c. TX (Ginzbarg 1992; Aplet et al. 1994), where it occurs in canyons in the Edwards Plateau. The species is most closely related to species of the West Indies, Central America, and South America; its distribution is obviously relictual. [= K; < *Croton alabamensis* – S]

Croton argyranthemus Michaux. Cp (GA): sandhills; common. [= K, S] {not yet keyed}

Croton capitatus Michaux *var.* ***lindheimeri*** (Engelmann & A. Gray) Müller of Aargau. In GA and westward. [= K; *C. engelmannii* Ferguson – S] {not yet keyed}

Ditrysinia Rafinesque 1825 (Sebastian-bush)

A monotypic genus, a shrub, of the Southeastern United States Coastal Plain. Perhaps as close to *Gymnanthes* as to *Sebastiania*. References: Govaerts, Frodin, & Radcliffe-Smith (2000)=Z.

Ditrysinia fruticosa (W. Bartram) Govaerts & Frodin, Sebastian-bush. Cp (GA, NC, SC): swamp forests, other wet to moist, mostly shaded, habitats; uncommon (NC Rare). May-June; July-October. Se. NC south to c. peninsular FL, west to e. TX. [= Z; = *Sebastiania fruticosa* (W. Bartram) Fernald – GW, K; = *Sebastiania ligustrina* (Michaux) Müller of Aargau – RAB; = *Sebastiana ligustrina* – S (orthographic error)]

Euphorbia Linnaeus 1753 (Spurge)

An extremely large and polymorphic genus. References: Huft (1979)=Z; Park (1998)=Y; Bridges & Orzell (2002)=X; Govaerts, Frodin, & Radcliffe-Smith (2000)=Q. [also see *Chamaesyce*]

1 Bracteal leaves lobed or toothed (rarely linear), usually marked with red or white at the base; glands of the cyathia usually 1 (rarely more), bilabiate, lacking petaloid appendages; [subgenus *Poinsettia*].
  2 Principal stem leaves opposite, dentate, neither lobed nor linear; plant pubescent ..... ***E. dentata***
  2 Principal stem leaves alternate, either lobed or linear; plant usually glabrous ..... ***E. cyathophora***
1 Bracteal leaves entire, not marked with red (white-margined in *E. marginata*); glands of the cyathia 4-5, not bilabiate, with or without petaloid appendages.
  3 Glands of the cyathia 5 (or 7-10 on the central cyathium in *E. pubentissima*), with petaloid appendages 0.1-5.0 mm long (measured along a radius), these white, maroon, red, pink, or green; stipules present, glandlike, often minute; [subgenus *Tithymalopsis*].
    4 Upper stem leaves and bracteal leaves with white margins, ovate, the apex acute; [alien, cultivated and rarely persisting or a waif]; [section *Petaloma*] ..... ***E. marginata***
    4 Upper stem leaves and bracteal leaves entirely green, obovate, elliptic, narrowly elliptic, or oblanceolate, the apex rounded or obtuse; [native]; [section *Tithymalopsis*].
      5 Petaloid appendages (0.5-) 1.0-4.4 mm long (measured along a radius), about as long as wide or longer, white; stems (1.5-) 3-9 (-11) dm tall, erect; leaves not ciliate-margined.
        6 Nodes below the umbel (25-) 35-60 (-115); cyathia (5-) 6.5-8.0 (-11.0) mm wide (across the appendages); stems (1-) 3-10 from a crown, each (1.2-) 2.5-5 (-7) mm in diameter at the base; plants (2-) 4-9 (-1.3) dm tall; leaves ascending, leathery, sessile or subpetiolate; plants flowering June-September; [plants (in our area) of the Mountains, upper Piedmont of NC, lower Piedmont and Coastal Plain of VA] ..... ***E. corollata***
        6 Nodes below the inflorescence (6-) 15-26 (-41); cyathia (3.5-) 4.0-5.5 (-6.5) mm wide (across the appendages); stems usually 1-2 (-3) from a crown, each (0.8-) 1.5-2.8 (-3.5) mm in diameter at the base; plants (1.5-) 3-5 (-6.5) dm tall; leaves usually reflexed (*E. pubentissima*) or usually ascending (*E. discoidalis*), thin, petiolate or subpetiolate; plants flowering March-July; [plants (in our area) nearly throughout, except sw. VA].
          7 Leaves 1.9-7.2 cm long, 0.1-0.5 cm wide, averaging > 10× as long as wide; primary inflorescence rays usually 3; [plants south of our area, and possibly in SC] ..... ***E. discoidalis***
          7 Leaves (1.6-) avg. 3.8 (-6.1) cm long, 0.5-2.2 cm wide, averaging < 4× as long as wide; primary inflorescence rays usually 5; [widespread in our area] ..... ***E. pubentissima***
      5 Petaloid appendages 0.05-0.6 mm long (measured along a radius), shorter than wide, green, red, white, or pink; stems (0.8-) 1.5-4.5 (-6) dm tall, erect, ascending or decumbent; leaves ciliate-margined (*E. mercurialina* and *E. curtisii*) or not.
        8 Leaf margins ciliate; cyathia 3.5-5.9 mm wide (across the appendages), green; leaves not fleshy, 1.7-2.2 (-3)× as long as wide, not especially variable; [of mesic forests with rich soils] ..... ***E. mercurialina***
        8 Leaf margins not ciliate (except some marginal hairs in *E. curtisii*); cyathia 2.0-3.4 mm wide (across the appendages), green or maroon; leaves slightly to strongly fleshy, 0.7-20× as long as wide, often very variable in shape, even on the same plant; [of more or less xeric sandhill woodlands with acidic, sandy soils].
          9 Stems usually 10-18 per crown, decumbent to weakly ascending; leaves opposite (scales on the lower stem sometimes alternate), fleshy, blue-green with a narrow, thickened, red-hyaline margin; branching dichotomous from the base of the plant (the branches typically equal, though sometimes unequal) ..... ***E. ipecacuanhae***
          9 Stems 1-4 (-9) per crown, erect to strongly ascending; leaves alternate, opposite, or in whorls of 3 (at least some alternate on a plant), less fleshy, green to blue-green, without a red margin (or with a very narrow, slightly red-hyaline, but not thickened margin in *E. exserta*); branching alternate below the inflorescence (rarely dichotomous or trichotomous), the branches typically unequal.
            10 Cyathia and capsules green; petaloid appendages white or pink; leaves thin-textured, green, finely pubescent with appressed white hairs (0.1-0.3 mm long) on the lower surface and margins (visible at 10× or greater); branching primarily alternate; leaves primarily alternate (typically opposite or 3-whorled below the inflorescence); cyathia unisexual, plants usually unisexual (dioecious) ..... ***E. curtisii***
            10 Cyathia and capsules maroon; petaloid appendages maroon-red; leaves slightly fleshy, somewhat blue-green, glabrous; branching primarily opposite; leaves primarily opposite (usually some alternate on upper branches); cyathia bisexual, plants bisexual ..... ***E. exserta***
  3 Glands of the cyathia 4 (except 5 in *E. purpurea*), oval, reniform, or crescent-shaped, lacking petaloid appendages (the glands themselves yellowish or green); stipules absent or vestigial; [subgenus *Esula*].
    11 Principal stem leaves finely serrulate (especially toward the apex); [subgenus *Esula*, section *Tithymalus*].
      12 Ovary and capsule smooth ..... ***E. helioscopia***
      12 Ovary and capsule verrucose-roughened.
        13 Seeds smooth or very obscurely reticulate, 2-2.5 mm long ..... ***E. obtusata***
        13 Seeds distinctly alveolate, 1.5-1.8 mm long ..... ***E. spathulata***
    11 Principal stem leaves entire.
      14 Stem leaves opposite, decussate (each succeeding pair turned by 90 degrees); seeds 4-6 mm long; [subgenus *Esula*, section *Lathyris*] ..... ***E. lathyris***
      14 Stem leaves alternate (or mostly so); seeds 1-3 mm long.
        15 Stem leaves linear to narrowly oblong, averaging ca. 10× as long as wide; [subgenus *Esula*, section *Esula*].
          16 Stem leaves 1-3 cm long, 1-3 mm wide ..... ***E. cyparissias***

16 Stem leaves 3-8 cm long, 4-8 mm wide ..... ***E. esula***
15 Stem leaves oblanceolate, obovate, elliptic, or oblong, 1-10 cm long, 5-30 mm wide, averaging 1-5× as long as wide.
17 Principal stem leaves elliptic to oblong, (5-) 7-10 cm long; rhizomatous perennial to 1 m tall; seeds smooth, 3-4 mm long; rays of the umbel usually 5-8; [subgenus *Esula*, section *Tithymalus*] ..... ***E. purpurea***
17 Principal stem leaves oblanceolate to obovate, 1-2 cm long; annual, or perennial by basal offshoots, to 0.4 m tall; seeds pitted, 1.3-2.0 mm long; rays of the umbel 3 (-5); [subgenus *Esula*, section *Esula*].
18 Seeds pitted only on one face, the inner face furrowed ..... ***E. peplus***
18 Seeds pitted on both the inner and outer faces.
19 Seeds finely pitted with numerous, evenly distributed, circular pits; bracteal leaves broader than long; glands of the cyathia crescent-shaped, the horns slender, elongate, and caudate ..... ***E. commutata***
19 Seeds coarsely pitted with transversely elongate pits in 4 vertical rows (appearing nearly transversely rugose); bracteal leaves longer than broad; glands of the cyathia crescent-shaped, the horns short and blunt ..... ***E. falcata***

Euphorbia commutata Engelmann ex A. Gray, Woodland Spurge, Tinted Spurge. Mt (GA, NC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, VA): rich forests and rock outcrops, over calcareous or mafic rocks; uncommon (rare in Coastal Plain, rare in NC). March-May. PA west to s. ON and MN, south to FL and TX. The southern var. *erecta* J.B.S. Norton may be worthy of recognition; we probably have both it and the typic var. *commutata* in our area. Var. *erecta* (ranging north to VA, KY, and MO) has all the cauline leaves oblanceolate and with petioles 5-12 mm long; var. *commutata* has leaves varying from oblanceolate to obovate or ovate, the upper leaves usually broad and sessile. [= RAB, F, K, Q, W, WH; > *Eu. commutata* var. *commutata* – C, G; > *Eu. commutata* var. *erecta* J.B.S. Norton – C, G; = *Galarhoeus commutatus* (Engelmann) Small – S]

Euphorbia corollata Linnaeus, Eastern Flowering Spurge. Mt (GA, NC, SC, VA), Pd (GA, NC, VA), Cp (VA): woodlands and forests; common. June-September. NH and MA west to s. Ontario, MI, WI, MN, and NE, south to se.VA, c. NC, n. GA, s. AL, and e. TX. Huft (1979) considered *Eu. marilandica* a sporadic growth form of *Eu. corollata*. [= K, Y, Z; = *Eu. corollata* var. *corollata* – RAB; > *Eu. corollata* var. *corollata* – C, F; > *Eu. marilandica* Greene – C, F, G; >< *Eu. corollata* – G, W (also see *Eu. pubentissima*); = *Tithymalopsis corollata* (Linnaeus) Klotzsch – S; < *Eu. corollata* var. *corollata* – Q (also see *Eu. discoidalis*)]

Euphorbia curtisii Engelmann, White Sandhills Spurge, Curtis's Spurge. Cp (FL, GA, NC, SC): sandhills; common. Late March-June. Sc. and se. NC to ne. FL and w. panhandle FL, on the Coastal Plain. Less variable in leaf shape than *Eu. ipecacuanhae* or *Eu. exserta*. [= RAB, GW, K, Q, WH, Y, Z; > *Tithymalopsis curtisii* (Engelmann) Small – S; > *Tithymalopsis eriogonoides* Small – S]

Euphorbia cyathophora Murray, Painted Leaf, Fire-on-the-mountain. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): disturbed habitats, dunes; common (uncommon north of FL). June-October. VA, KS, and CA south into the New World tropics, the original range obscure. [= C, K, Q; > *Eu. heterophylla* Linnaeus var. *heterophylla* – RAB, F, misapplied; > *Eu. heterophylla* var. *graminifolia* Engelmann – RAB, F; = *Eu. heterophylla* – G; *Poinsettia cyathophora* (Murray) Klotzsch & Garcke – S; *Poinsettia heterophylla* – S, misapplied]

* ***Euphorbia cyparissias*** Linnaeus, Cypress Spurge, Graveyard Spurge. Mt, Pd (GA, NC, SC, VA), Cp (VA): roadbanks, graveyards, waste places; common, native of Europe. March-May (occasionally later). [= RAB, C, F, G, K, Q, W; = *Galarhoeus cyparissias* (Linnaeus) Small ex Rydberg – S; = *Tithymalus cyparissias* (Linnaeus) Lamarck]

* ***Euphorbia dentata*** Michaux, Painted Leaf, Wild Poinsettia, Toothed Spurge. Mt (GA, NC, VA), Pd (NC, SC, VA), Cp (VA): disturbed areas, hedgerows, thickets, railroad cinders; common, native of w. North America. July-October. [= RAB, C, F, G, Q, W; ? *Eu. dentata* var. *dentata* – K; = *Poinsettia dentata* (Michaux) Klotzsch & Garcke – S]

Euphorbia discoidalis Chapman, Summer Spurge. Cp (FL, GA): sandhills. E. and c. GA (or e. SC?) south and west to Panhandle FL and e. TX. Park (1998) includes in synonymy *Eu. corollata* var. *angustifolia* Elliott, which has a stated type locality in e. SC. [= K, WH, Y; = *Tithymalopsis discoidalis* (Chapman) Small – S; < *Eu. corollata* var. *corollata* – Q] {augment}

* ***Euphorbia esula*** Linnaeus *var. esula*, Wolf's-milk, Leafy Spurge Pd (VA): disturbed areas; rare, native of Eurasia. [= K; < *Eu. esula* – C, F, G; = *Eu. esula* ssp. *esula* – Q; < *Tithymalus esula* (Linnaeus) Scopoli]

Euphorbia exserta (Small) Coker, Maroon Sandhills Spurge, Coastal Sand Spurge. Cp (FL, GA, NC, SC, VA): sandhills; uncommon. March-June. Sc. NC south to c. peninsular and e. panhandle FL; disjunct in se. VA (Sussex County) (Belden et al. 2004). The leaves are extremely variable in size and shape, from linear to rotund. Park (1998) recognizes *Eu. exserta* and *Eu. gracilior* as distinct from one another, differing in the involucre (purple in *Eu. exserta* and green in *Eu. gracilior*) and the appendages (rudimentary and purple in *Eu. exserta* and semicircular and white in *Eu. gracilior*). [= K, Q, WH, Z; = *Eu. gracilior* Cronquist – RAB; > *Tithymalopsis exserta* Small – S; > *Tithymalopsis gracilis* (Boissier) Small – S; > *Eu. exserta* – Y; > *Eu. gracilior* – Y]

* ***Euphorbia falcata*** Linnaeus. Mt, Pd (VA): disturbed areas; rare, native of Europe. [= C, F, G, K; > *Eu. falcata* ssp. *falcata* – Q]

* ***Euphorbia helioscopia*** Linnaeus, Wartweed. Pd (GA, NC, SC, VA), Mt (VA), Cp (VA): cultivated ground; rare, native of Europe. Late March-June. [= RAB, C, F, G, K; = *Galarhoeus helioscopia* (Linnaeus) Haworth – S; > *Eu. helioscopia* ssp. *helioscopia* – Q]

Euphorbia ipecacuanhae Linnaeus, Carolina Ipecac. Cp (GA, NC, SC, VA): sandhills; common. February-May (and later, especially in response to fire). CT (formerly), NY (Long Island), NJ, and se. PA (Rhoads & Klein 1993) south to ec. GA, on the Coastal Plain. The leaves are extremely variable in size and shape, from linear to rotund. Huft (1979) considered *Eu. arundelana* Bartlett (reported from MD, SC, and GA) a sporadic form of *Eu. ipecacuanhae*. Park (1998) suggested that *Eu. ipecachuanhae* is actually a member of *Chamaesyce* (treated by Park as a subgenus), rather than of *Euphorbia*. [= RAB, C, G, K, Q, Z; > *Eu. ipecacuanhae* – F; *Eu. arundelana* Bartlett – F; = *Tithymalopsis ipecacuanhae* (Linnaeus) Small – S]

* ***Euphorbia lathyris*** Linnaeus, Caper Spurge, Myrtle Spurge, Mole Plant. Mt (NC, SC, VA), Pd (VA), Cp (VA): roadsides, disturbed areas; rare, native of Europe. June-August. [= RAB, F, K, Q, W; = *Eu. lathyrus* – C, G, an orthographic variant; = *Galarhoeus lathyrus* – S]

* ***Euphorbia marginata*** Pursh, Snow-on-the-mountain. Cp (FL, GA, NC, SC, VA), Pd (GA, VA), Mt (VA): roadsides, disturbed areas; uncommon (rare in FL), native of further west. July-November. [= RAB, C, F, G, K, Q, WH; = *Lepadena marginata* (Pursh) Nieuwland – S; = *Agaloma marginata* (Pursh) A. & D. Löve]

Euphorbia mercurialina Michaux, Cumberland Spurge, Mercury Spurge. Pd (GA, NC, VA*): rich slope over gabbro; rare (NC Rare). May-June. S. KY south through e. TN to nw. GA and n. AL; disjunct in c. NC, where found in 1992. Apparently introduced in VA. [= C, F, G, K, Q, W, Y, Z; = *Tithymalopsis mercurialina* (Michaux) Small – S]

Euphorbia obtusata Pursh, Woodland Spurge. Pd, Cp, Mt (NC, SC, VA): rich bottomland forests; uncommon (rare in Mountains). April-July. Sc. PA west to IN and IA, south to SC and TX. [= RAB, C, F, G, W; < *Eu. spathulata* Lamarck – K, Q; = *Galarhoeus obtusatus* (Pursh) Small – S]

* ***Euphorbia peplus*** Linnaeus, Petty Spurge. Mt (VA): disturbed areas; rare, native of Eurasia. [= C, F, G, K; = *Galarhoeus peplus* (Linnaeus) Haworth – S; > *Eu. peplus* var. *minima* A.P. de Candolle – Q; > *Eu. peplus* var. *peplus* – Q; = *Tithymalus peplus* (Linnaeus) Hill]

Euphorbia pubentissima Michaux, Southeastern Flowering Spurge. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry woodlands, sandhills; common (uncommon in FL). March-July. C. MD, VA, and c. and sw. TN south to panhandle FL, and s. MS. [= K, Y, Z; > *Eu. corollata* Linnaeus var. *zinniiflora* (Small) Ahles – RAB; >< *Eu. corollata* Linnaeus var. *corollata* – RAB, in part; = *Eu. corollata* var. *paniculata* Boissier – C, F, Q; > *Eu. zinniiflora* Small – F; > *Eu. apocynifolia* Small – F; > *Eu. corollata* var *mollis* Millspaugh – F; < *Eu. corollata* – G, W; > *Tithymalopsis zinniiflora* (Small) Small – S; > *Tithymalopsis apocynifolia* (Small) Small – S; > *Tithymalopsis paniculata* (Boissier) Small – S; = *Agaloma pubentissima* (Michaux) D.B. Ward]

Euphorbia purpurea (Rafinesque) Fernald, Glade Spurge, Darlington Spurge, Purple Spurge. Mt (NC, VA): rich moist forests in bottomlands or on slopes, in rich soil around rock outcrops, especially over calcareous rocks (such as dolomite) or mafic rocks (such as amphibolite); rare (US Species of Concern, NC Rare, VA Rare). May-August. NJ, PA, and OH south to w. NC. [= RAB, C, F, G, K, Q, W; = *Galarhoeus darlingtonii* (A. Gray) Small – S]

Euphorbia spathulata Lamarck, Prairie Spurge, Warty Spurge. Mt (NC?, VA), Cp* (FL*): rocky woodlands, disturbed areas; rare. May-June. MN and WA south to w. VA, AL, LA, TX, and Mexico. [= C, W, WH; *? Eu. dictyosperma* Fischer & Meyer – F, G; < *Eu. spathulata* – K, Q (also see *Eu. obtusata*); *? Galarhoeus arkansanus* (Engelmann & A. Gray) Small ex Rydberg – S]

* ***Euphorbia davidii*** Subils. Mt, Pd (NC): disturbed areas; rare, native of {}. Introduced in se. TN (Chester, Wofford, & Kral 1997). [= K, Q; *Eu. dentata* var. *gracillima* Millspaugh] {not yet keyed}

Euphorbia exigua Linnaeus, Dwarf Spurge. In PA and WV (Kartesz 1999). [= K; *Eu. exigua* ssp. *exigua* – Q] {not yet keyed}

Euphorbia floridana Chapman, Florida Spurge. Cp (FL, GA): sandhills, scrub; common. May-September. Panhandle FL and sw. GA west to s. MS. Reported for sw. GA by Bridges & Orzell (2002) and Jones & Coile (1988). [= K, Q, WH, X; = *Galarhoeus floridanus* (Chapman) Small - S] {not yet keyed}

Euphorbia heterophylla Linnaeus, Fiddler's Spurge, Mexican Fireplant. Cp (FL, GA): disturbed areas; uncommon. All year. [= K, Q; > *Poinsettia heterophylla* (Linnaeus) Klotzsch & Garcke ex Klotzsch – S; > *Poinsettia geniculata* Ortega – S; = *Poinsettia heterophylla* (Linnaeus) Klotzsch & Garcke ex Klotzsch – S, WH] {not yet keyed}

Euphorbia inundata Torrey ex Chapman *var. **inundata***. Cp (FL, GA): wet pine flatwoods, savannas, seepage slopes; common (rare in GA). In se. GA (Bridges & Orzell 2002). [= X; < *Eu. inundata* – K, Q; < *Galarhoeus inundatus* (Torrey ex Chapman) Small – S] {not yet keyed}

Euphorbia telephioides Chapman. Cp (FL): pine flatwoods; rare. Endemic to FL Panhandle (Bay, Franklin, and Gulf counties). [= K, WH; = *Galarhoeus telephioides* (Chapman) Small – S] {not yet keyed; add to synonymy}

Euphorbia tetrapora Engelmann. GA and AL west to TX. [= K, Q] {not yet keyed}

Manihot P. Miller 1754 (Cassava)

A genus of about 100 species, trees, shrubs, and herbs, of tropical and subtropical America. References: Govaerts, Frodin, & Radcliffe-Smith (2000)=Z.

1 Leaf segments 5-7, with entire margins; calyx of male flowers < 10 mm long; fruit wing-angled..... ***[M. esculenta]***
1 Leaf segments 9-13, with undulate lobes towards the tip; calyx of male flowers 12-15 mm long; fruit not winged ..... ***M. grahamii***

* ***Manihot grahamii*** Hooker, Hardy Tapioca, Graham's Cassava. Cp (FL, GA): disturbed areas; rare, uncommonly grown as an ornamental, rarely naturalizing. Introduced in sw. GA (Jones & Coile 1988), FL Panhandle, peninsular FL, west to LA. [= K, WH, Z]

* *Manihot esculenta* Crantz, Manioc, Tapioca, is naturalized on the Gulf Coast, as in AL and s. FL. [= K, WH; = *Jatropha manihot* Linnaeus – S] {add to synonymy}

Mercurialis Linnaeus 1753 (Mercury)

A genus of about 8 species, herbs, of the Old World. References: Govaerts, Frodin, & Radcliffe-Smith (2000)=Z.

* *Mercurialis annua* Linnaeus, Annual Mercury, Boys-and-girls, has been reported as a rare "ballast weed" from Charleston, SC and Mobile, AL(Wiggins 1932). It is presumably not established in our area. [= C, F, G, K, S, Z] {not keyed}

Ricinus Linnaeus 1753 (Castor-bean)

A monotypic genus, a shrub or tree, native to Africa and w. Asia, now pantropical. References: Govaerts, Frodin, & Radcliffe-Smith (2000)=Z.

* ***Ricinus communis*** Linnaeus, Castor-bean, Castor-oil Plant, Palma Christi. Cp (GA, NC, SC, VA), Pd (NC, SC): waste places, gardens; rare, native of the tropics, probably Africa. July-October. The seeds are dangerously poisonous, formerly the source of an oil used as a purgative and machine lubricant. In FL and further south in the tropics, *R. communis* is a small to medium tree. [= RAB, C, F, G, K, S, Z]

Sapium P. Browne (Milktree)

A genus of 21 species, trees and shrubs, of the Neotropics. The most recent monographers of *Sapium* and related genera (Kruijt 1996; Esser 2002) separate *Triadica* from *Sapium* sensu stricto. This conclusion is corroborated by molecular phylogenetic analysis (Wurdack, Hoffmann, & Chase 2005). References: Kruijt (1996)=Z; Govaerts, Frodin, & Radcliffe-Smith (2000)=Y. [also see *Triadica*]

* ***Sapium haematospermum*** Müller of Aargau, Milk-tree. Cp (FL): disturbed areas; rare, native of n. South America. Known in our area only from Escambia County, FL, where not recently seen. [= Y, Z; ? *S. caribaeum* Urban – K; ? *S. glandulosum* (Linnaeus) Morong – S, WH]

Stillingia Garden ex Linnaeus (Queen's-delight)

A genus of about 30 species, herbs, shrubs, and small trees, of tropical to subtropical regions of America, Madagascar, and se. Asia. References: Govaerts, Frodin, & Radcliffe-Smith (2000)=Z.

1 Stems woody, single; leaves < 1 cm wide; [of pineland ponds and other aquatic habitats] ..... ***S. aquatica***
1 Stems herbaceous, several from a crown; leaves > 1 cm wide; [of dry habitats] ..... ***S. sylvatica ssp. sylvatica***

Stillingia aquatica Chapman, Corkwood, Water Toothleaf. Cp (GA, SC): ponds in pine flatwoods; rare (SC Rare). May-September. Se. SC south to s. FL, west to sw. AL. [= RAB, K, S, Z]

Stillingia sylvatica Garden ex Linnaeus *ssp. sylvatica*, Queen's-delight. Cp (GA, NC, SC, VA), Pd (GA): sandhills, dryish coastal plain woodlands; common (VA Rare). May-July; June-September. Se. VA south to FL, west to TX and NM, north in the interior to KS. Ssp. *tenuis* (Small) D.J. Rogers is in s. FL. [= K, Z; < *S. sylvatica* – RAB, C, G; > *S. sylvatica* var. *sylvatica* – F; > *S. sylvatica* – S; > *S. spathulata* (Müller of Aargau) Small – S]

Tragia Linnaeus 1753 (Noseburn)

A genus of about 100-170 species, of tropical to warm temperate regions of the Old and New Worlds. References: Miller & Webster (1967)=Z; Govaerts, Frodin, & Radcliffe-Smith (2000)=Y.

1 Plant vining and trailing; larger leaf blades on a plant > 5 cm wide and > 8 cm long ..... ***T. cordata***
1 Plant not vining, erect; larger leaf blades on a plant < 3.5 cm wide and < 8 cm long.
  2 Leaf base cuneate at base; leaf blade 3-20× as long as wide ..... ***T. urens***
  2 Leaf base cordate, subcordate, truncate, or broadly rounded at base; leaf blade 1-3× as long as wide.
    3 Petioles 1-4 mm long; leaves rounded to acute at the tip; stamens 2 (-3) ..... ***T. smallii***
    3 Petioles 3-17 mm long; leaves acute to acuminate at the tip; stamens 3 ..... ***T. urticifolia***

Tragia cordata Michaux, Heartleaf Noseburn. Cp (GA): rocky calcareous woodlands, calcareous prairies; rare (GA Rare). C. KY, s. IN to s. MO, south through c. TN, rarely to e. TN (Meigs County, in the Ridge and Valley Province) (Chester, Wofford, & Kral 1997), n. AL (Jackson Co.) (D. Spaulding pers. comm.) to sc. and sw. GA, Panhandle FL, and e. TX. [= C, K, Z; = *T. macrocarpa* Willdenow – S]

Tragia smallii Shinners, Gulf Coast Noseburn. Cp (GA): sandhills; uncommon. Sw. GA west to e. TX. Reports of *T. betonicifolia* from GA are based on misapplication of that name to material representing *T. smallii*. [= K, Z; = *T. betonicaefolia* Nuttall – S, misapplied; *T. betonicifolia* Nuttall, misapplied]

Tragia urens Linnaeus, Southeastern Noseburn, Wavyleaf Noseburn. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (SC): sandhills, sandy woodlands, other woodlands; common (rare in Piedmont and Mountains). May-October. Se. VA south to FL and west to TX, mostly on the Coastal Plain, but ranging into the mountains southward. [= RAB, C, F, G, K, S, W, Z; = *T. linearifolia* Elliott – S]

Tragia urticifolia Michaux, Nettleleaf Noseburn. Pd (GA, NC, SC, VA), Cp (GA, SC), Mt (SC): dry woodlands and rock outcrops, particularly over mafic or calcareous rocks; common (VA Rare). May-October. Sc. VA west to MO, KS, and CO, south to FL and AZ. [= RAB, F, G, K, W; = *T. urticaefolia* – S, orthographic variant]

Triadica Loureiro 1790 (Chinese Tallow-tree)

A genus of 1-3 species, native to tropical and subtropical Asia. The most recent monographers of *Sapium* and related genera (Kruijt 1996; Esser 2002) place our naturalized species in the genus *Triadica*, native to Asia; *Sapium* (excluding *Triadica*) is a genus of 21 species restricted to the neotropics. This conclusion is corroborated by molecular phylogenetic analysis (Wurdack, Hoffmann, & Chase 2005). References: Kruijt (1996)=Z; Esser (2002)=Y; Govaerts, Frodin, & Radcliffe-Smith (2000)=X.

* ***Triadica sebifera*** (Linnaeus) Small, Chinese Tallow-tree, Popcorn Tree. Cp (FL, GA, NC, SC): marsh edges, shell deposits, disturbed areas; common (uncommon in NC and SC), native of e. Asia. May-June; August-November. With *Euphorbia, Chamaesyce*, and *Cnidoscolus*, one of our few Euphorbiaceous genera with milky sap. *Triadica sebifera* has become locally common from Colleton County, SC southward through the tidewater area of GA, and promises to become a serious weed tree (as it is in parts of LA, TX, and FL). [= K, S, X, Y, Z; = *Sapium sebiferum* (Linnaeus) Roxburgh – RAB, GW, WH]

Vernicia Loureiro 1790 (Tung-oil Tree)

A genus of 3 species, trees, native of se. Asia. References: Govaerts, Frodin, & Radcliffe-Smith (2000)=Z.

* ***Vernicia fordii*** (Hemsley) Airy-Shaw, Tung-oil Tree, Tung Tree. Cp (FL, GA, NC): planted for the oil and for ornament, rarely naturalizing; rare, native of central and western China. Naturalized on the Gulf Coastal Plain from former plantations; planted and showing a tendency to naturalize in the Coastal Plain of NC (Mount Olive, Wayne Co.). [= K, Z; = *Aleurites fordii* Hemsley -- WH]

FABACEAE Lindley 1836 *or LEGUMINOSAE* A.L. de Jussieu 1789 (Legume Family)

A family of about 730 genera and 20,000 species, trees, shrubs, and herbs, cosmopolitan. References: Isely (1990)=SE (throughout the family treatment); Isely (1998)=I; Lewis et al. (2005); Wojciechowski, Lavin, & Sanderson (2004); Wilbur (1963a); Robertson & Lee (1976).

1 Trees, shrubs, or woody vines ..... **Key A**
1 Herbs (including herbaceous vines).
  2 Leaves 4-many-foliolate.
    3 Leaves palmately compound, with 4 or more leaflets ..... **Key B**
    3 Leaves pinnately or bipinnately compound.
      4 Leaves bipinnately compound ..... **Key C**
      4 Leaves pinnately compound ..... **Key D**
  2 Leaves 1-3-foliolate.
    5 Leaves unifoliolate ..... **Key E**
    5 Leaves trifoliolate.
      6 Leaves pinnately trifoliolate ..... **Key F**
      6 Leaves palmately trifoliolate ..... **Key G**

Key A – woody legumes (trees, shrubs, or woody vines)

1 Leaves unifoliolate or trifoliolate, or reduced to phyllodial spines.
  2 Tree; leaves unifoliolate and > 5 cm wide; [subfamily *Caesalpinioideae*, tribe *Cercideae*] ..... ***Cercis***
  2 Shrubs or woody vines (rarely tree in *Erythrina*); leaves trifoliolate, unifoliolate, or reduced to phyllodial spines (if unifoliolate, < 2 cm wide); [subfamily *Papilionoideae*].
    3 Woody vine.
      4 Calyx 4.5-6 mm long; leaflets unlobed; [tribe *Phaseoleae*, subtribe *Diocleinae*] ..... ***Dioclea***
      4 Calyx 10-12 mm long; leaflets generally lobed; [tribe *Phaseoleae*, subtribe *Glycininae*] ..... ***Pueraria***
    3 Shrub or tree.
      5 Shrub or tree with twigs various, but not conspicuously green or flanged; leaves pinnately trifoliolate.
        6 Corolla 30-50 mm long, scarlet; legume with several seeds; leaflets lobed or not; [tribe *Phaseoleae*, subtribe *Erythrininae*] ..... ***Erythrina***
        6 Corolla 8-15 mm long, purplish, pink, or white; legume 1-seeded; leaflets not lobed; [tribe *Desmodieae*, subtribe *Lespedezinae*] ..... ***Lespedeza***
      5 Shrub with angled or flanged green twigs; leaves palmately trifoliolate, unifoliolate, or reduced to spine-tipped phyllodes; flowers bright yellow; [introduced, usually of roadsides or as remnants of cultivation]; [tribe *Genisteae*, subtribe *Genistinae*].
        7 Leaves all reduced to phyllodial spines; flowers axillary; calyx 10-15 mm long ..... ***Ulex***
        7 Leaves with normal lamina, either unifoliolate or trifoliolate; flowers in terminal racemes; calyx 3-6 mm long.
          8 Leaves trifoliolate lower on the stem, often unifoliolate above; corolla 15-22 mm long ..... ***Cytisus***

8 Leaves unifoliolate throughout; corolla 10-14 mm long ..... *[Genista]*

1 Leaves pinnate.
9 Woody vines; [subfamily *Papilionoideae*].
10 Leaves even-pinnate; legume 3.5-4 cm long; seeds shiny scarlet and black; [tribe *Abreae*] ..... *[Abrus]*
10 Leaves odd-pinnate; legume 4-15 cm long; seeds brown; [tribe *Milletieae*] ..... *Wisteria*
9 Trees or shrubs.
11 Leaves 2×-even-pinnate; [subfamily *Mimosoideae*]
12 Stamens connate at the base; inflorescence pink, 2.5-5 cm in diameter; [tribe *Ingeae*]
13 Petioles with glands; leaves with >4 pinnae pairs, each pinna with >10 pinnule pairs; inflorescence 2.5-5 cm in diameter ..... *Albizia*
13 Petioles lacking glands; leaves with 2 pinnae pairs, each pinna with <8 pinnule pairs; inflorescence 5-7 cm in diameter ..... *Calliandra*
12 Stamens free; inflorescence orange or yellowish-white, 1.0-2.2 cm in diameter.
14 Inflorescence yellowish-white, 1.8-2.2 cm in diameter; stamens 10; [tribe *Mimoseae*] ..... *Leucaena*
14 Inflorescence orange, 1.0-1.3 cm in diameter; stamens many; [tribe *Acacieae*] ..... *Vachellia*
11 Leaves otherwise.
15 [subfamily *Papilionoideae*].
16 Leaves glandular-punctate; corolla of only 1 petal; inflorescence a spike; shrubs; [tribe *Amorpheae*] ..... *Amorpha*
16 Leaves not glandular-punctate; corolla of 5 petals; inflorescence a raceme or panicle; trees or shrubs.
17 Leaflets alternate on the rachis; leaflets 4-15 (-20) cm long; [tribe *Sophoreae*] ..... *Cladrastis*
17 Leaflets opposite on the rachis, leaflets (1-) 2-5 (-6) cm long.
18 Leaflets with persistent linear stipels; native and cultivated, collectively widespread in our area; [tribe *Robinieae*] ..... *Robinia*
18 Leaflets lacking stipels; cultivated, perhaps not established; [tribe *Sophoreae*] ..... *[Styphnolobium]*
15 [subfamily *Caesalpinioideae*].
19 Leaves all 2-pinnate, or a mixture of 2-pinnate and 1-pinnate on the same plant; shrub or tree; [tribe *Caesalpineae*].
20 Leaves a mixture of 1-pinnate and 2-pinnate ..... *Gleditsia*
20 Leaves all 2-pinnate.
21 Leaves petiolate; leaflets 20-70 mm long ..... *Gymnocladus*
21 Leaves subsessile (the pinnae simulating 1-pinnate leaves); leaflets 1-5 mm long ..... *Parkinsonia*
19 Leaves all 1-pinnate (or appearing so in *Parkinsonia*); herb, shrub or tree.
22 Shrub with prominent glands on the leafstalk; [tribe *Cassieae*] ..... *Senna*
22 Tree or shrub (if a shrub, then lacking prominent glands on the leafstalk); [tribe *Caesalpineae*].
23 Leaflets 13-45 mm long; tree; leaves 1-pinnate ..... *Gleditsia*
23 Leaflets 1-5 mm long; shrub; leaves actually 2-pinnate, but subsessile, the pinnae simulating 1-pinnate leaves ..... *Parkinsonia*

Key B – herbaceous legumes with palmate leaves with 4 or more leaflets

Lupinus, Orbexilum, Pediomelum, Psoralidium, Zornia

Key C – herbaceous legumes with bipinnate leaves

1 Stamens > 10 ..... *Acaciella*
1 Stamens 10 or fewer,
2 Petiole with 1-several glands; stems ascending to erect; flowers greenish-white ..... *Desmanthus*
2 Petiole without glands; stems prostrate to weakly arching; flowers pink-purple, yellow, or greenish-yellow.
3 Flowers pink-purple; legume ribbed, the ribs with prickles ..... *Mimosa*
3 Flowers yellow to greenish-yellow; legume not ribbed or prickly ..... *Neptunia*

Key D – pinnate plus

Aeschynomene, Apios, Arachis, Astragalus, Chapmannia, Clitoria, Dalea, Galactia, Glottidium, Glycyrrhiza, Lathyrus, Lotus, Pisum, Securigera, Sesbania, Tephrosia, Vicia

Key E – unifoliolate

Alysicarpus, Baptisia, Crotalaria, Lupinus, Orbexilum, Pediomelum, Rhynchosia

Key F – pinnately trifoliolate

Amphicarpaea, Canavalia, Centrosema, Clitoria, Cullen, Dalea, Desmodium, Erythrina, Galactia, Glycine, Indigofera, Lablab, Lespedeza, Lotus, Macroptilium, Medicago, Melilotus, Mucuna, Orbexilum, Pediomelum, Phaseolus, Rhynchosia, Stylosanthes, Strophostyles, Trifolium, Vigna

Key G – palmately trifoliolate

Abrus Adanson 1763 (Precatory Bean)

A genus of about 17 species, woody vines and shrubs, of the Old World tropics, now pantropical. References: Isely (1998)=I.

* *Abrus precatorius* Linnaeus, Precatory Bean, Rosary Pea, Crab's Eye, Jequirity. Apparently reported for GA, AL, and AR by Isely (1998) and Kartesz (1999), but this is actually based on mislabeling in Map 64 in Isely (1998). The species does occur in peninsular FL, south of our area. The beautiful black-and-red beans have been traditionally used for jewelry and rosaries; they are extremely poisonous, though. [= I, K, WH; = *Abrus abrus* (Linnaeus) L.F. Wight – S]

Acaciella Britton & Rose 1928 (Acacia)

A genus of about 15 species, of sc. and se. United States south to Argentina. References: Isely (1998)=I.

Acaciella hirta Britton & Rose, Prairie Acacia. Cp (FL): sandhills, disturbed sandy areas; rare. W. LA, AR, and MO west to KS, OK, and TX; disjunct in e. Panhandle FL and n. peninsular FL. [= S; = *Acacia angustissima* (P. Miller) Kuntze var. *hirta* (Nuttall) B.L. Robinson – I, K, SE, WH; = *Acacia hirta* Nuttall]

Acmispon Rafinesque 1832 (American Bird's-foot-trefoil)

A genus of about 8 species, annual and perennial herbs, of temperate North America and South America. New World taxa often referred to *Lotus* are not closely related to *Lotus*, and should be segregated (Degtjareva et al 2006; Allan & Porter 2000). References: Isely (1981)=Z; Isely (1998)=I; Degtjareva et al. (2006); Allan & Porter (2000); Grant & Small (1996).

Acmispon helleri (Britton) A.A. Heller, Carolina Prairie-trefoil. Pd (GA, NC, SC, VA): dry woodlands and openings, originally probably limited to prairie-like sites (fire-maintained, post oak-blackjack oak savannas), generally on clayey soils, now primarily seen on roadbanks, along railroads, and in powerline rights-of-way, where mowing and bush-hogging have replaced fire as the force keeping the habitat open, sunny, and suitable for this plant of prairie affinities; rare. June-September. *A.. helleri* is endemic to the Piedmont of extreme sc. VA, NC, SC, and ne. GA. *A. helleri* is clearly closely related to *A. americanus* (= *Lotus unifoliolatus*, = *Lotus purshianus*, = *Lotus americanus*), of prairies of the midwestern states and various habitats further west, which ranges east to LA, AR, MO, IL, IN, and WI. Isely (1981) reduced *A. helleri* to a variety (in *Lotus*), because it "is but one of many elements within the *L. purshianus* complex and its differences from the rest are less than among the California races," while also stating "since it has no breeding contact with var. *purshianus*, it is reasonably maintained as a species." Since *A. helleri* seems adequately separated from *A. americanus* by its narrower leaflets, glabrate vestiture, and allopatric distribution, I have chosen to "reasonably maintain it as a species." [= S; = *Lotus helleri* Britton – RAB; < *L. americanus* (Nuttall) Bischoff – F; < *L. purshianus* F.E. & E.G. Clements – G; = *L. unifoliolatus* (Hooker) Bentham var. *helleri* (Britton) Kartesz & Gandhi – K; = *L. purshianus* F.E. & E.G. Clements var. *helleri* (Britton) Isely – C, I, SE, Z]

Aeschynomene Linnaeus 1753 (Joint-vetch)

A genus of about 175 species, herbs and shrubs, pantropical and warm temperate. References: Carulli, Tucker, & Dill (1988)=Z; Rudd (1955)=Y; Isely (1998)=I. Key adapted in part from SE.

1 Prostrate perennial; leaves with 3-18 leaflets [of dry, sandy or disturbed areas].
  2 Leaves with 8-18 leaflets; leaflets 3-4 mm long; [rare alien, of disturbed areas]..... ***Ae. hystrix var. incana***
  2 Leaves with 3-7 (-9) leaflets; leaflets 4-12 mm long; relatively common native, of dry sandy pinelands]..... ***Ae. viscidula***
1 Erect or ascending annual; leaves with 20-50 or more leaflets; [of moist to wet habitats].
  3 Leaflets with 2-4 longitudinal nerves; mature fruit stipe 1.5-3 mm long..... ***Ae. americana var. americana***
  3 Leaflets with 1 longitudinal nerve; mature fruit stipe 4-25 mm long.
    4 Mature fruit stipe 12-25 mm long; corolla (10-) 12-15 mm long; fruit segments 5-7 mm long, 4.5-6.5 mm wide; paired bracts subtending each flower toothed (rarely entire); standard greenish-yellow with distinct dark-red veins; leaflets 6-25 mm long, 2-5 mm wide..... ***Ae. virginica***
    4 Mature fruit stipe 4-8 (-10) mm long; corolla 7-13 (-15) mm long; fruit segments 4-6 mm long, 3.5-6 mm wide; paired bracts subtending each flower toothed or entire; standard pale orange or reddish-orange, the veins usually indistinct; leaflets 2.5-25 mm long, 1-4 mm wide.
      5 Paired bracts subtending each flower entire (rarely toothed); leaflets 2.5-13 mm long, 1-2.5 mm wide; fruit segments 4-5 mm wide, 3.5-5 mm wide..... ***Ae. indica***
      5 Paired bracts subtending each flower toothed (rarely entire); leaflets 6-25 mm long, 1.5-4 mm wide; fruit segments 5-6 mm wide, 5-6 mm wide..... ***Ae. rudis***

Aeschynomene americana Linnaeus *var.* ***americana***, Shyleaf. Cp (FL, GA), {AL, LA}: moist, disturbed sites; uncommon (rare in GA). S. GA southward (Jones & Coile 1988, SE). [= I, SE, Y; < *Ae. americana* – K, S, WH]

* ***Aeschynomene histrix*** Poiret *var.* ***incana*** (Vogel) Bentham. Cp (FL): disturbed areas, rare, native of tropical America. Probably introduced on ship's ballast at Pensacola in the 19th century, but seemingly established as it was recollected in Escambia County, FL, in 1985 (Isely 1990). [= K, WH; = *Ae. hystrix* var. *incana* – SE, orthographic variant]

Aeschynomene indica Linnaeus, Southern Joint-vetch Cp (FL, GA, NC, SC, VA) {AL, LA, MS}: marshes, ditches, disturbed wetlands; uncommon (rare in VA). July-October. Apparently native to se. North America, from NC west to AR, south to s. FL and TX, now widespread in the tropics and subtropics of the Old World and New World. Perry, Ware, & McKenney-Mueller (1998) discuss the occurrence of this species in VA. [= GW, I, K, SE, WH, Y, Z; < *Ae. virginica* – S]

* ***Aeschynomene rudis*** Bentham, Frisolillo. Cp (GA, NC, SC), {AL} : roadside ditches, rice fields, disturbed wetlands; rare, native of South America. July-October. Native to South America, introduced in se. United States, recently becoming a weed. [= I, K, SE, WH, Y, Z]

Aeschynomene virginica (Linnaeus) Britton, Sterns, & Poggenburg, Northern Joint-vetch, Sensitive Joint-vetch. Cp (NC, VA): fresh to brackish tidal marshes and adjacent ditches, fields, and disturbed areas; rare. July-October. NJ to ne. NC. Generally not weedy in most of its range, but in NC (now) found mostly in weedy situations, such as ditches or fields hydrologically connected to tidal waters. See Tyndall, Holt, & Lam (1996) and Belden & Van Alstine (2003) for additional information on habitat, population biology, and survey techniques. See Baskin et al. (1998) for additional information about seed germination and viability. [= RAB, C, F, G, I, K, SE, Y, Z; < *Ae. virginica* – S (also see *Ae. indica*)]

Aeschynomene viscidula Michaux, Sticky Joint-vetch. Cp (FL, GA) {AL, MS}: dry sandy areas, such as sandhills, dry pinelands, and barrier islands; uncommon (rare in GA). From s. GA southward (Jones & Coile 1988, SE). [= I, K, SE, WH, Y; = *Secula viscidula* (Michaux) Small – S]

Albizia Durazzini 1772 (Silktree)

A genus of about 100-120 species, trees, shrubs, and vines, of tropical, subtropical, and warm temperate Asia, Africa, and America. References: Isely (1973)=Z; Isely (1998)=I.

1 Leaflets 7-15 mm long; bark of mature trees smoothish, with small wart-like bumps ..... ***A. julibrissin***
1 Leaflets 15-30 mm long; bark of mature trees rough, with plates ..... ***A. kalkora***

* ***Albizia julibrissin*** Durazzini, Mimosa, Silktree. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): disturbed areas, suburban woodlots, escaped and persistent in forests and woodlands; common (uncommon in VA Mountains), native of tropical Asia. May-August; July-November. Becoming a serious weed; "literally almost everywhere in the 'Dixie' south" (Isely 1973). [= RAB, C, I, K, SE, W, WH, Z; = *Albizzia julibrissin* – F, G, S, orthographic variant]

* ***Albizia kalkora*** (Roxburgh) Prain, Kalkora Mimosa. Pd (NC): naturalizing in suburban areas; rare, native of e. Asia (Japan, Korea, Taiwan). Documented by herbarium specimens at DUKE and NCU.

Alysicarpus Necker ex Desvaux 1813 (Alyce Clover)

A genus of about 25-30 species, herbs, native of the Old World tropics. References: Isely (1998)=I.

* ***Alysicarpus ovalifolius*** (Schumacher) J. Léonard, Alyce Clover. Cp (FL, GA, VA), Pd (GA, NC): disturbed areas; rare, native of the Old World Tropics, planted as a forage crop (at least formerly), and rarely naturalized. The VA occurrence is from chrome ore piles in Newport News – presumably a waif. [= WH; < *Alysicarpus vaginalis* (Linnaeus) A.P. de Candolle – I, K, SE]

Amorpha Linnaeus 1753 (Indigo-bush, Leadplant)

A genus of about 15 species, shrubs, of temperate North America. References: Wilbur (1964)=Z; Wilbur (1975)=Y; Isely (1998)=I.

1 Short shrubs, usually 0.3-1 (-1.5) m tall; petioles 1-15 (-20) mm long, usually shorter than the width of the contiguous leaflets (except in *A. georgiana* var. *confusa*); leaflets usually slightly or conspicuously revolute.
  2 Leaflet mucros mostly swollen apically; plant usually evidently and rather densely pubescent or puberulent (except *A. herbacea* var. *floridana*, of s. GA and FL).
    3 Upper portions of the plant (stems and leaves) glabrescent; calyx tube glabrous to sparsely or densely minutely strigillose; fruit glabrous; [of s. GA southward] ..... ***A. herbacea var. floridana***
    3 Upper portions of the plant (stems and leaves) conspicuously pubescent; calyx tube densely puberulent to short pilose; fruit densely to sparsely puberulent (rarely glabrate); [widespread in our area] ..... ***A. herbacea var. herbacea***
  2 Leaflet mucros mostly tapered apically; plant usually glabrous or sparsely pubescent.
    4 Leaflets (10-) 15-25 (-35) mm long, (7-) 9-15 (-18) mm wide; standard intense (rarely light) bright blue; petiole (6-) 8-15 (-20) mm long; racemes mostly panicled, (1-) 3-5 (-8) per flowering branch, 10-20 (-45) cm long; flowering June-July .. ***A. georgiana var. confusa***
    4 Leaflets (3-) 6-10 (-15) mm long, (2-) 3-5 (-8) mm wide; standard reddish-purple; petiole 1-3 (-5) mm long; racemes solitary (less commonly panicled), 1 (-4) per flowering branch, (2-) 3-5 (-6) cm long; flowering April-May ..... ***A. georgiana var. georgiana***
1 Taller shrubs, usually 1-3 (-4) m tall, petioles 10-30 mm long, usually exceeding the width of the contiguous leaflets; leaflets not revolute, or slightly so.
  5 Calyx lobes (1.2-) 2.0-3.5 mm long (thus approaching, equal to, or exceeding the length of the calyx tube); racemes 3-8 (-15) cm long .....

..... ***A. schwerinii***

5 Calyx lobes (0-) 0.2-1.2 mm long (thus distinctly shorter than the calyx tube); racemes 5-20 (-25) cm long.
6 Calyx lobes obsolete to very small, (0-) 0.2-0.6 (-0.8) mm long; plants glabrous to glabrate; leaflets usually not mucronate, the midrib commonly terminating in a sessile or shortly exserted (0.2-0.4 mm), slightly enlarged, glandular tip; leaflets relatively few, (9-) 11-15 (-19)..... ***A. glabra***
6 Calyx lobes small, 0.2-1.2 mm long (the abaxial lobe usually 0.8-1.2 mm long); plants pubescent or puberulent, usually conspicuously so; leaflets usually mucronate, the midrib usually slender, exserted, 0.5-1.5 mm long and tapering; leaflets relatively many, 9-23 (-31).
7 Foliage remaining green when dried; leaflets (7-) 9-23 (-31) per leaf, dull to somewhat shiny above; [widespread in our area]..... ***A. fruticosa***
7 Foliage blackening when dried; leaflets (7-) 9-15 (-19) per leaf, usually shiny above; [of s. SC and southward]..... ***A. nitens***

Amorpha fruticosa Linnaeus, Tall Indigo-bush. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): riverbanks, forests, woodlands, marsh edges, sometimes in disturbed sites; uncommon (rare in VA Mountains). April-June; June-October. [= RAB, C, G, GW, I, K, SE, W, WH, Y; > *A. fruticosa* var. *fruticosa* – F; > *A. fruticosa* var. *tennessensis* (Shuttleworth) E.J. Palmer – F; > *A. curtissii* Rydberg – S; > *A. fruticosa* – S; > *A. tennesseensis* Shuttleworth – S; > *A. virgata* Small – S]

Amorpha georgiana Wilbur *var.* ***confusa*** Wilbur, Savanna Indigo-bush. Cp (NC, SC): pine savannas; rare. (May-) June-July; August-October. The varietal epithet is rather unfortunate; it refers to nomenclatural, rather than taxonomic, confusion. In fact, the two varieties of *A. georgiana* seem so distinct that they warrant specific status. Var. *confusa* is a narrow endemic of the se. Coastal Plain of NC (Brunswick, Columbus, and Bladen counties) and immediately adjacent SC (Horry County). It is restricted to moist loamy savannas, especially on the Foreston soil series, a habitat now largely destroyed by fire suppression, real estate development, and conversion of savannas to pine tree farms. [= I, K, SE, Y, Z; < *A. georgiana* – RAB, GW; ? *A. cyanostachya* auct. non M.A. Curtis – S, in part]

Amorpha georgiana Wilbur *var.* ***georgiana***, Georgia Indigo-bush. Cp (GA, NC, SC): pine savannas, sandy river terraces; rare. Late April-June; July-October. As mentioned above, the two varieties of *A. georgiana* probably deserve specific recognition. Var. *georgiana* is endemic to the Coastal Plain of sc. NC, SC, and se. GA, primarily in the fall-line Sandhills region, but rarely found on younger terraces (as far east as Pender County, NC). Much of its habitat has been destroyed. [= I, K, SE, Y, Z; < *A. georgiana* – RAB, GW]

Amorpha glabra Desfontaines ex Poiret, Appalachian Indigo-bush, Mountain Indigo. Mt, Pd (GA, NC, SC): dry to dry-mesic ridgetop and slope forests, primarily in the Blue Ridge escarpment; uncommon (rare in GA and SC). May-July; July-October. Endemic to the Southern Appalachian mountains (and nearby provinces) of n. AL, ne. GA, w. NC, nw. SC, and e. and c. TN. [= RAB, I, K, S, SE, W, Y]

Amorpha herbacea Walter *var.* ***floridana*** (Rydberg) Wilbur, Florida Indigo-bush. Cp (FL, GA): pine flatwoods and sandy river terraces; rare. Se. GA (Echols County) south into FL (Sorrie 1998b). [= Y, Z; < *A. herbacea* var. *herbacea* – I, K, SE; = *A. floridana* Rydberg – S; < *A. herbacea* – WH]

Amorpha herbacea Walter *var.* ***herbacea***, Dwarf Indigo-bush. Cp (FL, GA, NC, SC), Pd (GA, SC), Mt (NC): pine savannas, pine flatwoods, sandhills, other open forests and disturbed sites; common (rare in Mountains). May-July; July-October. Endemic to FL, GA, SC, and NC, mostly limited to the Coastal Plain. [= Y, Z; < *A. herbacea* – RAB, W, WH; = *A. herbacea* – S; < *A. herbacea* var. *herbacea* – I, K, SE]

Amorpha nitens Boynton, Dark Indigo-bush. Cp (SC), Pd, Mt (GA): sandy woodlands, rocky slopes, bottomland forests; rare. April-June. S. SC south to GA, west to LA, north in the interior to w. KY, s. IL, AR, and e. OK. First reported for SC by Nelson & Kelly (1997). [= I, K, S, SE, Y]

Amorpha schwerinii C. Schneider, Piedmont Indigo-bush. Pd (GA, NC, SC): forests and woodlands, primarily rather xeric and rocky (though not exclusively so); rare. April-June; June-October. Endemic to the Piedmont (rarely adjacent provinces) of sc. NC, c. SC, nc. GA, e. AL, and ne. MS. [= RAB, I, K, S, SE, Y]

Amphicarpaea Elliott ex Nuttall 1818 (Hog-peanut)

A genus of 5-6 species, of e. and se. Asia, North America, and montane Africa. It now appears that 2-3 semi-cryptic taxa should be recognized in what has traditionally been considered a single species of *Amphicarpaea* (Callahan 1997, Parker 1996). The genus name has been corrected to *Amphicarpaea* from the frequently used *Amphicarpa*. References: Callahan (1997)=Y; Parker (1996)=Z; Isely (1998)=I.

1 Petiole 3.5-5.3 cm long; petiolule of the terminal leaflet 1.0-1.4 mm long; terminal leaflet 4.2-5.2 cm long..... ***A. bracteata var. bracteata***
1 Petiole 6.0-6.8 cm long; petiolule of the terminal leaflet 1.7-1.9 mm long; terminal leaflet 5.5-6.1 cm long..... ***A. bracteata var. comosa***

Amphicarpaea bracteata (Linnaeus) Fernald *var.* ***bracteata***, Hog-peanut. {Mt, Pd, Cp (GA, NC, SC, VA) {FL}: dry to moist forests, thickets; common (rare in FL?). July-September; August-October. Producing inflorescences of two types, one with chasmogamous flowers and aerial legumes, the other with cleistogamous flowers and subterranean legumes. The distributions and habitats of the two varieties in our area require herbarium and field investigation}. [= K; = *Amphicarpa bracteata* var. *bracteata* – F, G, orthographic variant; < *Amphicarpaea bracteata* – C, I, SE, WH; < *Amphicarpa bracteata* – RAB, orthographic variant; < *Falcata comosa* (Linnaeus) Kuntze – S]

Amphicarpaea bracteata (Linnaeus) Fernald *var.* ***comosa*** Fassett, Hog-peanut. {Mt, Pd, Cp (GA, NC, SC, VA): dry to moist forests, thickets; common. July-September; August-October. Producing inflorescences of two types, one with chasmogamous flowers and aerial legumes, the other with cleistogamous flowers and subterranean legumes. The distributions and habitats of the two varieties in our area require herbarium and field investigation}. [= K; = *Amphicarpa bracteata* var.

comosa – F, G, orthographic variant; < *Amphicarpaea bracteata* – C, I, SE, WH; < *Amphicarpa bracteata* – RAB, orthographic variant; < *Falcata comosa* (Linnaeus) Kuntze – S]

Apios Fabricius 1759 (Groundnut)

A genus of about 7-10 species, perennial vines, of temperate e. Asia and e. North America. References: Woods (2005)=Z; Isely (1998)=I. Key based on Z.

1 Petiole 20-58 mm long; flower deep maroon to pale maroon and white; style glabrous; legume 6-10 (-12) cm long; seed 5-6 mm long; tubers several in a chain, each 2-10 cm in diameter ..... ***A. americana***
1 Petiole 70-75 mm long; flower pale green and rose-purple; style bearded; legume 12-15 (-18) cm long; seed 7.2-11.0 mm long; tuber 1, 15-20 cm in diameter ..... ***A. priceana***

Apios americana Medikus, Common Groundnut. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): marshes, wet thickets, streambanks, bottomland forests; common. June-August; July-September. Nova Scotia, New Brunswick, and Québec west to MN and SD, south to s. FL and TX. [= RAB, C, GW, I, K, SE, W, WH, Z; > *A. americana* var. *americana* – F, G; > *A. americana* var. *turrigera* Fernald – F, G; = *Glycine apios* Linnaeus – S]

Apios priceana B.L. Robinson, Kentucky Groundnut, Price's Potato-bean. Ip (AL, KY, MS, TN), Cp (KY, MS): mixed oak woods, especially over limestone; rare. Sw. KY, c. TN, ne. MS, and n. and c. AL. [= C, F, G, I, K, SE, Z; = *Glycine priceana* (B.L. Robinson) Britton – S]

Arachis Linnaeus 1753 (Peanut)

A genus of about 60 species, annual and perennial herbs, native of South America (especially Brazil). References: Isely (1998)=I.

1 Petiole 5-10 cm long; corolla 1.1.5 cm long; annual ..... ***A. hypogaea***
1 Petiole 2.5-3.5 cm long; corolla 1.8-2 cm long; perennial ..... ***A. prostrata***

* ***Arachis hypogaea*** Linnaeus, Peanut. Cp (FL, GA, NC, SC, VA), Pd (NC): fields; commonly cultivated, rarely persistent, native of South America. July-October. This remarkable plant bears normal aerial flowers, but following pollination the pedicels elongate and arch downward, the legume soon buried and developing underground. [= RAB, C, F, I, K, S, SE, WH]

* ***Arachis prostrata*** Bentham, Grassnut. Cp (FL): disturbed areas; rare, native of South America, planted on raodsides and spreading. July-October. Anderson (2007) states that this is "naturalized and spreading." [= K, WH; ? *A. glabrata* Bentham – I, SE, misapplied] {add to synonymy S}

Astragalus Linnaeus 1753 (Milkvetch)

A grenus of 2300-2500 species, herbs and shrubs, most diverse in arid regions of w. North America and w. and c. Asia. The habitats of the southeastern species may be characterized as rocky or sandy, "relictual islands" of aridity in the generally moist landscape of eastern North America. References: Barneby (1964)=Z; Isely (1998)=I.

1 Legume pilose with > 1 mm or more long; stems conspicuously pubescent, the hairs spreading and simple; plants decumbent, spreading, or ascending, the stems 0.5-4 dm long.
  2 Corolla 14-19 mm long; leaflets 17-29; legume bilocular; calyx lobes shorter than the calyx tube; [of calcareous habitats of the interior] ..... ***A. tennesseensis***
  2 Corolla 8-12 mm long; leaflets (5-) 7-15; legume unilocular; calyx lobes equaling or longer than the calyx tube [of dry sandy habitats from SC south] ..... ***A. villosus***
1 Legume glabrous; stems glabrous or inconspicuously pubescent, the hairs appressed, simple or dolabriform; plants erect with stems (3-) 4-15 dm long, or decumbent with stems 1-3 dm long (*A. distortus* var. *distortus* and *A. bibullatus*).
  3 Plants erect, stems (3-) 4-15 dm long; legume straight to moderately curved.
    4 Lower stipules connate; pubescence dolabriform; legumes 1-1.5 cm long, 4-5 mm in diameter; [typically of dry to mesic soils] ..... ***A. canadensis var. canadensis***
    4 Lower stipules free; pubescence simple; legumes either longer or wider (2-3 cm long and 4-6 mm in diameter in *A. michauxii*, 1.5-2.0 cm long and 8-18 mm in diameter in *A. neglectus*); [typically of notably dry, either rocky or sandy, soils].
      5 Leaves with 21-31 coriaceous to somewhat fleshy leaflets, many of the leaflets alternate or subopposite; legumes 2-3 cm long, 4-6 mm in diameter; [of dry sandy habitats from NC south] ..... ***A. michauxii***
      5 Leaves with 11-23 thin-textured leaflets, all of the leaflets usually opposite; legumes 1.5-2 cm long, 8-18 mm in diameter; [of rocky calcareous habitats from VA north] ..... ***A. neglectus***
  3 Plants decumbent or ascending, stems 1-5 dm long; legume either dry and strongly curved (about 90 degrees), or globose and initially fleshy.
    6 Legume globose, 1.3-2 cm in diameter, initially fleshy; corolla 18-25 mm long; [of calcareous glades of c. TN] ..... ***A. bibullatus***
    6 Legume lanceolate, 1.2-2.5 cm long, 4-7 mm wide, strongly curved; corolla (7-) 8-15 mm long; [of shaley habitats from w. VA northward or of dry sandy sites in FL and possibly adjacent GA].
      7 Leaflets mostly 1-2× as long as wide, typically noticeably notched at the tip; mature legume reticulately textured; corolla 8-11 mm long; [of dry sandy sites in FL and possibly adjacent GA and s. MS] ..... ***A. obcordatus***

7 Leaflets mostly 2-3.5× as long as wide, truncate or shallowly notched at the tip; mature legume lacking a reticulately textured surface; corolla 9-15 mm long; [**either** of shaley habitats from w. VA northward **or** of woodlands and prairies from MS westward]
8 Keel 7-9.5 mm long; legume usually 3-4× as ling as wide, often curved 90°, grooved along sutures on both sides ..... ***A. distortus var. distortus***
8 Keel 6-7 mm long; legume usually 2.5-3.5x as long as wide, nearly straight or curved < 90°, grooved only along one suture..... ***[A. distortus var. engelmannii]***

Astragalus bibullatus Barneby & E.L. Bridges, Pyne's Ground-plum. Ip (TN): calcareous glades; rare. Endemic to c. TN (Barneby & Bridges 1987). [= I, K, SE; = *Geoprumnon crassicarpum* (Nuttall) Rydberg ex Small – S, misapplied; = *A. crassicarpus* Nuttall, misapplied]

Astragalus canadensis Linnaeus *var.* ***canadensis***, Canada Milkvetch. Mt (GA, NC, SC, VA), Pd, Cp (NC, SC, VA): forests, woodlands, streambanks, rocky slopes and bluffs; uncommon (rare in VA Piedmont, rare in Coastal Plain, rare in GA). June-August; July-October. Ranging through much of North America, from Québec and Hudson Bay west to British Columbia, south to GA, TX, CO, and Utah; also apparently in Siberia. The other varieties occur further west. See Barneby (1964) for a detailed discussion of taxonomic and nomenclatural problems involving *A. canadensis*. Barneby comments that "the eastern mountain race [in the Appalachians] is commonly distinguished from var. *canadensis* of the Mississippi Valley and northward by a narrower and more open flowering and fruiting raceme, and the flowers at the same time are relatively small. There is something to be said in favor of recognizing an eastern montane variety, so long as we confine its distinguishing characteristic to a loose raceme." The distribution, as mapped by Barneby, is suggestive of a composite map of 2 (or more) different taxa, one of them being centered in the Southern and Central Appalachians (extending out into nearby provinces) . F and G separate var. *carolinianus*, basing the distinction, however, on a different set of characters, and considering var. *canadensis* to range south to VA (at least). Further study is needed; it seems we may have in our area 2 taxa worthy of distinction at the varietal level. [= I, K, SE, Z; < *A. canadensis* – RAB, C, W; > *A. canadensis* var. *canadensis* – F, G; > *A. canadensis* var. *carolinianus* (Linnaeus) M.E. Jones – F, G; > *A. carolinianus* Linnaeus – S]

Astragalus distortus Torrey & A. Gray *var.* ***distortus***, Ozark Milkvetch, Bent Milkvetch. Mt, Pd (VA): shale barrens and other dry, shaley places; rare. May-July. *A. distortus* is interpreted by Z (and followed by C and SE) to consist of 2 varieties: var. *distortus*, occurring in the s. Midwest from IL, MO, and OK south to MS, LA, and AR, and disjunct in n. and sc. VA, e. WV, and w. MD, and var. *engelmannii* (Sheldon) M.E. Jones, of TX and ne. LA. The two varieties seem fairly readily distinguishable morphologically in the Midwest. Appalachian var. *distortus* complicates the issue, since it approaches var. *engelmannii* in flower size and matches it in ovule number. The Appalachian plant, with a combination of morphologic characters not matching the two named varieties and far allopatric from them might better be considered a distinct variety. Further study is needed. [= C, I, K, SE, Z; < *A. distortus* – F, G; = *Holcophacos distortus* (Torrey & A. Gray) Rydberg – S]

Astragalus michauxii (Kuntze) F.J. Hermann, Sandhills Milkvetch, Michaux's Milkvetch. Cp (GA, NC, SC): sandhills; rare. Late April-June; June-October (and persisting). Sc. NC south through SC to GA, a Southeastern Coastal Plain endemic (reports from AL and FL are in error). "The Michaux milk-vetch is greatly isolated from any member of the genus morphologically similar" (Barneby 1964). [= RAB, I, K, SE, Z; = *Tium michauxii* (Kuntze) Rydberg – S]

Astragalus neglectus (Torrey & A. Gray) Sheldon, Cooper Milkvetch. Mt (VA): dry calcareous woodlands and barrens, over dolostone and limestone; rare. June-September. Se. Ontario west to se. Saskatchewan and ne. ND, south to w. NY, ne. PA, c. PA, n. OH, s. MI, se. WI, and e. SD; disjunct in w. VA and e. WV (Wieboldt et al. 1998). [= C, F, G, I, K, SE, Z]

Astragalus obcordatus Elliott, Florida Milk-vetch. Cp (FL, GA?): sandhills; rare. S. MS south to c. peninsular FL. Reported for s. GA, but no specimen documentation is known (Barneby 1964). [= I, K, SE, WH, Z; = *Phaca obcordata* (Elliott) Rydberg ex Small – S]

Astragalus tennesseensis A. Gray ex Chapman. Ip (AL, TN): calcareous glades; rare. C. TN, n. AL, IL (and formerly IN, and possibly MO). [= I, K, SE, Z; >< *A. tennessensis* – F; >< *A. plattensis* Nuttall – F; > *Geoprumnon tennesseense* (A. Gray ex Chapman) Rydberg – S; >< *Geoprumnon plattense* (Nuttall) Rydberg – S]

Astragalus villosus Michaux, Bearded Milkvetch, Southern Milkvetch. Cp (FL, GA, SC): sandhills and other dry, sandy places; common (rare in AL, GA, MS, and SC). May-June; June-August. A Southeastern Coastal Plain endemic: s. SC south to Panhandle FL, west to s. MS. This species is described by Barneby (1964) as "a lowly but delightful little astragalus." [= RAB, I, K, SE, WH, Z; = *Phaca intonsa* (Sheldon) Rydberg ex Small – S]

Astragalus distortus Torrey & A. Gray var. *engelmannii* (Sheldon) M.E. Jones. Cp (MS): {habitats}; rare. AR, TX, and w. LA; disjunct eastward in MS (NatureServe 2007). [= I, K, SE, Z]

Baptisia Ventenat 1808 (Wild Indigo)

A genus of about 20 species, perennial herbs, of temperate e. and c. North America. References: Isely (1981)=Y; Larisey (1940a)=Z; Mendenhall (1994a, 1994b)=X; Turner (2006)=Q; Isely (1998)=I.

1 Leaves 1-foliolate, sessile or perfoliate.
2 Leaves perfoliate; plant glabrous or nearly so; [widespread, from s. SC southward] ..... ***B. perfoliata***
2 Leaves sessile; plant glabrous or densely cobwebby pubescent; [narrow endemics of GA and FL].
3 Plant cobwebby-pubescent; leaves ca. 1× as long as wide, cordate at base; corolla 9-11 mm long, yellow; [of e. GA (Brantley and Wayne counties)]..... ***B. arachnifera***
3 Plant glabrous; leaves 1.3-1.6× as long as wide, rounded to broadly cuneate at base; corolla 12-15 mm long, pale yellow to greenish; [of the FL Panhandle (Franklin, Gadsden, Leon, Liberty, and Wakulla counties)]..... ***B. simplicifolia***
1 Leaves 3-foliolate, petiolate or sessile.

4 Flowering or fruiting pedicels bracteolate; corolla 11-14 mm long
5 Calyx lobes about as long as the calyx tube ..... ***B. lecontei***
5 Calyx lobes much > the calyx tube.
6 Plant glabrous; [of ne. FL (Clay and St. Johns counties)] ..... ***B. calycosa***
6 Plant tomentose to hirsute; [of FL Panhandle (Escambia, Holmes, Okaloosa, Santa Rosa, and Walton counties)] ..... ***B. hirsuta***
4 Flowering or fruiting pedicels lacking bracteoles; corolla larger (except *B. tinctoria*).
7 Plants in flower ..... **Key A**
7 Plants in fruit ..... **Key B**

Key A – flowering *Baptisia*

1 Flowers lavender or blue.
2 Leaflets 2-4 (-5) cm long, mostly < 10 mm wide (if wider, then < 4 cm long); leaflets mostly oriented in a vertical plane; fertile stems usually 0.4-1.0 m tall, the leafy branches horizontally spreading; racemes 1-2.5 (-4) dm long, rather densely flowered; petioles 0-4 (-12) mm long; [of diabase glades and barrens] ..... ***B. australis* var. *aberrans***
2 Leaflets 4-6 (-9) cm long, mostly > 12 mm wide; leaflets not oriented in a vertical plane; fertile stems usually 1-1.5 m tall, the leafy branches ascending; racemes 2-4 (-5) dm long, rather sparsely flowered; petioles 5-20 (-40) mm long; [of flood-scoured riverside cobblebars and rock outcrops, also frequently cultivated and sometimes persistent or escaped] ..... ***B. australis* var. *australis***
1 Flowers yellow, cream-white, or white.
3 Flowers white or cream-white.
4 Flowering pedicels 10-18 (-30) mm long, subtended by persistent bracts 10-25 mm long and 7-10 mm wide; flowers cream-white (to pale-yellow).
5 Petioles of median leaves 4-10 mm long ..... ***B. bracteata***
5 Petioles of median leaves 2-4 mm long ..... ***[B. leucophaea]***
4 Flowering pedicels 3-10 mm long, subtended by caducous bracts 4-7 mm long and 1-2 mm wide; flowers white.
6 Calyx 4.5-6.5 mm long; corolla 13-16 (-18) mm long; petioles 5-10 (-20) mm long ..... ***B. albescens***
6 Calyx 7-8 mm long; corolla 20-25 mm long; petioles (of the lower leaves at least) 10-20 mm long.
7 Legume usually 15-20 (-30) mm in diameter, thin-walled and brittle; [of NC south through GA to FL and AL] ..... ***B. alba***
7 Legume usually 10-12 (-15) mm in diameter, rigid and tough; [of c. TN, c. KY, and MS westward] ..... ***[B. leucantha]***
3 Flowers yellow.
8 Flowering pedicels 14-18 (-30) mm long, subtended by persistent bracts 10-25 mm long and 7-10 mm wide; flowers pale-yellow (to cream-white).
9 Petioles of median leaves 4-10 mm long ..... ***B. bracteata***
9 Petioles of median leaves 2-4 mm long ..... ***[B. leucophaea]***
8 Flowering pedicels 2-10 mm long, subtended by caducous bracts 2-10 mm long and 1-2 mm wide; flowers bright yellow.
10 Leaflets mostly 1-2.5 (-4) cm long, 1-2.5× as long as wide, the petiolules 0-1 mm long; corolla 12-16 mm long; racemes numerous, terminating most of the branches ..... ***B. tinctoria***
10 Leaflets mostly 4-9 cm long, 1.5-4× as long as wide, the petiolules 2-10 mm long; corolla 20-28 mm long; racemes solitary (-3) (*B. cinerea*) or numerous (*B. lanceolata*).
11 Inflorescences of many-flowered cylindrical racemes; stipules persistent or caducous.
12 Plant persistently cinereous-pubescent stipules (some of them at least) persistent ..... ***B. cinerea***
12 Plant puberulent when young, soon glabrate to glabrous; stipules caducous; [of MS westward] ..... ***[B. sphaerocarpa]***
11 Inflorescence of solitary axillary flowers or flowers in clusters of 2-4 in axils or terminal racemes; stipules caducous.
13 Petiolules 2-3 mm long; leaflets 1-2.5× as long as wide; [of LA, AR, TX, and OK] ..... ***[B. nuttalliana]***
13 Petiolules 4-10 mm long; leaflets 1.7-5× as long as wide; [of SC, GA, FL, and AL].
14 Leaflets 3-5× as long as wide, usually < 1.5 cm wide; flowers usually solitary or in clusters of 2-3; fruits broadly ellipsoid or subspheroidal, < 2× as long as wide; [se. SC south through GA Coastal Plain to ne. FL] ..... ***B. lanceolata* var. *lanceolata***
14 Leaflets 1.7-3.2 (-5)× as long as wide, the larger typically > 2 cm wide; flowers in racemes of (1-) 3-10 flowers; fruits usually ellipsoid, often > 2× as long as wide; [FL Panhandle, s. AL, and c. peninsular FL] ..... ***[B. lanceolata* var. *tomentosa]***

{add *B. megacarpa* to key}

Key B – fruiting *Baptisia*

1 Legume 5-11 mm in diameter.
2 Legume cylindric, 20-30 (-35) mm long, 7-9 mm in diameter, yellow-brown, leathery in txture ..... ***B. albescens***
2 Legume globose or subspheroidal, 7-25 mm long, 5-11 mm in diameter, black, woody in texture.
3 Leaflets mostly 1-2.5 (-4) cm long ..... ***B. tinctoria***
3 Leaflets 3.5-10 cm long.
4 Leaflets 3-5× as long as wide, usually < 1.5 cm wide; infructescence nodes (fruits or aborted fruits) usually 1-3; fruits broadly ellipsoid or subspheroidal, <2× as long as wide; [se. SC south through GA Coastal Plain to ne. FL] ..... ***B. lanceolata* var. *lanceolata***
4 Leaflets 1.7-3.2 (-5)× as long as wide, the larger typically > 2 cm wide; infructescence nodes (1-) 3-10; fruits usually ellipsoid, often > 2× as long as wide; [FL Panhandle, s. AL, and c. peninsular FL] ..... ***[B. lanceolata* var. *tomentosa]***
1 Legume 8-25 mm in diameter.
5 Pod drying tan, thin-walled and brittle ..... ***B. megacarpa***
5 Pod drying black to blackish-brown, leathery or tough.
6 Stems puberulent (sometimes inconspicuously so), not glaucous.

7 Legume (20-) 30-40 (-50) mm long, 15-25 mm in diameter; pedicels 14-18 (-30) mm long, subtended by persistent bracts10-25 mm long and 7-10 mm wide.....***B. bracteata, [B. leucophaea]***

7 Legume 10-35 mm long, 8-15 mm in diameter; pedicels 2-10 mm long, subtended by caducous bracts 2-10 mm long and 1-2 mm wide.

8 Petiolules 2-5 mm long; stipules (some of them at least) persistent.....***B. cinerea***

8 Petiolules 4-10 mm long; stipules caducous.....***B. lanceolata var. lanceolata***

6 Stems glabrous and generally glaucous as well.....

.....***B. alba, [B. leucantha],[B. leucophaea], B. australis var. australis, B. australis var. aberrans***

{add *B. nuttalliana* to fruiting key}

Baptisia alba (Linnaeus) Ventenat, Thick-pod White Wild Indigo. Pd (GA, NC, SC), Cp (FL, GA, NC, SC): dry woodlands, roadsides; uncommon (rare in NC). May-July; June-October. NC south to n. peninsular FL, west to AL. *B. leucantha* (see below) is a western sibling, treated as either a species or a variety. In fruit, it is easily separated from *B. albescens* and other *Baptisia* by its nearly spheroidal legume. *B. alba* and *B. albescens* have been nomenclaturally confused; Isely (1986a) corrects the application of the epithet "*alba*." [= S, WH; = *B. alba* var. *alba* – I, K, SE; = *B. pendula* Larisey – RAB; = *B. lactea* (Rafinesque) Thieret var. *obovata* (Larisey) Isely – C (by implication), X, Y; = *B. lactea* var. *pendula* (Larisey) B.L. Turner – Q; > *B. pendula* var. *pendula* – Z; > *B. pendula* var. *obovata* Larisey – Z]

Baptisia albescens Small, Narrow-pod White Wild Indigo, Spiked Wild Indigo. Pd, Mt (GA, NC, SC), Cp (FL, GA, NC, SC, VA): dry woodlands, pine flatwoods, roadsides; uncommon (rare in NC, VA, and FL). May-July; June-October. Se. VA south through NC, SC, and GA to n. FL, e. AL and e. TN. The fruits are unlike any of our other species in being cylindric, about 3× as long as the diameter, and yellowish-brown (rather than black) when mature. [= I, K, S, SE, WH; = *B. alba* – RAB, C, F, G, Q, W, X, Y, misapplied; > *B. alba* – Z; > *B. albescens* – Z]

Baptisia arachnifera Duncan, Hairy Rattleweed, Hairy Wild Indigo. Cp (GA): sandhills; rare. Endemic to GA (Wayne and Brantley counties). Unmistakable for its simple leaves and dense "cobwebby" pubescence. [= I, K, Q, SE, X, Y]

Baptisia australis (Linnaeus) R. Brown ***var. aberrans*** (Larisey) M. Mendenhall, Eastern Prairie Blue Wild Indigo, Glade Wild Indigo. Pd (NC), Mt (GA): glades, barrens, and open woodlands over limestone (or other calcareous rocks) and diabase (or other mafic rocks), in areas that were formerly prairies, barrens, glades, or oak savannas; rare. April-May; June-August. C. and se. TN, nw. GA, c. NC, and (possibly) s. KY and sc. VA. Blue-flowered *Baptisia* from mafic glades, barrens, and former prairies and oak savannas in NC has proven problematic to taxonomists. Larisey (1940a) treated *B. australis* and *B. minor* as separate species, and placed eastern plants resembling *B. minor* in *B. minor* var. *aberrans* Larisey, but without providing very satisfying characters for separating it from typical *B. minor* of mw. North America. RAB apparently (though tacitly) included *B. minor* within *B. australis*. Isely (1981, 1990) treated blue-flowered *Baptisia* as *B. australis* var. *australis* and var. *minor*, regarding var. *minor* as reaching its eastern limit in MO (the two varieties thus allopatric), and stating that "sporadic collections within the range of var. *australis* have the pods and some of the vegetative characters of var. *minor*... most of these collections are from dry or sterile habitats, e.g., cedar glades, that var. *australis* typically does not inhabit" (Isely 1990). His treatment of *australis* and *minor* at the varietal level seems largely based on the existence of *minor*-like plants within his concept of the range of *australis*. NC plants from glade-like sites are morphologically more similar to midwestern prairie *B. minor*, occur in similar habitats, and grow with a large number of other plants with midwestern phytogeographic affinities, such as *Eryngium yuccifolium* var. *yuccifolium*, *Echinacea laevigata* (an eastern sibling of *E. purpurea*), *Oligoneuron album*, *Oligoneuron rigidum* ssp. *glabratum* (an eastern sibling of *O. rigidum* ssp. *rigidum*), *Silphium terebinthinaceum*, and others. The affinities of these plants seem to be with *B. minor*; "shoehorning" them into the more eastern *B. australis*, which they do not resemble in morphology, habitat, or (indeed) range is not a desirable disposition. Eastern plants referrable to *B. minor* do, however, as noted by Larisey and Isely, differ from midwestern plants in leaflet size and shape, branching, and pod shape; they are best treated as an eastern, relictual variety, var. *aberrans* Larisey. Mendenhall (1994a, 1994b) found that *B. minor* var. *aberrans* warranted taxonomic recognition, and indeed that it is less closely related to *B. australis s.s.* and *B. minor* than they are to one another; she chose to treat the three entities as varieties under *B. australis*. For now, the best treatment seems to be to follow Mendenhall, and acknowledge the existence of three varietal entities, with the phylogenetic affinities uncertain. The range of *B. australis* var. *minor* is thus largely midwestern, from se. NE, s. MO, and e. and c. KS south to w. AR, e. and c. OK, and ne. TX. [= K, X; = *Baptisia minor* Lehmann var. *aberrans* Larisey – Z; < *B. australis* (Linnaeus) R. Brown – RAB, S; < *B. australis* var. *australis* – I, Q, SE; < *B. australis* var. *minor* (Lehmann) Fernald – C, G; < *B. minor* – F]

Baptisia australis (Linnaeus) R. Brown *var.* ***australis***, Tall Blue Wild Indigo, Streamside Blue Indigo. Mt (GA, NC*?, VA), Pd (NC*?, VA): riverbank scour areas, gravel bars, and disturbed areas (where persisting from cultivation); rare. April-June; June-August. Native to w. and n. VA, w. MD, WV, w. PA, e. and c. KY, ne. TN, se. IN, and s. OH, and possibly native to other states, the original range somewhat obscured by its frequent cultivation. [= C, G, K, X; = *B. australis* – F, W, Z; < *B. australis* – RAB, S (also see *B. minor*); < *B. australis* var. *australis* – I, Q, SE (also see *B. australis* var. *aberrans*)]

Baptisia bracteata Elliott, Creamy Wild Indigo. Pd (GA, NC, SC), Mt (GA, SC), Cp (SC): sandhills, other dry woodlands; uncommon (NC Rare). March-April; May-June. Ne. AL northwest through n. GA and n. SC to w. NC. The more western *B. leucophaea* Nuttall is better treated as a species than as *B. bracteata* var. *leucophaea* (Nuttall) Kartesz & Gandhi (Mendenhall 1994b). [= RAB, Q, S, W, X, Z; = *B. bracteata* var. *bracteata* – C, I, K, SE]

Baptisia calycosa Canby, Florida Wild Indigo. Cp (FL): dry pinelands; rare. Endemic to ne. FL (Clay and St. Johns counties). [= Q, S, Z; = *B. calycosa* var. *calycosa* – I, K, SE, WH, Y] {synonymy incomplete: X}

Baptisia cinerea (Rafinesque) Fernald & Schubert, Carolina Wild Indigo. Cp (NC, SC, VA), Pd (VA): sandhills, other dry sandy woods; common (rare in VA). Late April-June; June-July. Though common in the Coastal Plain of the Carolinas, *B. cinerea* is a narrow endemic, ranging only from s. VA south to s. SC. The large, yellow flowers are very showy. In fall, the leaves do not drop, but stay attached to the stems, the whole plant turning an ashy gray; these dried plants are conspicuous

through the following winter. The report in Jones & Coile (1988) of *B. cinerea* in GA is in error; the specimen is of *B. lanceolata*. [= RAB, C, F, G, I, K, Q, SE, X; = *B. villosa* auct. non (Walter) Nuttall – S, Z]

Baptisia hirsuta Small, Hairy Wild Indigo, Panhandle Wild Indigo. Cp (FL): dry pinelands; rare. Endemic to FL Panhandle (Escambia, Holmes, Okaloosa, Santa Rosa, and Walton counties). May; June-September. [= Q, S, Z; = *B. calycosa* Canby var. *villosa* Canby – I, K, SE, WH, Y] {synonymy incomplete: X}

Baptisia lanceolata (Walter) Elliott *var.* ***lanceolata***, Gopherweed. Cp (FL, GA, SC): sandhills; uncommon (rare in GA and SC). April-May; June-November. S. SC south to ne. FL and sw. GA, a Southeastern Coastal Plain endemic. Small (1933) alleges that *B. lanceolata* ranges north to NC, but no documentation is known. The plant is reminiscent of *B. cinerea*, but forms larger, bushier plants and is separable by characters in the key. [= I, K, Q, SE, X; < *B. lanceolata* – RAB, S, WH; = *B. lanceolata* – Z]

Baptisia lanceolata (Walter) Elliott *var.* ***tomentosa*** (Larisey) Isely. Cp (AL, FL): sandhills; rare. Panhandle FL and adjacent s. AL; disjunct in c. peninsular FL. Two forms have been recognized, the "narrow-leaved form," endemic to the Apalachicola Lowlands portion of the FL Panhandle, and the "typical form", occupying the FL Panhandle, s. AL, and disjunct in c. peninsular FL (Isely 1981). Mendenhall (1994b) included broad-leaved and narrow-leaved forms of var. *tomentosa* in her study, which provided some support for the taxonomic recognition of these unnamed entities. [= I, K, SE, Y; = *B. lanceolata* var. *elliptica* (Small) B.L. Turner – Q; = *B. elliptica* Small – S; < *B. lanceolata* – WH; > *B. elliptica* var. *elliptica* – Z; > *B. elliptica* var. *tomentosa* Larisey – Z]

Baptisia lecontei Torrey & A. Gray, Leconte's Wild Indigo. Cp (FL, GA): sandhills; uncommon (rare in GA). Sc. GA south to e. Panhandle FL and s. peninsular FL. [= I, K, Q, S, SE, WH, X, Y, Z]

Baptisia megacarpa Chapman ex Torrey & A. Gray, Apalachicola Wild Indigo, Bigpod Wild Indigo. Cp (FL, GA): moist florests of floodplains and lower slopes; rare. Late April-early June; June-July. E. Panhandle FL and sw. GA west to se. AL. [= I, K, Q, S, SE, WH, X, Y; > *B. megacarpa* – Z; > *B. riparia* Larisey var. *riparia* – Z; > *B. riparia* var. *minima* – Z]

Baptisia perfoliata (Linnaeus) R. Brown ex Aiton f., Catbells, Gopherweed. Cp (GA, SC): sandhills; uncommon. April-May; May-July. S. SC to e. GA; disjunct in c. peninsular FL (Orange and Osceola counties); disjunct in wc. AL (Sumter County) (Keener 2007), a Southeastern Coastal Plain endemic. [= RAB, I, K, Q, S, SE, X, Y, Z]

Baptisia simplicifolia Croom. Cp (FL): pine flatwoods; rare. Endemic to Panhandle FL (Franklin, Gadsden, Leon, Liberty, and Wakulla counties) (Wunderlin & Hansen 2004). [= I, K, Q, S, SE, WH, X, Y, Z]

Baptisia tinctoria (Linnaeus) Ventenat, Honesty-weed, Rattleweed. Cp, Pd, Mt (GA, NC, SC, VA): sandhills, pine flatwoods, xeric woodlands, ridges, woodland edges, and roadbanks; common. April-August; July-November. Widespread in eastern United States, from NY and MN south to GA. The most widespread and common of our species of *Baptisia*, *B. tinctoria* is readily recognizable from its small, yellow flowers, small leaflets, and small fruits. The taxa synonymized need further investigation. [= RAB, C, I, K, Q, S, SE, W, X; > *B. tinctoria* var. *projecta* Fernald – F, G, Z; > *B. tinctoria* var. *tinctoria* – F, G, Z; > *B. tinctoria* var. *crebra* Fernald – F, Z; > *B. tinctoria* – S; > *B. gibbesii* Small – S]

Baptisia leucantha Torrey & A. Gray. East to s. MS, ne. MS, c. TN, c. KY, and s. OH; alleged by S to occur in NC, probably based on misinterpreted material of *B. alba*. [= S, X; = *Baptisia alba* var. *macrophylla* (Larisey) Isely – I, K, SE; = *B. lactea* (Rafinesque) Thieret var. *lactea* – C, Q, Y; > *B. leucantha* var. *leucantha* – Z; > *B. pendula* Larisey var. *macrophylla* Larisey – Z]

Baptisia leucophaea Nuttall. Nw. IN west to s. MN and e. NE, south to w. KY, c. MS, c. LA, se. LA (Turner 2006), and e. TX. [= F, G, Q; = *B. bracteata* Muhlenberg ex Elliott var. *leucophaea* (Nuttall) Kartesz & Gandhi – K; = *B. bracteata* var. *glabrescens* (Larisey) Isely – C, I, SE, Y; = *B. leucophaea* var. *glabrescens* Larisey – Z]

Baptisia nuttalliana Small. Woodlands and prairies. S. AR and se. OK south to se. LA (Florida parishes) and se. TX. [= I, K, Q, S, SE, Y, Z] {not yet keyed; synonymy incomplete}

Baptisia sphaerocarpa Nuttall. Woodlands and prairies. S. MS west to se. MO, e. OK, and e. TX. [= I, K, SE; > *B. sphaerocarpa* – Z; > *B. viridis* Larisey – Z] {synonymy incomplete}

Many of our species hybridize; hybrids known in our area include the following, listed in alphabetic order by hybrid formulae. Others may certainly occur. Additional hybrids have been created by plant breeders and may be found in cultivation.

B. albescens × *cinerea*. Known from SC.
B. albescens × *perfoliata* [*B.* ×*fulva* Larisey]. Known from GA and SC. [*B.* ×*fulva* Larisey – Z]
B. albescens × *tinctoria* [*B.* ×*serenae* M.A. Curtis (pro sp.); *B.* ×*pinetorum* Larisey]. Known from GA, NC, SC, and VA.
B. cinerea × *tinctoria*. Known from NC (Brunswick County).
B. perfoliata × *tinctoria* [*B.* ×*microphylla* Nuttall (pro sp.) – Z]. Known from SC.

Calliandra Bentham 1840

A genus of about 135 species, trees ands shrubs, of the New World tropics and subtropics. References: Isely (1998)=I.

* ***Calliandra haematocephala*** Hasskarl, Powderpuff Tree. Cp (FL): disturbed areas; rare, native of South America, cultivated in the souther part of our area and allegedly persistent or spreading. [= I, WH]

Canavalia deCandolle 1825

A genus of about 50 species, perennial or annual herbs or vines, pantropical. References: Isely (1998)=I.

Canavalia rosea (Swartz) deCandolle, Baybean. Cp (FL): ocean beaches; rare. Pantropical, north to Dixie County on the west coast and Volusia County on the east coast of FL. [= I, K, SE, WH; ? *Canavali lineata* (Thunberg) deCandolle – S, misapplied]

Centrosema (A.P. de Candolle) Bentham 1837 (Spurred Butterfly Pea)

A genus of about 40 species, perennial vining herbs, of tropical and warm temperate regions of the Western Hemisphere. References: Isely (1998)=I; Fantz (2002a).

Identification notes: *Centrosema* and *Clitoria* are unique among our legumes in having resupinate flowers, the pedicel twisted 180 degrees so that the large "standard" is lowermost. They are often confused; the following key includes both genera for easy differentiation.

1 Leaflets 5-7-foliolate; [rare alien] ..... ***Clitoria ternatea* var. *ternatea***
1 Leaflets 3-foliolate.
  2 Calyx tube 10-13 mm long, much longer than the lobes; bracteoles 3-7 mm long, not enclosing the calyx tube; legume 3-5 cm long, 5-7 mm broad; standard 4-6 cm long, not spurred ..... ***Clitoria mariana* var. *mariana***
  2 Calyx tube 4-5 mm long, shorter than or about as long as the lobes; bracteoles 5-12 mm long, partly enclosing the calyx tube; legume 7-12 cm long, 3-4 mm broad; standard 2.5-3.5 cm long, spurred near the base.
    3 Lower calyx lobe 5-8 mm long, subulate to lanceolate; upper (bifurcate) calyx lobe 3-4 mm long; bracteoles 5-7 mm long; stems to 3 m long; [of n. FL southward] ..... ***Centrosema arenicola***
    3 Lower calyx lobe 8-11 mm long, subulate; upper (bifurcate) calyx lobe 7-8 mm long; bracteoles 8-12 mm long; stems to 1.5 m long; [widespread in our area] ..... ***Centrosema virginianum***

Centrosema arenicola (Small) F.J. Hermann, Sand Butterfly-pea. Cp (FL): longleaf pine sandhills; rare. N. FL (Columbia, Dixie, and Duval counties) south to s. FL. [= K, WH; > *Bradburya arenicola* Small – S; > *Bradburya floridana* Britton – S; = *C. arenicolum* – I, orthographic variant

Centrosema virginianum (Linnaeus) Bentham, Spurred Butterfly Pea. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): dry woodlands and openings; common. June-August; July-October. S. NJ south to s. FL, west to KY, AR, and TX. [= RAB, C, G, K, SE, W, WH; > *C. virginianum* var. *virginianum* – F; > *C. virginianum* var. *ellipticum* Fernald – F; = *Bradburya virginiana* (Linnaeus) Kuntze – S]

Cercis Linnaeus 1753 (Redbud)

A genus of about 6-10 species, trees of north temperate areas. Apparently the basalmost (evolutionarily the earliest diverging) extant genus in the Fabaceae (Lewis et al. 2005). References: Isely (1975)=Z; Robertson & Lee (1976)=Y; Isely (1998)=I.

1 Flowering pedicels 6-8 mm long; flowers 8-11 mm long ..... ***C. canadensis* var. *canadensis***
1 Flowering pedicels 10-20 mm long; flowers (11-) 12-14 mm long ..... ***[C. chinensis]***

Cercis canadensis Linnaeus *var.* ***canadensis***, Eastern Redbud. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist to dry forests and woodlands, especially over calcareous or mafic rocks, also commonly planted as an ornamental; common (uncommon in Coastal Plain south of VA, uncommon in NC Mountains). March-May; June-November. MA, WI, and NE south to c. peninsular FL and e. TX. This spectacular small tree is showy in bud or flower. The smooth, medium gray bark is distinctive in winter. Other varieties occur in TX and Mexico. [= C, G, I, K, SE, Y, Z; < *C. canadensis* – RAB, F, S, W, WH]

* *Cercis chinensis* Bunge, native to China, is sometimes cultivated. [= I]

Chamaecrista Moench 1794 (Partridge-pea)

A genus of about 250-350 species, shrubs and herbs, of primarily tropical and subtropical areas, extending into temperate areas in North America, South America, and e. Asia. References: Isely (1975)=Z; Irwin & Barneby (1982)=Y; Robertson & Lee (1976)=X; Isely (1998)=I.

1 Corolla 0.8-1.0 cm in diameter, the larger petals 4-7 (-8) mm long; functional stamens 5-8.
  2 Petiole pilose with hairs 1-2 (-3) mm long; petiolar gland cylindric or clavate; functional stamens 5-8; leaflets 5-6× as long as wide ..... ***Ch. nictitans* var. *aspera***
  2 Petiole incurved-puberulent with hairs 0-0.8 mm long; petiolar gland stalked-cupuliform or stalked-discoid; functional stamens 5; leaflets 3-5× as long as wide ..... ***Ch. nictitans* var. *nictitans***
1 Corolla 2.5-3.5 cm in diameter, the larger petals 15-20 mm long; functional stamens 10.
  3 Perennial from a horizontal woody root or crown; stems clustered ..... ***Ch. deeringiana***
  3 Annual from a taproot; stems solitary.
    4 Pods 6.5-10 mm wide; seeds 4.7-6.3 mm across; [of tidal marshes in e. VA] ..... ***Ch. fasciculata* var. *macrosperma***
    4 Pods 3-5 (-6.5) mm wide; seeds (2.8-) 3.2-4.8 mm across; [widespread geographically and ecologically].
      5 Surface of leaflets pubescent; [from w. Panhandle FL and s. AL westward] ..... ***[Ch. fasciculata* var. *puberula]***
      5 Surface of leaflets glabrous; [collectively widespread in our area].

6 Petiolar gland depressed, 1.5-2.5 mm wide, raised at both ends; pods 6-10 cm long; plant usually glabrous or glabrescent, to 24 dm tall ..... ***Ch. fasciculata var. brachiata***

6 Petiolar gland not depressed, <1.5 mm wide; pods 4-6 cm long; plant usually pubescent, to 10 dm tall ..... ***Ch. fasciculata var. fasciculata***

Chamaecrista deeringiana Small & Pennell, Florida Senna. Cp (FL, GA): sandhills, dry longleaf pine woodlands, disturbed sandy areas; uncommon (rare in GA). Sw. and wc. GA (Jones & Coile 1988) south to Panhandle FL and west to s. MS (Sorrie & Leonard 1999); disjunct in s. FL. [= I, K, S, SE, Y, Z; < *Ch. fasciculata* (Michaux) Greene – WH]

Chamaecrista fasciculata (Michaux) Greene var. ***brachiata*** (Pollard) Isely. Cp (FL, GA): fields, disturbed areas; common (uncommon in GA). E. GA south to s. FL, west to w. Panhandle FL. [= I, SE; < *Chamaecrista fasciculata var. fasciculata* – K; = *Cassia fasciculata* var. *brachiata* (Pollard) Pullen ex Isely – X, Z; = *Chamaecrista brachiata* Pollard – S; < *Ch. fasciculata* – WH, Y]

Chamaecrista fasciculata (Michaux) Greene *var. **fasciculata***, Common Partridge-pea. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, disturbed areas, fencerows, and a wide range of other habitats; common (uncommon in VA Mountains). June-September; July-November. MA west to MN, south to s. FL and Mexico. See discussion of the *Chamaecrista fasciculata* complex under var. *macrosperma*. [< *Cassia fasciculata* Michaux – RAB, W; < *Chamaecrista fasciculata* – C, WH, Y; > *Cassia fasciculata* var. *fasciculata* – F, G, X; > *Cassia fasciculata* var. *robusta* (Pollard) J.F. Macbride – F, G, X; > *Chamaecrista fasciculata* – S; > *Chamaecrista robusta* Pollard – S; = *Chamaecrista fasciculata* var. *fasciculata* (variant 1, variant 2, and typical variant) – Z; < *Chamaecrista fasciculata* var. *fasciculata* – I, SE (also see var. *macrosperma*); < *Chamaecrista fasciculata* var. *fasciculata* – K (also see var. *brachiata*); > *Cassia fasciculata* var. *littoralis* (Pollard) J.F. MacBride – X]

Chamaecrista fasciculata (Michaux) Greene *var. **macrosperma*** (Fernald) C.F. Reed, Tidal-marsh Partridge-pea. Cp (VA): freshwater tidal marshes; rare. Endemic to e. VA (Rappahannock, Mattaponi, Pamunkey, Chickahominy, James, and Appomattox Rivers and their major estuarine tributaries) and MD. Isely (1975) did not recognize this taxon formally, but treated it informally as "variant 1," commenting (incorrectly) that it is "apparently a local, saline-adapted ecotype." Irwin & Barneby (1982) treated *Ch. fasciculata* as a very polymorphic species in which it was impractical to recognize infraspecific taxa, concluding "a student of tropical *Chamaecrista* has the choice of accepting as a fact of life that sort of infraspecific variability that inspired the dissection of *Ch. fasciculata* or of retreating to the position of Britton & Urban who, driven by logic rather than sense, found a species in every particular combination of gland and hairiness that fell in their way. But in passing over the observed variation as taxonomically insignificant, it is well to bear in mind that its cause and its biological significance remain a mystery." Botanists familiar with var. *macrosperma* in the field contend that it shows a cohesion in morphologic characters, ecology, and distribution that is biologically and taxonomically significant; it warrants varietal status. [= K; < *Chamaecrista fasciculata* – C, S, Y; = *Cassia fasciculata* var. *macrosperma* Fernald – F, G; < *Chamaecrista fasciculata* var. *fasciculata* – I, SE; = *Cassia fasciculata* var. *fasciculata* "variant 1" – Z]

Chamaecrista nictitans (Linnaeus) Moench *var. **aspera*** (Muhlenberg ex Elliott) Irwin & Barneby, Southern Sensitive-plant. Cp (FL, GA, SC): savannas, pinelands, disturbed sandy soils; uncommon. June-October; July-November. Var. *aspera* ranges from se. SC south to s. FL. [= I, WH; = *Cassia aspera* Muhlenberg ex Elliott – RAB, X, Z; = *Chamaecrista nictitans* ssp. *nictitans* var. *aspera* (Muhlenberg ex Elliott) Irwin & Barneby – K, SE, Y; = *Chamaecrista aspera* (Muhlenberg ex Elliott) Greene – S]

Chamaecrista nictitans (Linnaeus) Moench *var. **nictitans***, Common Sensitive-plant. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): forests, woodlands, disturbed areas, pine savannas, and a wide variety of other habitats; common. June-October; July-November. *Ch. nictitans* is widely distributed in e. North America, and (depending on the scope of what is included in it) south into South America. Var. *nictitans* ranges throughout se. United States, north to MA, NY, OH, and KA. [= I, WH; < *Cassia nictitans* Linnaeus – RAB, W, X, Z; < *Chamaecrista nictitans* – C; > *Cassia nictitans* var. *nictitans* – F, G; > *Cassia nictitans* var. *hebecarpa* Fernald – F, G; = *Chamaecrista nictitans* ssp. *nictitans* var. *nictitans* – K, SE, Y; > *Chamaecrista procumbens* (Linnaeus) Greene – S; > *Chamaecrista multipinnata* Pollard – S]

Chamaecrista fasciculata (Michaux) Greene var. *1*. Dunes, sandy disturbed areas. s. AL west to e. and s. TX. [= I; < *Ch. fasciculata* var. *fasciculata* – K; > *Chamaecrista littoralis* Pollard – S; > *Chamaecrista mississipiensis* (Pollard) Pollard ex Heller – S; < *Ch. fasciculata* – Y; = *Cassia fasciculata* Michaux var. *puberula* (Greene) J.F. Macbride (variants 1, 2, and 3) – SE, Z; > *Chamaecrista puberula* Greene] {synonymy incomplete}

Chapmannia Torrey & A. Gray 1838 (Alicia)

A genus of about 7 species, perennial herbs, shrubs and trees, of tropical America and Africa, most closely related in the Southeastern flora to *Stylosanthes* and the introduced *Arachis* (Lewis et al. 2005). References: Isely (1998)=I.

Chapmannia floridana Torrey & A. Gray, Alicia. Cp (FL): longleaf pine sandhills, scrub; rare. N. FL (Clay County) south to s. FL. [= I, K, S, WH]

Cladrastis Rafinesque 1824 (Yellow-wood)

A genus of about 6 species, trees, of the se. United States and montane regions of Japan and China. *Cladrastis* is the only member of the tribe Sophoreae in our area, with the exception of the cultivated (and weakly, if at all, established) *Styphnolobium*

and *Maackia*; additionally *Sophora tomentosa* Linnaeus var. *truncata* Torrey & A. Gray closely approaches our area in n. peninsular FL. References: Duley & Vincent (2003)=X; Isely (1981)=Z; Isely (1998)=I; Rudd (1972)=Y.

Cladrastis kentukea (Dumont de Courset) Rudd, Yellow-wood. Mt (GA, NC), Pd (NC*, SC): mountain forests, Piedmont bluffs, especially on calcareous or mafic rocks (introduced only in the Piedmont of NC); rare. April-May; July-August. This small to large tree has a native range primarily in the Southern Appalachians (mostly on the west side), the Ozarks, and limestone regions in-between (such as c. TN), ranging from s. OH, s. IN, and s. MO south to sw. NC, sc. SC, n. GA, AL, c. AR, and e. OK, but is cultivated more widely. As discussed by Wyatt (1985), the SC occurrence on Fall Line bluffs of the Savannah River is an interesting disjunction, apparently relictual. Yellow-wood is a distinctive tree, distinguished by its smooth silvery-gray bark, peculiar leaves with alternate leaflets, and pendent panicles of white flowers. The genus *Cladrastis* has 4 other species, all of temperate e. Asia. [= K, W, X, Y; = *C. lutea* (Michaux f.) K. Koch – RAB, C, F, G, I, S, SE, Z]

Clitoria Linnaeus 1753 (Butterfly Pea, Pigeonwings)

A genus of about 60 species, of tropical and warm temperate regions of the New and Old World. References: Isely (1998)=I; Fantz (2000, 2002b)=Z.

Identification notes: *Centrosema* and *Clitoria* are unique among our legumes in having resupinate flowers, the pedicel twisted 180 degrees so that the large "standard" is lowermost. They are often confused; see key under *Centrosema*.

1 Leaves 3-foliolate; standard 4.5-5.5 cm long ..... ***C. mariana* var. *mariana***
1 Leaves 5-7-foliolate; standard 3.5-4 cm long ..... ***C. ternatea* var. *ternatea***

Clitoria mariana Linnaeus *var.* ***mariana***, Butterfly Pea. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry woodlands and openings, roadsides; common. June-August; July-October. NY (Long Island), NJ west to s. OH, s. IL, MO, and OK, south to c. peninsular FL, TX, and South America; disjunct in s. AZ. Var. *pubescentia* Fantz is endemic in c. and s. peninsular FL. Var. *orientalis* Fantz is endemic in se. Asia. [= Z; < *C. mariana* – RAB, C, F, G, I, K, SE, W, WH; < *Martiusia mariana* (Linnaeus) Small – S]

* ***Clitoria ternatea*** Linnaeus *var.* ***ternatea***, Blue-pea. Cp (GA): disturbed areas; rare, introduced and weakly naturalized. In s. GA (Isely 1998). [= Z; < *C. ternatea* – I, K, S, SE]

Crotalaria Linnaeus 1753 (Rattlebox)

A genus of about 600 species, annual and perennial herbs, nearly cosmopolitan in tropical and temperate regions (especially diverse in Africa). References: Windler (1974)=Z; Isely (1986b)=Y; Isely (1998)=I. Key adapted in part from SE.

1 Leaves trifoliolate; erect annual herb, typically 1-2 m tall.
  2 Leaflets obovate to elliptic-oblong, 1.5-3.5× as long as wide; legume conspicuously curved (or straight in *C. incana*).
    3 Legume 10-15 mm in diameter, pilose; stem pubescence spreading ..... ***C. incana***
    3 Legume 5-6 mm in diameter, minutely puberulent; stem pubescence appressed ..... ***C. pallida* var. *obovata***
  2 Leaflets lanceolate, often narrowly so, 3-15× as long as wide; legume straight or nearly so (or upcurved at the tip).
    4 Corolla 8-10 mm long; legume 4-6 mm in diameter, upcurved at tip ..... ***C. lanceolata***
    4 Corolla 18-20 mm long; legume 15 mm in diameter, not upcurved ..... ***C. ochroleuca***
1 Leaves unifoliolate; plants of various habits, mostly either perennial, smaller, or both.
  5 Corolla 1.7-3.0 cm long; leaflets 4-15 cm long; stipules not decurrent on the stem and not conspicuously foliose; [exotic annual herbs, in disturbed habitats].
    6 Bracts of the inflorescence 2-3 mm long, caducous; leaflets 4-8 cm long ..... ***C. retusa***
    6 Bracts of the inflorescence 5-8 mm long, persistent; leaflets 5-15 cm long ..... ***C. spectabilis***
  5 Corolla 0.7-1.4 cm long; leaflets 1-8 cm long; stipules of at least the upper leaves conspicuously decurrent on the stem, giving the impression of a downward-pointing arrowhead (this feature sometimes inconspicuous or essentially absent in *C. rotundifolia*); [native perennial or annual herbs, in natural or disturbed habitats].
    7 Plant an erect annual; stems with spreading pubescence, the longer hairs 1-2 mm long; leaflets of the upper portion of the plant (4-) avg. 6 (-8)× as long as wide; [mostly of the Piedmont and Mountains (and Coastal Plain of VA)] ..... ***C. sagittalis***
    7 Plant a decumbent, sprawling, or erect perennial; stems with appressed or spreading pubescence, the longer hairs <1.2 mm long; leaflets of the upper portion of the plant averaging either (1-) avg. 1-2 (-4)× or (5-) avg. 8-10 (-15)× as long as wide; [mostly of the Coastal Plain].
      8 Leaflets glabrous above; leaflets of the upper portion of the plant usually (5-) 10 (-15)× as long as wide; plant erect or ascending ..... ***C. purshii***
      8 Leaflets pubescent above (the hairs sometimes sparse – check with hand lens); leaflets of the upper portion of the plant usually (1-) 2 (-4)× as long as wide; plant decumbent to low-ascending.
        9 Stem pubescence appressed ..... ***C. rotundifolia* var. *rotundifolia***
        9 Stem pubescence spreading ..... ***C. rotundifolia* var. *vulgaris***

* ***Crotalaria incana*** Linnaeus, Shake-shake. Cp (SC): disturbed areas; rare, native of Africa. Also in peninsular FL, from Alachua County southward. [= I, K, S, SE, WH]

* ***Crotalaria lanceolata*** E. Meyer, Lanceleaf Rattlebox. Cp (FL, GA, NC, SC): sandy fields, roadsides, other disturbed areas; uncommon (rare north of FL), native of Africa. July-October; August-November. [= RAB, I, K, SE, WH]

* ***Crotalaria ochroleuca*** G. Don, Slenderleaf Rattlebox. Cp (FL, GA, NC, SC): roadsides and sandy fields; rare, native of Africa. July-August; August-October. [= I, K, SE, WH; ? *C. intermedia* – RAB, misapplied; ? *C. brevidens* Bentham var. *intermedia* (Kotschy) Polhill, misapplied]

* ***Crotalaria pallida*** Aiton *var.* ***obovata*** (G. Don) Polhill, Smooth Rattlebox. Cp (FL, GA, NC, SC), Pd (GA, NC, SC): roadsides and fields; common, native of Africa. July-September; August-October. [= I, K, SE, WH; ? *C. mucronata* – RAB; ? *C. striata* A.P. de Candolle – S]

Crotalaria purshii A.P. de Candolle, Coastal Plain Rattlebox, Pursh's Rattlebox. Cp (FL, GA, NC, SC, VA), Pd?, Mt? (GA): mesic to dry pinelands, sandy openings, roadsides; common (rare in VA). May-July; July-September. A Southeastern Coastal Plain endemic: se. VA south to n. FL, c. peninsular FL, and west to e. LA, with scattered locations inland. [= RAB, C, G, I, K, S, SE, W, WH; > *C. purshii* var. *purshii* – F; > *C. purshii* var. *bracteolifera* Fernald – F]

* ***Crotalaria retusa*** Linnaeus, Rattleweed. Cp (FL, GA, NC, SC), Pd (NC): disturbed areas; rare, native of the Old World tropics. July-September; August-October. [= RAB, F, G, I, K, S, SE, WH]

Crotalaria rotundifolia Walter ex J.F. Gmelin *var.* ***rotundifolia***, Low Rattlebox, Rabbitbells. Cp (FL, GA, SC): sandy forests and woodlands, roadsides; uncommon (rare in GA and SC). E. SC south to s. FL, and west to e. LA, endemic to the Southeastern Coastal Plain. [= Z; < *C. rotundifolia* – C, I, K, SE, WH, Y; < *C. angulata* – RAB, F, G, apparently misapplied; = *C. maritima* Chapman – S]

Crotalaria rotundifolia Walter ex J.F. Gmelin *var.* ***vulgaris*** Windler, Low Rattlebox, Rabbitbells. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA): sandy forests and woodlands, roadsides; common (rare in VA). Se. VA south to c. peninsular FL, west to se. LA; also widespread in Mexico. [= Z; < *C. rotundifolia* – C, I, K, SE, WH, Y; < *C. angulata* – RAB, F, G, misapplied; = *C. rotundifolia* – S]

Crotalaria sagittalis Linnaeus, Common Rattlebox. Cp (NC, SC, VA), Pd, Mt (GA, NC, SC, VA): woodlands, woodland edges, openings, fields; common. June-August; July-September. MA and VT west to s. MI, s. WI, and c. MN, south to c. SC, s. AL, s. MS, TX, Mexico and Central America; West Indies. [= RAB, C, G, I, K, S, SE, W; > *C. sagittalis* var. *sagittalis* – F; > *C. sagittalis* var. *oblonga* Michaux – F]

* ***Crotalaria spectabilis*** Roth, Showy Rattlebox. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): fields, roadsides, disturbed areas; common (rare in VA), native of s. Asia. July-September; August-October. [= RAB, C, F, G, I, K, SE, WH; *? C. retzii* A. Hitchcock – S]

Cullen Medikus 1787

A genus of ca. 35 species, herbs and shrubs, of the Old World. References: Isely (1998)=I.

* ***Cullen americanum*** (Linnaeus) Rydberg, Scurf-pea. Cp (FL?, MS?, SC): waste areas around wool-combing mills, other disturbed areas; rare, perhaps only a waif, native of the w. Mediterranean region (a misnomer). There are other (older) reports from other southeastern states, including FL and MS. [= I, S; = *C. americana* – K, SE, orthographic variant]

Cytisus Desfontaines 1798 (Broom)

A genus of about 65 species, shrubs and herbs, of Eurasia. References: Isely (1998)=I.

* ***Cytisus scoparius*** (Linnaeus) Link, Broom, Scotch Broom, Besom, Ginster. Cp (NC, SC, VA), Pd, Mt (GA, NC, SC, VA): roadbanks, woodland borders, disturbed areas; common (rare in Mountains), native of Europe. April-May; May-July. [= RAB, C, F, G, I, S, SE, W; > *C. scoparius* var. *scoparius* – K]

Dalea Lucanus 1758 (Prairie-clover)

A genus of about 165 species, herbs and shrubs, of temperate and tropical America, especially dry areas and most diverse in Mexico. References: Barneby (1977)=Z; Ward (2004c)=Y; Isely (1998)=I. Key adapted from SE.

1 Spikes corymbosely aggregated, capitate, surrounded by an involucre of 3-4 series of sterile bracts; [subgenus *Dalea*, section *Kuhnistera*].
  2 Leaflets 5-9 (-15); petals (other than the standard) mostly 3.7-4.5 mm long ..... ***D. pinnata var. pinnata***
  2 Leaflets usually 3; petals (other than the standard) mostly 4.8-6.8 mm long ..... ***D. pinnata var. trifoliata***
1 Spikes not corymbosely disposed, ovoid to cylindric, with or without a few subtending, sterile bracts.
  3 Corolla subpapilionaceous, with apparent, differentiated wings and keel; stamens 9-10; annual herb; [alien, of disturbed habitats]; [subgenus *Dalea*, section *Dalea*] ..... ***D. leporina***
  3 Corolla not papilionaceous, the wings and keel not differentiated; stamens 5; perennial herb; [native, primarily of calcareous glades and Coastal Plain pinelands]; [subgenus *Dalea*, section *Kuhnistera*].
    4 Leaflets 15-25; leaflets 2.5-3.5× as long as wide ..... ***[D. foliosa]***
    4 Leaflets 3-9; leaflets 3-10 (or more)× as long as wide.
      5 Plants slightly to obviously pubescent (at least the spikes obviously pubescent); leaflets commonly involute or tubular, and > 10× as long as wide; corolla purple or pink.
        6 Leaflets 5-7 (-9); spikes lengthening and loosening in fruit, often becoming sinuous; plants decumbent to ascending, stems normally branching only below the middle ..... ***D. gattingeri***

6 Leaflets 3-5 (-7); spikes remaining compact; plants decumbent or ascending, stems normally branching only below the middle (*D. cahaba*), or ascending to erect, the stems branching above the middle (*D. purpurea* var. *purpurea*).
7 Interfloral bracts with pubescence along the keel and margins; plants decumbent to ascending, stems normally branching only below the middle..... ***[D. cahaba]***
7 Interfloral bracts with pubescence in a transverse band only; plants ascending to erect, the stems branching above the middle.... ***[D. purpurea var. purpurea]***

5 Plants glabrous (except that the calyx lobes may be pubescent); leaflets broad and flat or narrow and involute; corolla pink-purple or white.
8 Calyx tube not incised on the ventral (upper) side; blade of the standard cordate; corolla white; [of calcareous habitats of inland provinces of GA, AL, TN, WV and westward]..... ***D. candida***
8 Calyx tube deeply incised on the ventral (upper side; blade of the standard not cordate; corolla pink-purple or white; [of the Coastal Plain of GA southward and westward].
9 Leaflets linear, folded, or involute and terete-filiform; spikes globose ca. 6-12 mm long and in diameter; bracts much shorter than the calyx; corolla usually bright pink-purple (less commonly white or lavender)..... ***D. feayi***
9 Leaflets elliptic to oblanceolate, flat or folded; spikes ovoid to cylindric, 7-40 mm long; bracts as long as or longer than the calyx; corolla pink or white.
10 Plants spreading or decumbent; leaves widely spaced, generally lacking axillary fascicles; bract tips recurved in bud; calyx 2.7-3.3 mm long; flowers white; [of sc. and sw. GA west to se. LA]..... ***D. gracilis***
10 Plants erect-ascending to sprawling; leaves more densely spaced, generally with well-developed axillary fascicles; bract tips not recurved in bud; flowers pink or white; [of the GA Coastal Plain, se. AL, and south through e. FL Panhandle to the s. FL peninsula].
11 Leaflets of primary stem leaves mostly 5; corolla white..... ***D. albida***
11 Leaflets of primary stem leaves mostly 7-9; corolla pink (rarely white)..... ***D. carnea***

Dalea albida (Torrey & A. Gray) D.B. Ward, White-tassels. Cp (FL, GA): pinelands; uncommon. July-November. E. GA (near the SC border) west to se. AL, south to ne. FL, n. peninsular FL, and e. FL Panhandle. [= Y; = *Dalea carnea* (Michaux) Poiret var. *albida* (Torrey & A. Gray) Barneby – I, K, SE, WH, Z; = *Petalostemon albidus* (Torrey & A. Gray) Small – S]

Dalea candida Michaux ex Willdenow, White Prairie-clover. Mt (GA): limestone glades and barrens; rare (GA Special Concern). Late May-August. WV, KY, IN, WI, MN, and Saskatchewan south to nw. GA, e. TN, w. AL, sc. MS, s. LA, and ne. TX. [= I, SE (excluding *D. occidentalis*); = *D. candida* var. *candida* – C, K, Z; = *Petalostemum candidum* (Michaux ex Willdenow) Michaux – F, G; = *Petalostemon candidus* (Michaux ex Willdenow) Michaux – S]

Dalea carnea (Michaux) Poiret, Pink-tassels. Cp (FL, GA): dry sandy pinelands; uncommon (rare in GA). June-November. Se. GA south to s. peninsular FL. [= Y; = *Dalea carnea* (Michaux) Poiret var. *carnea* – I, K, SE, WH, Z; = *Petalostemon carneus* Michaux – S]

Dalea feayi (Chapman) Barneby, Feay's Prairie-clover. Cp (FL, GA): sandhills; rare. June-October. E. GA (vicinity of the Altamaha River); FL peninsula; Panhandle FL (vicinity of the Apalachicola River). [= I, K, SE, WH, Z; = *Petalostemon feayi* Chapman – S]

Dalea gattingeri (A. Heller) Barneby, Gattinger's Prairie-clover. Mt (GA): limestone glades and barrens; rare. May-August. C. TN, nw. GA, n. AL, s. MO, and n. AR (Sundell et al. 1999). [= I, K, SE; = *Petalostemon gattingeri* (A. Heller) A. Heller – S]

Dalea gracilis (Nuttall) D.B. Ward, Sprawling White-tassels. Cp (FL, GA): wet pine savannas; common (rare in GA). August -September. Sc. and sw. GA west to se. LA. [= Y; = *Dalea carnea* (Michaux) Poiret var. *gracilis* (Nuttall) Barneby – I, K, SE, WH, Z; = *Petalostemon gracilis* Nuttall – S]

* ***Dalea leporina*** (Aiton) Bullock, Hare's-foot Dalea. Mt (VA): habitat not known, presumably agricultural; rare, native of w. North America. [= I, K, SE, Z; *? Parosela alopecuroides* (Willdenow) Rydberg – S]

Dalea pinnata (J.F. Gmelin) Barneby *var. **pinnata***, Summer Farewell, Eastern Prairie-clover. Cp (FL, GA, NC, SC): sandhills and other dryish pinelands, especially in loamy sands; uncommon. August-November. Sc. and se. NC south through SC and GA to c. peninsular FL and e. panhandle FL. [= I, K, SE, WH, Z; < *Petalostemum pinnatum* (J.F. Gmelin) Blake – RAB; < *Kuhnistera pinnata* (J.F. Gmelin) Kuntze – S]

Dalea pinnata (J.F. Gmelin) Barneby *var. **trifoliata*** (Chapman) Barneby. Cp (FL, GA): sandhills, dry to moist longleaf pine flatwoods; uncommon. September-November. E. GA (near the Savannah River) south and west to w. Panhandle FL, s. AL, and s. MS. [= I, K, SE, WH, Z; < *Kuhnistera pinnata* (J.F. Gmelin) Kuntze – S; = *Petalostemon pinnatus* (J.F. Gmelin) Blake ssp. *trifoliatus* (Chapman) Wemple]

Dalea cahaba J. Allison, Cahaba Prairie-clover. Mt (AL): dolomitic Ketona glades; rare. May-June; June-September. Endemic to c. AL (Bibb County) (Allison & Stevens 2001).

Dalea foliosa (A. Gray) Barneby, Cedar Glade Prairie-clover. Calcareous glades. Late June-September. C. TN, n. AL, IL, and OH (?). [= C, I, K, SE, Z; = *Petalostemum foliosum* A. Gray – F, G; = *Petalostemon foliosus* A. Gray – S]

Dalea purpurea Ventenat var. *purpurea*, Purple Prairie-clover. Prairies, glades, and open woodlands. NY and Ontario west to British Columbia, south to KY, TN, n. AL, c. MS, TX, and NM. [= C, I, K, SE, Z; < *Petalostemum purpureum* (Ventenat) Rydberg – F, G; < *Petalostemon purpureus* (Ventenat) Rydberg – S]

Desmanthus Willdenow 1806 (Bundleflower)

A genus of about 25 species, herbs and shrubs, of warm temperate and subtropical America. References: Isely (1973)=Z; Isely (1998)=I.

Desmanthus illinoensis (Michaux) MacMillan ex B.L. Robinson & Fernald, Bundleflower, Prairie Mimosa. Pd* (NC*, SC*), Cp (FL, GA*?, SC*, VA*), Mt (GA*?): prairies, marsh edges, disturbed areas; rare. June-July; August-November. OH, MN, and ND south to Panhandle FL, TX, and NM; with scattered adventive occurrences east and west of the native distribution. [= RAB, C, F, G, I, K, SE, W, WH, Z; = *Acuan illinoense* (Michaux) Kuntze – S; = *Mimosa illinoensis* Michaux]

Desmodium Desvaux 1813 (Tick-trefoil, Tick-clover, Beggar's-ticks, Stick-tights)

A genus of about 300 species, annual herbs, perennial herbs, and shrubs, nearly cosmopolitan (but lacking from Europe). In our area, *Desmodium* is a complex genus. Some of the species in our area are confusing and can be identified only with difficulty. References: Isely (1998)=I; Krings (2004). Key based on SE, C, RAB, F, and Krings (2004). Some parts adapted with little change from SE. Some parts, especially Key D, will likely be substantially revised, based on additional herbarium and field testing.

1 Longest calyx lobes shorter than the calyx tube; stipe of the loment 4-20 mm long, about 3× or more as long as the calyx; mature leaves without stipels at the base of the petiolules of the leaflets; leaves subverticillate at the top of the stem (alternate in *D. pauciflorum*); stamens monadelphous; lower margin of the loment incised to the upper suture ..... [see ***Hylodesmum***]
1 Longest calyx lobes longer than the calyx tube; stipe of the loment absent or nearly so, included within the calyx; mature leaves retaining stipels at the base of the petiolules of the leaflets; leaves alternate; stamens diadelphous; lower margin of the loment not incised to the upper suture.
2 Leaflets narrow, the terminal leaflet < 10 mm wide, and also 4-12× as long as wide, typically thick and strongly reticulate; petioles of midstem leaves 1-10 (-15) mm long; [primarily of the Coastal Plain and lower Piedmont (rarely Mountains) in our area] ..... **Key A**
2 Leaflets broader, the terminal leaflet > 15 mm wide, or < 4× as long as wide, typically thin and not reticulate; petioles of midstem leaves various, but > 15 mm long if leaflet proportions are narrow; [collectively widespread in our area].
3 Stems trailing vinelike along the ground ..... **Key B**
3 Stems erect or ascending, not vinelike.
4 Stipules persistent (most or all of the stipules persisting through the year), 4-20 mm long, ovate to amplexicaul-clasping (to lance-attenuate, and if so, generally longer than 8 mm long, except in *D. floridanum*); leaflets 1.5-3× as long as wide ..... **Key C**
4 Stipules caducous (most or all of the stipules falling soon after expansion of the leaves), 2-6 (-8) mm long, mostly linear-subulate or lance-attenuate (in some species narrowly ovate to triangular); leaflets 1-8 (-10)× as long as wide ..... **Key D**

Key A (*Desmodium* with very narrow leaflets)

1 Petioles (0-) 1-3 (-4) mm long, the leaves thus subsessile; leaflets 5-10 mm wide, strongly pubescent on the lower surface ..... ***D. sessilifolium***
1 Petioles 3-15 mm long, the leaves thus obviously petiolate; leaflets 2-5 (-8) mm wide, glabrate or inconspicuously puberulent on the lower surface.
2 Loment segments flat to distinctly concave along the upper (suture) margin; [of dry to mesic habitats] ..... ***D. strictum***
2 Loment segments slightly convex along the upper (suture) margin; [of boggy, wet, or mesic habitats] ..... ***D. tenuifolium***

Key B (*Desmodium* with trailing stems)

1 Stipules ovate, persistent, slightly to strongly clasping at the base, 6-12 mm long.
2 Leaflets ovate, 1.2-1.9× as long as wide; flowers white to yellowish; loment uncinate-puberulent only along the sutures ..... ***D. ochroleucum***
2 Leaflets ovate, 0.8-1.1× as long as wide; flowers blue-purple; loment uncinate-puberulent over the surface ..... ***D. rotundifolium***
1 Stipules lanceolate to linear (or deltate in *D. humifusum*), usually quickly deciduous, not clasping at the base, 2-8 mm long.
3 Terminal leaflet 1.4-2.0× as long as wide, 3.0-7.0 cm long; loment segments 6-8 mm long; stipules 4-8 mm long, ovate to lance-acuminate ..... ***[D. humifusum]***
3 Terminal leaflet 0.9-1.2× as long as wide, 1.5-2.3 cm long; loment segments 4-5 mm long; stipules lanceolate, 1-5 mm long ..... ***D. lineatum***

Key C

1 Loment segments nearly symmetrical along the axis of the loment (the isthmi more or less equal above and below, thus each segment diamond-shaped, rounded-diamond-shaped, or essentialy elliptical), each segment 3-3.5 mm long; annual from a taproot; [of the Coastal Plain of NC and SC] ..... ***D. tortuosum***
1 Loment segments asymmetrical along the axis of the loment (the isthmi deeper below than above, thus each segment triangular, rounded-triangular, or semi-circular), each segment 5-11 mm long; perennial; [collectively widespread in our area].
2 Corolla 6-7 mm long; loment with 2-4 segments, each 5-7 mm long; lower leaves often 1-foliolate; [of se. SC and southward] ..... ***D. floridanum***
2 Corolla 8-13 mm long; loment with 4-6 segments, each 6.5-11 mm long; lower leaves usually 3-foliolate; [collectively widespread in our area].
3 Stem densely spreading pilose (at least the upper stem) and also uncinate-puberulent; loment segments 6.5-10 mm long ..... ***D. canescens***
3 Stem glabrous or uncinate-puberulent; loment segments 9-11 mm long
4 Leaves glabrous or nearly so ..... ***D. cuspidatum* var. *cuspidatum***
4 Leaves evidently pubescent ..... ***D. cuspidatum* var. *longifolium***

Key D

FABACEAE

1 Corolla 8-11 mm long; petioles mostly 1-8 mm long; [plants of the Mountains of VA and possibly NC] ..... ***D. canadense***
1 Corolla 3-8 (-9) mm long (or 8-10 mm long in *D. laevigatum*); petioles mostly longer, mostly 10-60 mm long (except *D. ciliare* and *D. obtusum*); [plants collectively widespread in our area].
2 Loment with 1-3 segments, rounded below.
3 Leaflets cinereous on the lower surface; corolla 6-7 mm long; loment with 3 (-4) segments ..... ***D. nuttallii***
3 Leaflets not cinereous on the lower surface; corolla 3.5-6 mm long; loment with 1-2 (-3) segments; ["*Desmodium ciliare* group"].
4 Leaflets 3-5.5× as long as wide ..... ***D. ciliare***
4 Leaflets 1.2-3-5× as long as wide.
5 Terminal leaflet usually distinctly longer and narrower than the lateral leaflets; stem (near the middle) sparsely to densely uncinate-pubescent ..... ***D. obtusum***
5 Terminal leaflet similar to the lateral leaflets; stem (near the middle) glabrous to pilose, or also with some uncinate-pubescence.
6 Petioles 1-3 (-5) mm long; pedicels 3-8 mm long; stem usually pilose; leaflets sub-appressed pubescent (to glabrate) ..... ***D. ciliare***
6 Petioles 10-25 mm long; pedicels 8-15 mm long; stem glabrous (to sparsely uncinate-puberulent); stem glabrous (to sparsely uncinate-puberulent); leaflets glabrous or with only a few scattered hairs ..... ***D. marilandicum***
2 Loment with 3-5 segments, mostly obtusely angled below.
7 Leaves densely villous on the lower surface; stem densely pubescent with uncinate or non-uncinate hairs.
8 Leaflets 1.5-2.0 (-2.2)× as long as wide; loment usually curved (the upper margin convex); loment with 2-4 segments; loment segments 4-5 mm long ..... ***D. nuttallii***
8 Leaflets 1.0-1.5 (-1.9)× as long as wide; loment straight; loment with (3-) 4-5 (-6) segments; loment segments (4-) 5-8 (-9) mm long. ..... ***D. viridiflorum***
7 Leaves glabrous to moderately appressed-villous on the lower surface; stem glabrate, pilose or uncinate pubescent.
9 Bracts (subtending clusters of 2-3 flowers) usually villous; plants moderately to densely villous; loment usually incurved (the upper margin convex); loment with 2-4 segments, each segment 4-5 mm long ..... ***D. nuttallii***
9 Bracts (subtending clusters of 2-3 flowers) not villous; plants glabrous or slightly to moderately villous or pilose; loment usually nearly straight; loment with 3-5 segments, each segment 4-8.5 mm long.
10 Corolla 8-10 mm long; pedicels usually 10-15 (-20) mm long; stems and leaves glabrous; leaflets distinctly pale on the lower surface ..... ***D. laevigatum***
10 Corolla 6-8 (-9) mm long; pedicels 3-12 mm long; stems and leaves pubescent or glabrate (but pubescent at least on the leaves); leaflets green or slightly pale on the lower surface; ["*Desmodium paniculatum* group"].
11 Leaflet lower surface glabrous, except for the conspicuous uncinate puberulence on the veins; stems and petioles glabrous or uncinate-puberulent; [plant of the Coastal Plain and possibly lower Piedmont] ..... ***D. fernaldii***
11 Leaflet lower surface strigose to conspicuously sub-appressed-villous, and sometimes also uncinate-puberulent; stems and petioles glabrate to conspicuously pilose or uncinate-puberulent; [plants collectively widespread in our area].
12 Leaflets (2.5-) 3-8 (-10)× as long as wide; leaflet pubescence usually sparse, of straight, appressed hairs < 0.5 mm long (or sometimes of longer spreading hairs); leaflets usually lacking uncinate pubescence on either surface; mid-stems glabrous or glabrate, the pubescence usually uncinate puberulence.
13 Loment segments rounded on the lower margin (thus semicircular to gibbous); leaves subsessile to short-petiolate; [plant restricted to Coastal Plain] ..... ***D. paniculatum var. epetiolatum***
13 Loment segments angled on the lower margin (thus triangular to sub-rhombic); leaves long-petiolate; [plant widespread in our area] ..... ***D. paniculatum var. paniculatum***
12 Leaflets 1.5-3 (-4)× as long as wide; leaflet pubescence usually evident, of spreading hairs > 0.5 mm long; leaflets usually with uncinate pubescence on the veins of the upper surface; mid-stems pubescent, either pilose or with uncinate pubescence (if not, evidently pubescent on the petioles).
14 Stem and petiole pubescence sparsely to densely uncinate-puberulent; upper surface of leaflets commonly uncinate-puberulet on the veins ..... ***D. glabellum***
14 Stem and petiole pubescence pilose; upper surface of leaflets occasionally uncinate-puberulent on the veins ..... ***D. perplexum***

Desmodium canadense (Linnaeus) A.P. de Candolle, Showy Tick-trefoil, Canadian Tick-trefoil. Mt (NC?, VA), Pd (VA): marl marshes, *Thuja* swamps, springs, seeps, hay meadows; rare. July-September; August-October. Québec and Nova Scotia west to Alberta, south to n. VA, sw. VA, NC (?), MO, and OK. Small (1933) reports this species for NC; the documentation is not known. [= C, F, G, I, K, SE, W; = *Meibomia canadensis* (Linnaeus) Kuntze – S]

Desmodium canescens (Linnaeus) A.P. de Candolle, Hoary Tick-trefoil. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): fields, woodland borders, disturbed areas; common (rare in FL). June-August; August-October. MA west to WI and NE, south to n. peninsular FL and TX. [= RAB, C, F, G, I, K, SE, W, WH; = *Meibomia canescens* (Linnaeus) Kuntze – S]

Desmodium ciliare (Muhlenberg ex Willdenow) A.P. de Candolle. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, woodland borders, disturbed areas; common. June-September; August-October. MA west to IN, MO, and se. KS, south to s. FL and TX; also in Cuba. [= RAB, C, G, I, SE, W, WH; > *D. ciliare* var. *ciliare* – F, K; > *D. ciliare* var. *lancifolium* Fernald – F, K; = *Meibomia ciliaris* (Muhlenberg ex Willdenow) Blake – S]

Desmodium cuspidatum (Muhlenberg ex Willdenow) A.P. de Candolle ex Loudon *var.* ***cuspidatum***, Toothed Tick-trefoil. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): fields, woodland borders, disturbed areas; uncommon (rare in FL, GA, and VA). June-August; August-October. VT and MA west to MI and WI, south to FL Panhandle and OK. [= C, F, G, K, SE; < *D. cuspidatum* – RAB, I, W, WH; = *Meibomia grandiflora* (A.P. de Candolle) Kuntze – S]

Desmodium fernaldii Schubert, Fernald's Tick-trefoil. Cp (FL?, GA?, NC, SC, VA), Pd? (SC): sandhills, dry flatwoods, woodland borders; common (rare in VA). June-September; August-October. Se. VA south to s. SC (and maybe e. GA and n. FL); Isely (1998) states that reports from the Gulf Coast are based on "glabrate forms of *D. glabellum*," and also suggests that *D. fernaldii* is only weakly differentiated from *D. glabellum*. [= RAB, C, F, G, I, K, SE, W, WH; < *Meibomia rhombifolia* Vail – S (also see *D. floridanum*)]

Desmodium floridanum Chapman, Florida Tick-trefoil. Cp (FL, GA, SC): sandhills, other dry sandy habitats; common (uncommon in GA and SC). June-September; August-October. Se. SC south to s. FL. [= RAB, I, K, SE, WH; < *Meibomia rhombifolia* Vail – S (also see *D. fernaldii*)]

Desmodium glabellum (Michaux) A.P. de Candolle. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, woodland borders, disturbed areas; common. June-September; August-October. ME west to WI and NE, south to n. peninsular FL and TX. [= RAB, F, I, K, SE, WH; < *D. glabellum* – C (also see *D. perplexum*); ? *Meibomia paniculata* (Linnaeus) Kuntze – S, in part; ? *Meibomia pubens* (Torrey & A. Gray) Rydberg – S (also see *D. paniculatum* var. *paniculatum*); < *D. paniculatum* var. *dillenii* (Darlington) Isely – W]

Desmodium laevigatum (Nuttall) A.P. de Candolle. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, woodland borders, disturbed areas; common (uncommon in GA Coastal Plain and FL). June-September; August-October. S. NY west to IN and MO, south to n. FL, Panhandle FL, and TX. [= RAB, C, F, G, I, K, SE, W, WH; = *Meibomia laevigata* (Nuttall) Kuntze – S]

Desmodium lineatum A.P. de Candolle, Matted Tick-trefoil. Cp (FL, GA, NC, SC, VA), Pd (GA?, NC): sandhills and other dry forests and woodlands; common (rare in VA). June-August; August-October. Se. MD south to n. peninsular FL, west to TX. [= RAB, C, F, G, I, K, SE, W, WH; > *Meibomia arenicola* Vail – S; > *Meibomia polymorpha* (A. Gray) Small – S]

Desmodium marilandicum (Linnaeus) A.P. de Candolle. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): fields, woodland borders, disturbed areas; common (rare in GA Mountains, uncommon in FL). June-September; August-October. MA west to MI and MO, south to n. peninsular FL and TX. [= RAB, C, F, G, I, K, SE, W, WH; = *Meibomia marilandica* (Linnaeus) Kuntze – S]

Desmodium nuttallii (Schindler) Schubert. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): fields, woodland borders, disturbed areas; common (rare in FL and GA) . July-September; August-October. NY west to IN, south to n. peninsular FL, FL Panhandle, AL, and AR. [= RAB, F, I, K, SE, W, WH; < *D. viridiflorum* – C, G; < *Meibomia viridiflora* (Linnaeus) Kuntze – S (also see *D. viridiflorum*)]

Desmodium obtusum (Muhlenberg ex Willdenow) A.P. de Candolle. Mt (NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry pine woodlands, fields, woodland borders, disturbed areas; common. June-September; August-October. MA west to s. MI, south to Panhandle FL and TX. [= RAB, I, K, SE, W, WH; = *D. rigidum* (Elliott) A.P. de Candolle – C, F, G; = *Meibomia rigida* (Elliott) Kuntze – S]

Desmodium ochroleucum M.A. Curtis ex Canby, White Tick-trefoil, Creamflower Tick-trefoil. Pd (NC, VA), Cp (FL, GA, VA), Mt (GA, NC): dry woodlands, especially over calcareous soils; rare. June-August; August-October. NJ (?), DE, and MD south to sc. and sw. NC, GA, TN, AL, Panhandle FL, MS, and MO. [= RAB, C, F, G, I, K, SE, W; = *Meibomia ochroleuca* (M.A. Curtis ex Canby) Kuntze – S]

Desmodium paniculatum (Linnaeus) A.P. de Candolle *var.* ***epetiolatum*** Schubert. Cp (NC, SC?, VA): pine savannas and flatwoods, bogs; uncommon? (VA Watch List). June-September; August-October. Var. *epetiolatum* ranges from se. VA south to se. NC or e. SC. It may reflect hybridization between *D. paniculatum* var. *paniculatum* and another species. Further study is needed. [= F, I, K, SE; < *D. paniculatum* – RAB, C; < *D. paniculatum* var. *paniculatum* – W]

Desmodium paniculatum (Linnaeus) A.P. de Candolle *var.* ***paniculatum***. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): fields, woodland borders, disturbed areas; common. June-September; August-October. S. ME west to s. Ontario, MI, and NE, south to s. FL and TX. [= F, I, K, SE; < *D. paniculatum* – RAB, C, WH; > *Meibomia chapmanii* (Britton) Small – S; = *D. paniculatum* var. *pubens* Torrey & A. Gray – G; > *Meibomia paniculata* (Linnaeus) Kuntze – S; >< *Meibomia pubens* (Torrey & A. Gray) Rydberg – S (also see *D. glabellum*); < *D. paniculatum* var. *paniculatum* – W]

Desmodium perplexum Schubert. Mt, Pd (NC, SC, VA), Cp (FL, NC, SC, VA) {GA}: fields, woodland borders, disturbed areas; common (rare in FL). July-September; August-October. [= RAB, F, I, K, SE, WH; < *D. glabellum* – C; ? *Meibomia dillenii* (Darlington) Kuntze – S; < *D. paniculatum* var. *dillenii* (Darlington) Isely – W]

Desmodium rotundifolium A.P. de Candolle, Roundleaf Tick-trefoil. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry forests and woodlands; common (rare in GA Coastal Plain, rare in FL. June-August; August-October. VT and MA west to s. MI, south to GA, LA, and MO. [= RAB, C, F, G, I, K, SE, W, WH; ? *Meibomia michauxii* Vail – S]

Desmodium sessilifolium (Torrey) Torrey & A. Gray, Sessile-leaf Tick-trefoil. Pd (NC, SC, VA), Mt (VA), Cp (FL, GA, SC?): dry woodlands; rare. July-August; August-October. RI west to s. MI and KS, south to NC, Panhandle FL, MS, and TX. [= RAB, C, F, G, I, K, SE, W, WH; = *Meibomia sessilifolia* (Torrey) Kuntze – S]

Desmodium strictum (Pursh) A.P. de Candolle, Pineland Tick-trefoil, Pinebarren Tick-trefoil. Cp (FL, GA, NC, SC, VA), Pd (NC, SC): sandhills, other dry woodlands; common (rare in GA and VA). July-August; August-October. S. NJ south to s. FL, west to w. LA. [= RAB, C, F, G, I, K, SE, W, WH; = *Meibomia stricta* (Pursh) Kuntze – S]

Desmodium tenuifolium Torrey & A. Gray, Slimleaf Tick-trefoil. Cp (FL, GA, NC, SC, VA), Pd? (NC?): bogs, pine savannas, wet pine flatwoods; common (VA Rare). July-August; August-October. Se. VA south to c. peninsular FL, west to w. LA. [= RAB, C, F, G, I, K, SE, WH; = *Meibomia tenuifolia* (Torrey & A. Gray) Kuntze – S]

Desmodium tortuosum (Swartz) A.P. de Candolle. Cp (FL, GA, NC, SC): fields, woodland borders, disturbed areas; common (uncommon in NC). July-August; August-October. E. NC south to s. FL, west to TX. [= RAB, I, K, SE, WH; = *Meibomia purpurea* (P. Miller) Vail – S]

Desmodium viridiflorum (Linnaeus) A.P. de Candolle. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, woodland borders, disturbed areas; common. June-September; August-October. DE south to c. peninsular FL, west to TX, and inland to w. VA, w. NC, n. TN, and AR. [= RAB, F, I, K, SE, W, WH; < *D. viridiflorum* – C, G (also see *D. nuttallii*); < *Meibomia viridiflora* (Linnaeus) Kuntze – S (also see *D. nuttallii*)]

Desmodium cuspidatum (Muhlenberg ex Willdenow) A.P. de Candolle ex Loudon *var.* ***longifolium*** (Torrey & A. Gray) Schubert. {AL, GA, KY, TN}. Var. *longifolium* (Torrey & A. Gray) Schubert, differing in its pubescent stem, leaves, stipules, and calyx (vs. nearly glabrous), is generally more western, ranging from OH west to MN and NE, south to GA and ne. TX. [= C, F, G, K, SE; < *D. cuspidatum* – RAB, I]

Desmodium humifusum (Muhlenberg ex Bigelow) Beck. {DC, DE, MD, NJ} MA (Nova Scotia?) south to MD and DC (and possibly VA). Perhaps only a hybrid. [= C, F, I, K, SE; *D. glabellum* – G, misapplied; *Meibomia glabella* – S, misapplied]

Desmodium incanum A.P. de Candolle. Cp (FL, GA): lawns, disturbed areas; uncommon (rare in GA), presumably introduced or adventive from tropical America. A pantropical weedy species. [= I, SE, WH; > *D. incanum* var. *incanum* – K; = *Meibomia cana* (J.F. Gmelin) Blake – S, illegitimate basionym; = *D. canum* (J.F. Gmelin) Schinz & Thellung, illegitimate basionym] {not yet keyed}

* ***Desmodium triflorum*** (Linnaeus) deCandolle. Cp (FL, LA): lawns, roadsides; uncommon, native of the Old World tropics. [= I, K, SE; = *Sagotia triflora* (Linnaeus) Duchassaing & Walpers – S] {not yet keyed; add to synonymy}

Dioclea Kunth 1824

A genus of about 30-40 species, perennials, woody vines, and shrubs, of tropical (rarely temperate) regions of the Old and New World. References: Isely (1998)=I.

Dioclea multiflora (Torrey & A. Gray) C. Mohr. Cp (FL, GA): alluvial forests; rare. S. GA and FL Panhandle west to e. TX, north in the interior to w. TN and w. KY. [= C, G, I, K, S, SE; = *Galactia mohlenbrockii* R.H. Maxwell – WH]

Erythrina Linnaeus 1753 (Coral Bean)

A genus of about 120 species, trees, shrubs, and perennial herbs, of tropical and subtropical regions of the Old and New World. References: Isely (1998)=I.

1 Leaflets not lobed; [cultivated tree, persistent] ..... ***E. crista-galli***
1 Leaflets hastately lobed; [native herb or shrub] ..... ***E. herbacea***

* ***Erythrina crista-galli*** Linnaeus, Coraltree. Cp (GA, NC): cultivated, disturbed areas, roadside ditches; rare, native of South America. [= I, K, SE; = *Micropteryx crista-galli* (Linnaeus) Walpers – S]

Erythrina herbacea Linnaeus, Coral Bean, Cardinal-spear. Cp (FL, GA, NC, SC): maritime forests, dry sandy woodlands, sandhills in the outer Coastal Plain; uncommon (rare in NC). May-July; July-September. Se. NC south to FL, west to se. TX, and south to e. Mexico (Tamaulipas and e. San Luis Potosi). [= RAB, I, K, SE, WH; > *E. herbacea* – S; > *E. arborea* (Chapman) Small – S]

Galactia P. Browne 1756 (Milkpea)

A genus of about 50-60 species, perennial herbs, of tropical and warm temperate regions, primarily American. References: Duncan (1979)=Z; Isely (1998)=I; Ward & Hall (2004)=Y. [also see *Dioclea*]

Identification notes: Definite identification of the taxa from key lead 4 on is problematic. Note also that the traditional application of *G. regularis* and *G. volubilis* is reversed.

1 Leaves with (5-) 7 (-9) leaflets; flowers white ..... ***G. elliottii***
1 Leaves with 3 leaflets; flowers white, pink, red, or purple.
  2 Plant erect, with 4-6 (-8) leaves ..... ***G. erecta***
  2 Plant prostrate, trailing, or twining, generally with numerous leaves.
    3 Legumes villous with hairs 1-1.5 mm long; corolla when fresh bright reddish purple and white (drying dark on herbarium specimens); stems villous with hairs > 0.5 mm long ..... ***G. mollis***
    3 Legumes glabrous, or pubescent with hairs < 1 mm long; corolla pink to pink-purple (drying pale or the petals dropping on herbarium specimens); stems glabrate to villosulous with hairs < 0.5 mm long.
      4 Inflorescences generally exserted, (2-) 4-15 (-20) cm long, the flowers well distributed along half or more of the length of the inflorescence axis; flower buds generally 5-8 mm long; corolla 8-12 (-14) mm long; plants twining (rarely trailing) ..... ***G. regularis***
      4 Inflorescences short or exserted, if exserted then the flowers generally from nodes crowded into the upper half of the axis; flower buds 5-10 mm long; corolla (11-) 12-16 (-18) mm long; plants trailing or twining.
        5 Internodes short, 1-2 cm long, the stem thus appearing leafy; inflorescences with 1-3 flowers (or also with solitary axillary flowers); [plants of Coastal Plain of SC southward] ..... ***G. minor***
        5 Internodes generally longer; inflorescences with 1-3 or more flowers; [plants collectively widespread in our area].
          6 Stems glabrescent to conspicuously pubescent with spreading hairs < 0.5 mm long; leaflets 1.5-3.5 (-4) cm long, the undersurface with hairs 0.4-0.7 mm long; [plants of e. GA southward] ..... ***G. floridana***
          6 Stems antrorse- or retrorse-strigose; leaflets 1.5-5 (-7) cm long, the undersurface strigose with hairs < 0.3 mm long; [plants widespread in our area] ..... ***G. volubilis* var. *volubilis***

Galactia elliottii Nuttall, Elliott's Milkpea. Cp (FL, GA, SC): moist forests; uncommon. July-September; August-October. S. SC south to s. FL. [= RAB, I, K, S, SE, WH, Y, Z]

Galactia erecta (Walter) Vail, Erect Milkpea. Cp (FL, GA, NC, SC): sandhills; common. May-July; July-September. Se. NC south to Panhandle FL, west to e. TX. [= RAB, I, K, S, SE, WH, Y, Z]

Galactia floridana Torrey & A. Gray, Florida Milkpea. Cp (FL, GA): sandhills and other xeric sands; rare (GA Special Concern). S. GA south to s. FL, west to s. MS. [= Y; < *G. floridana* – I, K, SE, Z (also see *G. volubilis* var. *fasciculata*); = *G. floridana* var. *floridana* – S; < *G. volubilis* – WH]

Galactia minor W.H. Duncan, Little Milkpea. Cp (FL, GA, NC, SC): sandhills; uncommon. June-August; July-October. Sc. NC south to Panhandle FL, west to s. MS. [= Y, Z; < *G. regularis* (Linnaeus) Britton, Sterns, & Poggenburg – RAB

(misapplied); = *G. microphylla* (Chapman) H.J. Rogers ex Isely – I, K, SE; = *G. floridana* Torrey & A. Gray var. *microphylla* Chapman – S; < *G. volubilis* – WH]

Galactia mollis Michaux. Cp (FL, GA, NC, SC): sandhills; uncommon (rare in NC and SC). May-July; July- September. Se. NC south to c. peninsular FL, west to Panhandle FL and se. AL. [= RAB, I, K, S, SE, WH, Y, Z]

Galactia regularis (Linnaeus) Britton, Sterns, & Poggenburg. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry forests and woodlands; common. July-September; August-October. Se. PA west to MO and OK, south to s. FL and se. TX. [= Y, Z; > *G. volubilis* (Linnaeus) Britton – RAB, C, F, G (misapplied); > *G. macreei* M.A. Curtis – RAB, C, F, G; = *G. volubilis* – I, K, S, SE, misapplied; < *G. volubilis* – WH]

Galactia volubilis (Linnaeus) Britton *var.* ***volubilis***. Cp (FL, GA, NC, SC, VA), Pd?, Mt? (VA): sandhills, other dry forests and openings; common. June-August; July-October. NJ and s. PA west to c. AR, south to s. FL and LA. Var. *baltzelliana* D.B. Ward & D.W. Hall and var. *fasciculata* (Vail) D.B. Ward & D.W. Hall are localized endemics of the FL Peninsula. Duncan (1979) describes additional forms of this taxon (which he treated under the name *G. glabella*) that he considered to potentially warrant description as varieties or species; they need further study. [= Y; < *G. regularis* (Linnaeus) Britton, Sterns, & Poggenburg – RAB, C, F, G, I, K, SE, WH (misapplied); > *G. regularis* – S, misapplied; > *G. brevipes* Small – S; > *G. brachypoda* Torrey & A. Gray – S; < *G. glabella* Michaux – Z]

Genista Linnaeus 1753 (Dyer's Greenweed)

A genus of about 80-90 species, shrubs, herbs, and small trees, native to Eurasia. References: Isely (1998)=I.

* *Genista tinctoria* Linnaeus, Dyer's Greenweed, Dyer's Broom. Cp (VA): disturbed areas; rare, native of Europe. June-September. Not cited in Harvill et al. (1992), but described as naturalized in sterile soils south to VA in C, F, and G. [= C, F, G, I, K]

Gleditsia Linnaeus 1753 (Honey Locust, Water Locust)

A genus of 13-16 species, trees (and a shrub), scattered relictually in the Old and New Worlds, related to *Gymnocladus*. References: Isely (1975)=Z; Robertson & Lee (1976)=Y; Isely (1998)=I; Schnabel & Wendel (1998).

1 Legume ovate, 3-5 (-8) cm long and 1-3-seeded; foliage glabrous (or slightly puberulent when young); [trees of frquently flooded swamps, often with *Taxodium*, rarely planted and escaped] ..... ***G. aquatica***
1 Legume elongate, 20-40 cm long and multi-seeded; foliage puberulent (even in age); [trees of moist to dry forests, frequently planted and escaped in disturbed areas] ..... ***G. triacanthos***

Gleditsia aquatica Marshall, Water Locust. Cp (FL, GA, SC): swamp forests; common. April-May; July-November. E. SC south to c. peninsular FL, west to TX, and north in the interior to IN, IL, and MO; occasionally cultivated north of its native range. [= RAB, C, F, G, GW, I, K, S, SE, WH, Y, Z]

Gleditsia triacanthos Linnaeus, Honey Locust. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): woodlands, forests (generally bottomland), fencerows, often planted as a street tree; common (uncommon in Mountains). April-May; July-November. NY west to SD, south to panhandle FL and TX. Its occurrence over much of our region appears to be as an adventive; the native range is poorly known. *G. triacanthos* is more likely to be native in the western part of our region, particularly in the Mississippi drainage. The trunks are normally beset with lengthy, branched thorns, but thornless trees are encountered (and are usually favored for horticultural planting). [= RAB, C, G, GW, I, K, S, SE, W, Y, Z]

The hybrid *Gleditsia* ×*texana* Sargent (pro sp.) [*G. aquatica* × *triacanthos*] occurs occasionally in the area of range overlap of its parents. It is intermediate between its parents. [= I, K]

Glycine Willdenow 1802 (Soybean, Soya)

A genus of about 10-20 species, annual and perennial herbs, of Asia and Australia. References: Isely (1998)=I.

* ***Glycine max*** (Linnaeus) Merrill, Soybean. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): abundantly cultivated, rarely persisting as a waif, native of e. Asia. July-October. One of the most important legume crops in the world. [= RAB, F, I, K, SE]

Glycyrrhiza Linnaeus 1753 (Licorice)

A genus of about 20 species, herbs, mainly of Eurasia (isolated taxa in North Americam South America, and Australia). References: Isely (1998)=I.

* ***Glycyrrhiza lepidota*** Pursh, Wild Licorice, American Licorice. Cp (VA): disturbed areas; rare, native of w. North America. Described as naturalized in old fields in e. VA in C, F, and G. [= K; > *G. lepidota* Pursh var. *glutinosa* (Nuttall) S. Watson – C, F, G, I]

Gymnocladus Lamarck 1785 (Kentucky Coffee-tree)

A genus of 6 species, all trees, ours in e. North America and 5 species in e. Asia, related to *Gleditsia*. References: Isely (1975)=Z; Robertson & Lee (1976)=Y; Lee (1976)=X; Isely (1998)=I.

Gymnocladus dioicus (Linnaeus) K. Koch, Kentucky Coffee-tree. Mt (GA*, NC*, VA), Pd* (GA*, NC*): native in rich bottomland and slope forests, also in disturbed areas, persistent and weakly spreading from horticultural plantings; rare. April-May; August-November (and persistent). The original native range has been obscured, perhaps PA west to se. SD, south to w. VA, TN, n. AL, and OK. [= RAB, C, F, G, I, K, S, SE, X, Y, Z]

Hylodesmum H. Ohashi & R.R. Mill 2000

A genus of ca. 15 species, perennial herbs, mainly of e. Asia and e. North America. This group has often been included in *Desmodium* as a section or subgenus, but is now shown to be amply distinct in morphology and also to form a monophyletic group based on molecular analysis. References: Raveill (2006); Ohashi & Mill (2000)=Z.

1 Stems dimorphic, the flowering stem normally lacking leaves (rarely with leaves), the sterile stem with a subverticillate cluster of 3-7 leaves near the top; pedicels 10-20 mm long ..... ***H. nudiflorum***
1 Stems monomorphic, bearing both leaves and flowers, the leaves either subverticillate or not; pedicels 2-10 mm long.
  2 Leaves subverticillate, clustered; leaflets conspicuously and strongly acuminate, 5-10 cm long; flowers usually distinctly pink or pink-purple; inflorescence 3-8 dm long, elongate, large, and conspicuous, much exceeding the leaves ..... ***H. glutinosum***
  2 Leaves alternate, scattered; leaflets acute to slightly acuminate, 3-7 cm long; flowers white; inflorescence 1-2 dm long, small and inconspicuous, often partly obscured by the leaves ..... ***H. pauciflorum***

Hylodesmum glutinosum (Muhlenberg ex Willdenow) H. Ohashi & R.R. Mill, Heartleaf Tick-trefoil, Clusterleaf Tick-trefoil. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests, especially nutrient-rich; uncommon (rare in FL). June-August; August-October. Nova Scotia west to Saskatchewan, south to Panhandle FL and Mexico. [= Z; = *Desmodium glutinosum* (Muhlenberg ex Willdenow) A. Wood – RAB, C, F, G, I, K, SE, W, WH; = *Meibomia acuminata* (Michaux) Blake – S]

Hylodesmum nudiflorum (Linnaeus) H. Ahashi & R.R. Mill, Naked Tick-trefoil. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): moist to dry forests; common. July-August; August-October. ME west to MN, south to Panhandle FL, n. peninsular FL, and TX. [= Z; = *Desmodium nudiflorum* (Linnaeus) A.P. de Candolle – RAB, C, F, G, I, K, SE, W, WH; = *Meibomia nudiflora* (Linnaeus) Kuntze – S; =]

Hylodesmum pauciflorum (Nuttall) H. Ohashi & R.R. Mill, Few-flowered Tick-trefoil. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): moist forests; common (uncommon in FL and NC). June-August; August-October. NY west to OH and IA, south to Panhandle FL and TX. [= Z; = *Desmodium pauciflorum* (Nuttall) A.P. de Candolle – RAB, C, F, G, I, K, SE, W, WH; = *Meibomia pauciflora* (Nuttall) Kuntze – S]

Indigofera Linnaeus 1753 (Indigo)

A genus of about 700 species, annual herbs, perennial herbs, and shrubs, nearly cosmopolitan in tropical and warm temperate regions. References: Isely (1998)=I.

1 Leaflets borne alternately or irregularly on the rachis ..... ***I. spicata***
1 Leaflets borne opposite on the rachis.
  2 Stem pubescence hirsute or pilose with long brownish hairs ..... ***I. hirsuta***
  2 Stem pubescence strigose-appressed.
    3 Legume 7-9 mm long, ovoid, not falcate, indehiscent, with 2-3 seeds; corolla 6-9 mm long; [native species] ..... ***I. caroliniana***
    3 Legume 15-36 mm long, linear-cylindric, slightly to strongly falcate, dehiscent, with 3-12 or more seeds; corolla **either** 5-6 mm long **or** 15-18 mm long; [introduced species].
      4 Corolla 15-18 mm long; legume 30-40 mm long, straight; leaflets 2.5-4 cm long ..... ***I. decora***
      4 Corolla 5-6 mm long; legume 15-36 mm long, slightly to strongly falcate; leaflets (0.5-) 1-3 cm long.
        5 Legume 15-20 mm long, strongly falcate ..... ***I. suffruticosa***
        5 Legume 28-36 mm long, slightly falcate ..... ***I. tinctoria***

Indigofera caroliniana P. Miller, Wild Indigo, Carolina Indigo. Cp (FL, GA, NC, SC): sandy forests and woodlands, including sandhills and sandy maritime forests; common (uncommon in NC and SC). June-August; July-October. E. NC south to s. FL, west to se. LA, a Southeastern Coastal Plain endemic. [= RAB, I, K, S, SE, WH]

* ***Indigofera decora*** Lindley, Chinese Indigo. Pd (GA): planted horticulturally and spreading to nearby roadbanks; rare (but potentially invasive), native of China. June-July (-September). In GA (Oglethorpe County).

* ***Indigofera hirsuta*** Linnaeus, Hairy Indigo. Cp (FL, GA, SC): sandy disturbed areas, such as wildlife "food fields"; rare, native of the Old World tropics. First reported for SC by Nelson & Kelly (1997). Also known from other scattered locations in the Southeast, such as s. MS (Leonard, 2006, pers.comm.). [= I, K, SE]

* ***Indigofera spicata*** Forsskål, Trailing Indigo. Cp (FL): dry, disturbed areas, hammocks, dunes; rare, native of Africa. [= I, K, SE, WH]

* ***Indigofera suffruticosa*** P. Miller, West Indian Indigo. Cp (GA, NC, SC): disturbed areas, dry sandy woodlands; rare, formerly commonly cultivated, locally established as a weed at that time, perhaps no longer present in our area, native of the New World tropics, including s. FL. [= I, K, S, SE]

* ***Indigofera tinctoria*** Linnaeus, African Indigo. Cp (GA, NC, SC): formerly commonly cultivated, locally established as a weed at that time, perhaps no longer present in our area, native of Africa. Both this species and *I. suffruticosa* were cultivated as an important export crop in the Coastal Plain of GA, SC, and (less so) NC in the seventeenth and eighteenth centuries. [= I, K, S, SE]

Kummerowia Schindler 1912 (Korean-clover, Japanese-clover)

A genus of 2 species, annual herbs, native to temperate e. Asia. *Kummerowia* differs from *Lespedeza* in its annual habit (vs. perennial), conspicuous stipules (vs. not conspicuous), inflorescence branching pattern (see Akiyama & Ohba 1985), and leaflets with striate, parallel, lateral veins (vs. with reticulate lateral veins). It is now generally regarded as distinct from *Lespedeza* at the generic level, though they are closely related. References: Akiyama & Ohba (1985)=Z; Isely (1998)=I. Key based closely on SE.

1 Mid-stem leaves with petioles 4-10 mm long; leaflets emarginate at the apex; leaflets conspicuously spreading-ciliate; stems antrorsely appressed-strigose; calyx covering 1/3-1/2 of the legume ..... ***K. stipulacea***
1 Mid-stem leaves with petioles 1-2 (-4) mm long; leaflets not emarginate at the apex; leaflets inconspicuously appressed-ciliate; stems retrorsely appressed-strigose; calyx covering 1/2-4/5 of the legume ..... ***K. striata***

* ***Kummerowia stipulacea*** (Maximowicz) Makino, Korean Lespedeza, Korean-clover. Pd (GA, NC, SC, VA), Mt (NC, SC, VA), Cp (NC, SC, VA): fields, roadsides, disturbed areas; common (rare in GA), native of e. Asia. July-September; August-November. [= I, K, SE, Z; = *Lespedeza stipulacea* Maximowicz – RAB, C, F, G, W]

* ***Kummerowia striata*** (Thunberg) Schindler, Japanese-clover, Common Lespedeza. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common, native of e. Asia. July-September; August-November. [= I, K, SE, WH, Z; = *Lespedeza striata* (Thunberg) Hooker & Arnott – RAB, C, F, S, G, W]

Lablab Adanson 1763 (Hyacinth-bean)

A genus of a single species, an annual to perennial herb, native of the Old World tropics. References: Isely (1998)=I.

* *Lablab purpureus* (Linnaeus) Sweet, Hyacinth-bean, is cultivated and rarely may escape or persist as a waif in disturbed areas; it is reported from se. PA (Rhoads & Klein 1993). [= I, K, SE; = *Dolichos lablab* Linnaeus]

Lathyrus Linnaeus 1753 (Wild-pea, Vetchling)

A genus of about 150-160 species, annual and perennial herbs, of nearly cosmopolitan distribution. References: Isely (1998)=I.

1 Leaflets > 2, generally 4-12; [native species of various habitats].
  2 Foliaceous stipules laterally symmetrical, with 2 approximately equal basal lobes; leaves somewhat fleshy; [plants of ocean beaches and dunes] ..... ***[L. maritimus var. pellitus]***
  2 Foliaceous stipules asymmetrical, oblique at the base, the basal lobe well-developed only on one side.
    3 Racemes with 2-6 (-9) flowers; leaflets 4-8 (-10) per leaf; [plants of marshes, bottomlands, and other wet habitats] ..... ***L. palustris***
    3 Racemes with (5-) 10-20 flowers; leaflets (8-) 10-14 per leaf; [plants of dry to mesic forests] ..... ***L. venosus***
1 Leaflets 0-2; [alien species, except *L. pusillus*].
  4 Leaflets absent (but with foliaceous stipules) ..... ***[L. aphaca]***
  4 Leaflets 2.
    5 Stems not winged or flanged; corollas 10-15 mm long; flowers 3-10 per inflorescence.
      6 Corollas yellow ..... ***[V. pratensis]***
      6 Corollas red-purple ..... ***[V. tuberosus]***
    5 Stems winged; corollas 6-30 mm long; flowers 1-15 per inflorescence.
      7 Stems with wings 0-1 (-2) mm wide; corolla 6-14 mm long; flowers 1-3 (-4) per raceme.
        8 Legume (in fruit) and ovary (in flower) hirsute with swollen-based hairs; corolla 9-14 mm long ..... ***L. hirsutus***
        8 Legume (in fruit) and ovary (in flower) glabrous; corolla 6-9 mm long ..... ***L. pusillus***
      7 Stems with wings 1-3 mm wide; corolla 13-30 mm long; flowers 2-12 per raceme.
        9 Stems hirsute with swollen-based hairs; plant an annual; flowers 2-4 per raceme ..... ***L. odoratus***
        9 Stems glabrate; plant a perennial; flowers (3-) 4-12 per raceme.
          10 Stipules 4-10 mm wide; leaflets 2-5× as long as wide ..... ***L. latifolius***
          10 Stipules 2-3 mm wide; leaflets 6-15× as long as wide ..... ***L. sylvestris***

* ***Lathyrus hirsutus*** Linnaeus, Caley Pea, Singletary Pea. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, VA): roadsides, fields, disturbed areas; common (rare in FL), native of Europe. April-July. [= RAB, C, F, G, I, K, S, SE, W, WH]

* ***Lathyrus latifolius*** Linnaeus, Everlasting Pea, Perennial Sweet Pea. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): roadsides, fencerows, disturbed areas; common, native of Europe. May-September. [= RAB, C, F, G, I, K, SE, W]

* ***Lathyrus odoratus*** Linnaeus, Sweet Pea. Cp, Pd, Mt (GA, NC, SC, VA): cultivated, and occasionally persisting; rare, native of s. Europe. [= C, F, G, I, K, SE]

Lathyrus palustris Linnaeus, Marsh Pea, Marsh Vetchling. Pd (GA, VA), Mt (VA), Cp (NC): bottomland forests, marshes, streambanks; rare (GA Special Concern). May-June; July-September. Circumboreal, ranging in North America south to NJ, VA, ne. NC, ec. GA, OH, IN, MO, CO, and CA. [= RAB, I, K, SE; > *L. palustris* var. *palustris* – C, F, G; > *L. palustris* var. *myrtifolius* (Muhlenberg ex Willdenow) A. Gray – F, G; > *L. palustris* var. *linearifolius* Seringe – G; > *L. myrtifolius* Muhlenberg ex Willdenow – S]

Lathyrus pusillus Elliott, Tiny Pea. Cp (FL, NC, VA): open areas in bottomlands, disturbed areas; rare. April-July. E. VA, MO and KS, south to FL Panhandle and TX. [= RAB, F, G, I, K, S, SE, WH]

* ***Lathyrus sylvestris*** Linnaeus, Perennial Pea. Pd (GA) (NC?, SC?, VA): cultivated, and occasionally persisting; rare, native of Europe. [= C, F, G, I, K, SE]

Lathyrus venosus Muhlenberg ex Willdenow, Forest Pea, Bush Vetch. Mt, Pd (GA, NC, VA), Cp (VA): dry to mesic slope and bottomlands forests and woodlands, especially in base-rich soils; common. July-September. S. Ontario west to MN and Saskatchewan, south to c. NC, wc. GA, and MO. [= RAB, I, K, S, SE, W; > *L. venosus* var. *venosus* – C, F, G; > *L. venosus* var. *intonsus* Butters & St. John – C, F, G; > *L. venosus* var. *meridionalis* Butters & St. John – F]

* *Lathyrus aphaca* Linnaeus, Yellow Vetchling, native of Eurasia, is scattered in occurrence in the Southeast, including AL, TN, and KY (Kartesz 1999). [= G, I, K, SE]

Lathyrus maritimus (Linnaeus) Bigelow var. *pellitus* (Fernald) Gleason, Beach Pea. South to s. NJ. Reported from ocean beaches in Dare County (NC), but without adequate documentation. [= C, G; = *Lathyrus japonicus* Willdenow var. *pellitus* Fernald – F, K; < *L. japonicus* – I]

* *Lathyrus pratensis* Linnaeus, Meadow Pea. South to s. NJ. Reported for VA on the basis of "personal communication" (Kartesz 1999). {investigate} [= C, F, I, K]

* *Lathyrus tuberosus* Linnaeus. Introduced in e. TN (Chester, Wofford, & Kral 1997), WV (Kartesz 1999), and KY. [= C, F, G, I, K, SE]

Lespedeza Michaux 1803 (Lespedeza)

A genus of about 40 species, perennial herbs and shrubs, of temperate regions of e. Asia and e. North America. References: Clewell (1966a)=Z; Clewell (1966b)=Y; Isely (1986b)=X; Akiyama (1988)=Q; Clewell & Stickel (1990); Isely (1998)=I. Key based primarily on Z and SE. [also see *Kummerowia*]

1 Plants annual; stipules ovate to ovate-lanceolate, conspicuous; leaflets with striate, parallel, lateral veins ..... ***[Kummerowia]***
1 Plants perennial, stipules subulate, setaceous, or lanceolate, not conspicuous; leaflets with reticulate lateral veins, joining before reaching the margin.
  2 Plant a shrub, usually 1-3 m tall, bushy-branched, the woody stems over-wintering; corolla 8-15 mm long; [plants alien, planted in "wildlife food plots" and persisting or spreading]; [section *Macrolespedeza*).
    3 Calyx lobes equal to or shorter than the calyx tube; corolla 8-11 mm long; leaflets 1.5-2× as long as wide; racemes erect or strongly ascending; stems 1-several per crown, brown when young ..... ***L. bicolor***
    3 Calyx lobes longer than the calyx tube (especially or at least the lowest lobe); corolla (10-) 12-15 mm long; leaflets 2-3× as long as wide; racemes lax and drooping; stems many per crown, purplish when young ..... ***L. thunbergii***
  2 Plant an herb, 0.1-2 m tall, not bushy-branched (the taller species often wand-like), the stems in some species somewhat woody but dying back; corolla to 10 mm long; [plants native, except *L. cuneata* and *L. virgata*).
    4 Leaflets distinctly widest toward the tip, 3-5× as long as wide, the base and apex very differently shaped (the base narrowly cuneate, the tip rounded, truncate or even retuse); racemes reduced, with 2-3 flowers, shorter than the subtending leaves; [plants alien] ..... ***L. cuneata***
    4 Leaflets generally widest near the middle, 1-8 (-10)× as long as wide, the base and apex shaped similarly (i.e. both rounded, or both cuneate); racemes with 3-many flowers, shorter or longer than the subtending leaves; [plants native, except *L. virgata*].
      5 Midrib of leaflets distinctly excurrent as a spinose bristle 0.5-1.5 mm long; [plant a rare introduction] ..... ***L. virgata***
      5 Midrib of leaflets not excurrent, or only as an obscure mucro, not at all spinose; [plants native].
        6 Plants trailing at maturity (young stems erect to arching-ascending up to 2 dm tall, then lopping over); stems slender, wiry; corolla pink to purple.
          7 Pubescence of the stem spreading (pilose) ..... ***L. procumbens***
          7 Pubescence of the stem appressed (strigose).
            8 Calyx of legumes produced from cleistogamous flowers 1/4-1/3 as long as the pod; stems usually lacking axillary leaves; keel subequal to the wings, or shorter; stipules 2-4 (-5) mm long ..... ***L. repens***
            8 Calyx of legumes produced from cleistogamous flowers ca. 1/5 as long as the pod; stems often with axillary leaves distinctly smaller than the primary leaves; keel usually longer than the wings; stipules 3-5 (-6) mm long ..... ***L. frutescens***
        6 Plants erect at maturity; stems generally stout, stiff; corolla pink, purple, white, cream, or mixed.
          9 Plants in flower.
            10 Corolla primarily white or cream (often with a purplish throat).
              11 Raceme peduncles short (shorter than the subtending leaf), the inflorescence itself barely if at all exceeding the subtending leaf; calyx lobes 6-10 mm long; leaflets (2-) 2.5-5 (-8)× as long as wide ..... ***L. capitata***
              11 Raceme peduncles elongate (often longer than the subtending leaf), the inflorescence itself well-exserted beyond the subtending leaf; calyx lobes 3-7 mm long; leaflets either narrower or wider (see below).
                12 Leaflets 4-8 (-10)× as long as wide ..... ***L. angustifolia***
                12 Leaflets 1.3-1.8× as long as wide.

13 Leaves closely strigose on both surfaces with hairs 0.2-0.5 mm long, silvery when fresh; leaflets 1-2 cm long; petiole of midstem leaves not generally > 1 cm long, about the same length as the rachis; [plants of the Coastal Plain and, in NC and SC, the lower Piedmont] ..... ***L. hirta var. curtissii***
13 Leaves glabrate, or strigose above only, at least some of the hairs (especially those on the veins below) > 0.5 mm long, green or grey (to somewhat silvery) when fresh; leaflets 1.5-4 (-5) cm long; petiole of midstem leaves 1-1.5 (-2) cm long, much exceeding the rachis; [plants widespread in our area] ..... ***L. hirta var. hirta***

10 Corolla primarily pink or purple.
14 Peduncles of the racemes of chasmogamous (petaliferous) flowers longer than the subtending leaves; keel 1-2 mm longer than the wings ..... ***L. frutescens***
14 Peduncles of the racemes of chasmogamous (petaliferous) flowers shorter than the subtending leaves; keel about as long as or shorter than the wings.
15 Upper surface of the leaflets glabrous (sometimes strigose along the midrib only); pubescence of the stem appressed; leaflets 1.5-3× as long as wide ..... ***L. violacea***
15 Upper surface of the leaflets pubescent; pubescence of the stem appressed or spreading; leaflets 1.3-7× as long as wide.
16 Leaflets 1.3-3 (-3.5)× as long as wide ..... ***L. stuevei***
16 Leaflets (4-) 5-7× as long as wide ..... ***L. virginica***

9 Plants not in flower.
17 Leaflets of average, mid-stem leaves > 4× as long as wide (*L. capitata* keyed here and below).
18 Petioles of mid-stem leaves ca. 10 mm long ..... ***L. virginica***
18 Petioles of mid-stem leaves 1-3 mm long.
19 Leaflets 4-8(-10)× as long as wide; pubescence of the stems and leaves usually not silvery-cinereous ..... ***L. angustifolia***
19 Leaflets (2-) 2.5-5 (-8)× as long as wide; pubescence of stems and leaves usually silvery-cinereous ..... ***L. capitata***
17 Leaflets of average, mid-stem leaves < 3.5× as long as wide (*L. capitata* keyed here and above).
20 Leaflets (2-) 2.5-5 (-8)× as long as wide; leaf rachis (the apparent petiolule of the terminal leaflet) longer than the petiole. ..... ***L. capitata***
20 Leaflets 1.3-3 (-3.5)× as long as wide; leaf rachis shorter than the petiole (or about equal in *L. hirta* var. *curtissii*).
21 Central axis not strongly dominant, branches divaricate, irregular; stems slender, wiry ..... ***L. frutescens***
21 Central axis strongly dominant, branches ascending, mostly on the upper stem; stems stout, stiff.
22 Leaflets (1.3-) 1.8-3 (-3.5)× as long as wide.
23 Upper surface of the leaflets glabrous (sometimes strigose along the midrib only); pubescence of the stem appressed ..... ***L. violacea***
23 Upper surface of the leaflets pubescent; pubescence of the stem appressed or spreading ..... ***L. stuevei***
22 Leaflets 1.3-1.8× as long as wide.
24 Leaves closely strigose, the hairs 0.2-0.5 mm long, silvery when fresh; leaflets 1-2 cm long; [plants of the Coastal Plain and, in NC and SC, the lower Piedmont] ..... ***L. hirta var. curtissii***
24 Leaves glabrate, or strigose above only, at least some of the hairs > 0.5 mm long, green or grey when fresh; leaflets 1.5-4 (-5) cm long; [plants widespread in our area] ..... ***L. hirta var. hirta***

Lespedeza angustifolia (Pursh) Elliott, Narrow-leaved Lespedeza. Cp (FL, GA, NC, SC, VA), Pd (GA), Mt (NC): sandhill-pocosin ecotones and dry to moist savannas, mountain bogs; common. August-October; September-November. MA south to c. peninsular FL, west to s. MS, essentially a Southeastern Coastal Plain endemic, rarely disjunct inland to w. NC, c. GA, and ec. TN (Chester, Wofford, & Kral 1997). [= RAB, C, G, I, K, S, SE, W, WH, Y, Z; > *L. angustifolia* – F; > *L. hirta* var. *intercursa* Fernald – F]

* ***Lespedeza bicolor*** Turczaninow, Bicolor Lespedeza. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): "wildlife food plots," roadsides; common (uncommon in FL), native of e. Asia. June-September; August-November. [= RAB, C, I, K, Q, S, SE, W, WH]

Lespedeza capitata Michaux, Bush-clover. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): woodlands and woodland borders; common. August-October; September-November. ME and s. Ontario west to MN, SD, and NE, south to FL Panhandle and TX. [= RAB, C, I, K, S, SE, W, Y, Z; > *L. capitata* var. *capitata* – F, G; > *L. capitata* var. *stenophylla* Bissell & Fernald – F, G; > *L. capitata* var. *velutina* (Bicknell) Fernald – F, G; > *L. capitata* var. *vulgaris* Torrey & A. Gray – F]

* ***Lespedeza cuneata*** (Dumont-Cours.) G. Don, Sericea Lespedeza, Chinese Lespedeza. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): roadbanks, "wildlife food plots", disturbed areas; common, native of e. Asia. July-September; October-November. [= RAB, C, F, G, I, K, SE, W]

Lespedeza frutescens (Linnaeus) Elliott, Violet Lespedeza. Mt, Pd (GA, NC, VA), Cp (FL, GA, SC, VA): woodlands and woodland borders; common. July-September; October-November. MA and NY west to MI, WI, IA, and KS, south to ne. FL, FL Panhandle, AL, MS, AR, and TX. [= K, S; = *L. violacea* (Linnaeus) Persoon – RAB, C, F, G, I, S, SE, W, Y, Z, misapplied]

Lespedeza hirta (Linnaeus) Hornemann *var.* ***curtissii*** (Clewell) Isely, Silvery Lespedeza. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): sandhills and dry to moist savannas; common. August-October; September-November. Se. VA south to s. FL, west to Panhandle FL and se. AL, barely extending onto the Piedmont in NC, SC, and GA. Clewell (1966a) discusses apparent intergrades between the two varieties in s. NJ. [= C, I, SE, X; < *L. hirta* – RAB, G, S, WH; = *L. hirta* var. *appressipilis* Blake – F (as to intent, but not the type); = *L. hirta* ssp. *curtissii* Clewell – K, Y, Z]

Lespedeza hirta (Linnaeus) Hornemann *var.* ***hirta***, Hairy Lespedeza. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): woodlands and woodland borders; common. August-October; September-November. S. ME and s. Ontario west to MI, n. IL, c. MO, and OK, south to c. peninsular FL and TX. [= C, I, SE, X; < *L. hirta* – RAB, G, S, W, WH; > *L. hirta* var. *hirta* – F; > *L. capitata* var. *calycina* (Schindler) Fernald – F; = *L. hirta* ssp. *hirta* – K, Y, Z]

Lespedeza procumbens Michaux, Downy Trailing Lespedeza. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): woodlands and woodland borders, hammocks; common (rare in FL). July-September; August-November. MA, NH, and NY west to IL, MO, and KS, south to Panhandle FL and TX. [= RAB, C, G, I, K, S, SE, W, WH, Y, Z; > *L. procumbens* var. *procumbens* – F; > *L. procumbens* var. *elliptica* Blake – F]

Lespedeza repens (Linnaeus) W. Barton, Smooth Trailing Lespedeza. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): woodlands and woodland borders; common. July-September; August-November. CT and NY west to n. OH, s. WI, MO, and KS, south to n. peninsular FL, Panhandle FL, and c. TX. [= RAB, C, F, G, I, K, S, SE, W, WH, Y, Z]

Lespedeza stuevei Nuttall, Velvety Lespedeza. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC): woodlands and woodland borders; common. July-September; August-November. MA south to n. peninsular FL, west to c. and n. TX, north in the interior to. NC, TN, s. IN, s. IL, c. MO, and nc. KS. [= RAB, C, F, G, I, K, SE, W, WH, Y, Z; = *L. stuvei* – S, orthographic variant]

* ***Lespedeza thunbergii*** (A.P. de Candolle) Nakai. Pd (GA, NC, SC), Cp (FL, NC, SC), Mt (NC): "wildlife food plots," roadbanks; rare, native of e. Asia. Reported for Macon County, NC by Pittillo & Brown (1988). [= C, F, G, I, K, Q, SE, WH]

Lespedeza violacea (Linnaeus) Persoon, Wand Lespedeza. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): woodlands and woodland borders; common. July-September; August-November. S. ME and s. Ontario west to MI and se. MN, south to ne. FL, Panhandle FL, and e. TX. [= K, S, WH; = *L. intermedia* (S. Watson) Britton – RAB, C, F, G, I, SE, W, Y, Z]

* ***Lespedeza virgata*** (Thunberg) A.P. de Candolle. Mt (NC): roadbanks; rare, native of e. Asia. Clewell & Stickel (1990) report the occurrence of this species in NC. [= I, K]

Lespedeza virginica (Linnaeus) Britton, Virginia Lespedeza. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): sandhills, woodlands, and woodland borders; common. July-September; August-November. MA and NH west to MI, WI, IA, and KS, south to Panhandle FL and c. TX. [= RAB, C, F, G, I, K, S, SE, W, WH, Y, Z]

Many species of *Lespedeza* hybridize, and most combinations may occur in our area. Some of the hybrids have been named in the past as varieties or species. Hybrids generally occur in mixed populations with both parents and can usually be identified by their intermediate morphology (identification much easier in the field where context is apparent than in the herbarium). See Isely (1990) and Clewell (1966a) for additional hints about identification of hybrids.

Leucaena Bentham 1842 (Leadtree, Leucaena)

A genus of about 22 species, of tropical and warm temperate America. References: Hughes (1998)=Z; Isely (1998)=I.

* ***Leucaena leucocephala*** (Lamarck) de Wit *ssp.* ***leucocephala***, Leadtree, Leucaena, Jumbie-bean. Cp (FL, GA): disturbed areas; rare, native of the New World tropics. E. GA (Kartesz 1999, voucher at UGA), south into FL and the New World tropics. [= Z; < *L. leucocephala* – I, K, SE, WH; < *L. glauca* (Linnaeus) Bentham – S, misapplied]

Lotus Linnaeus 1753 (Birdsfoot-trefoil)

A genus of about 120-130 species, annual and perennial herbs and shrubs, of temperate Eurasia. New World taxa often referred to Lotus are not closely related to *Lotus*, and should be segregated (Degtjareva et al 2006; Allan & Porter 2000). References: Isely (1981)=Z; Isely (1998)=I; Degtjareva et al. (2006); Allan & Porter (2000); Grant & Small (1996). [also see *Acmispon*]

1 Leaves 3-foliolate, the upper commonly 1-foliolate; flowers solitary in leaf axils; [native annual herbs] ..... [see ***Acmispon helleri***]
1 Leaves 5-foliolate; flowers in umbels; [alien perennial herbs].
  2 Calyx tube 2.8-3.5 mm long; corolla usually 10-14 mm long; leaflets of the medial leaves mostly 1.5-2.5 (-5)× as long as wide ..... ***L. corniculatus***
  2 Calyx tube 1.8-2.8 mm long; corolla usually 8-10 mm long; leaflets of the medial leaves 3-4 (-6)× as long as wide..... ***L. tenuis***

* ***Lotus corniculatus*** Linnaeus, Birdsfoot-trefoil, Eggs-and-Bacon. Cp (NC, VA), Pd (VA), Mt (GA, VA): fields, roadsides, and waste places; uncommon, native of Eurasia. June-September. First reported for GA (Rabun County) by Stiles & Howel (1998). [= RAB, C, F, G, K, S, SE, W, Z; < *L. corniculatus* Linnaeus – I (also see *L. tenuis*)]

* ***Lotus tenuis*** Waldstein & Kitaibel ex Willdenow, Slender Birdsfoot-trefoil. Pd (NC): fields, roadsides, and waste places; rare, native of Eurasia. June-September. [= C, K, SE, Z; < *L. corniculatus* Linnaeus – I]

Lupinus Linnaeus 1753 (Lupine)

A genus of about 200-250 species, annual herbs, perennial herbs, and shrubs, of temperate and tropical regions in North America, Mediterranean Europe, South America, and Africa (especially diverse in w. North America and South America). References: Isely (1998)=I.

1 Leaves palmately compound; leaves and stems deciduous, dying back in winter; plant inconspicuously pubescent.
  2 Corolla yellow; plant annual; [alien] ..... ***L. luteus***
  2 Corolla blue; plant perennial; [native].
    3 Stem short; leaves clustered, nearly whorled; leaflets narrow; racemes long exserted; flowers small; [plants of e. GA southward] ..... ***L. perennis ssp. gracilis***
    3 Stem elongate; leaves alternate; leaflets broad; racemes only moderately exserted; flowers large; [plants of n. SC northward] ..... ***L. perennis ssp. perennis***
1 Leaves unifoliolate; leaves and stems evergreen, overwintering (absent in midsummer); plant conspicuously pubescent.
  4 Standard with a white to creamy eyespot; hairs of the legume 1.5-3 mm long, villous or sericeous.
    5 Legumes 35-47 mm long, 6.3-7.6 mm wide; plants to 7 dm tall; living plants grey-green; [of se. NC south to s. FL, west to s. MS] .....

..... *L. diffusus*

5 Legumes 27-42 mm long, 8.1-8.5 mm wide; plants to 19 dm tall; living plants silvery; [of FL] ..... ***L. cumulicola***

4 Standard with a red or deep purple eyespot; hairs of the legume 3-5 mm long, villous.

6 Hairs of the petioles 1.5-2.5 mm long; corolla pinkish to lavender; plants 2-6 dm long; [of se. NC southward to n. FL, west to se. LA] ... ***L. villosus***

6 Hairs of the petioles 0.5-1 (-1.5) mm long; corolla blue; plants 8-15 dm tall; [of FL Panhandle] ..... ***L. westianus***

Lupinus cumulicola Small. Cp (FL): sandhills and scrub; uncommon. Peninsular FL. [= K, S; < *L. diffusus* – I, SE, WH]

Lupinus diffusus Nuttall, Blue Sandhill Lupine. Cp (FL, GA, NC, SC): sandhills, sandy roadsides; common. March-May; June-July. Se. NC south to s. FL, west to s. MS. I concur with Duncan & McCartney (1992) in recognizing *L. cumulicola* Small of peninsular FL as distinct from *L. diffusus*. [= RAB, K, S; < *L. diffusus* – I, SE, WH]

Lupinus luteus Linnaeus, Yellow Lupine. Cp (FL): disturbed areas; rare, native of Mediterranean Europe. [= I, K, SE, WH]

Lupinus perennis Linnaeus *ssp.* ***gracilis*** (Nuttall) Dunn, Southern Sundial Lupine. Cp (FL, GA), Pd (GA): sandhills and sandy or dry rocky roadsides; uncommon. E. GA (immediately across the Savannah River from SC), south to n. FL and west to s. AL. The validity of this taxon is uncertain; the differences may be only clinal. [= K, SE; < *L. perennis* – RAB, C, G, WH; = *L. perennis* var. *gracilis* (Nuttall) Chapman – I; = *L. nuttallii* S. Watson – S]

Lupinus perennis Linnaeus *ssp.* ***perennis***, Northern Sundial Lupine. Mt (VA), Pd (NC, SC, VA), Cp (NC, SC, VA): sandhills, sandy roadsides, other dry habitats; uncommon. April-May; June-July. ME west to MN, south to n. SC, w. VA, e. WV, IN, and IL. [= SE; < *L. perennis* – RAB, C, G, W; > *L. perennis* var. *perennis* – F, I; > *L. perennis* var. *occidentalis* S. Watson – F; > *L. perennis* ssp. *perennis* var. *perennis* – K; > *L. perennis* ssp. *perennis* var. *occidentalis* – K; = *L. perennis* – S]

Lupinus villosus Willdenow, Pink Sandhill Lupine. Cp (FL, GA, NC, SC): sandhills, sandy roadsides; uncommon. April-May; June-August. Se. NC south to n. FL, west to se. LA. [= RAB, I, K, S, SE, WH]

Lupinus westianus Small, Gulf Coast Lupine. Cp (FL): coastal dunes, sandhills; rare. Endemic to Panhandle FL. The related *L. aridorum* McFarlane ex Beckner is endemic to sand pine scrub in the central FL peninsula. [= *L. westianus* var. *westianus* – I, K, WH; < *L. westianus* – S]

Maackia Ruprecht & Maximowicz 1856 (Maackia)

A genus of about 8 species, trees and shrubs, of e. Asia.

* ***Maackia amurensis*** Ruprecht, Amur Maackia, Chinese Yellow-wood. Pd (NC): sparingly naturalizing in suburban woodlands; rare, native of China and Siberia. Reported as sparingly naturalizing on Duke University campus, Durham County, NC (W. Cook, pers. comm., 2007).

Macroptilium (Bentham) Urban 1928

A genus of about 20 species, annual and perennial herbs, of tropical and subtropical America. References: Isely (1998)=I.

* ***Macroptilium lathyroides*** (Linnaeus) Urban. Cp (FL, GA, SC): disturbed areas; rare, native of tropical America. [= I, K, SE, WH; = *Phaseolus lathyroides* Linnaeus]

Medicago Linnaeus 1753 (Medick, Bur-clover)

A genus of about 80 species, annual and perennial herbs, of Eurasia and Africa. References: Isely (1998)=I. Key based largely on SE.

1 Legume 1-seeded, reniform, black at maturity; corolla 2-3 mm long ..... ***M. lupulina***

1 Legume several-seeded, spirally coiled or falcate, tan to dark brown; corolla 3-11 mm long.

2 Plants perennial, mostly erect or ascending, 2-8 (-10) dm tall; corolla 6-11 mm long, violet, yellow, or varicolored; legumes spineless.

3 Legume falcate; corolla yellow ..... ***M. falcata***

3 Legume spiral; corolla violet or varicolored (rarely yellow) ..... ***M. sativa***

2 Plant annual, mostly prostrate or ascending, 1-6 dm tall; corolla 3-6 mm long, yellow; legumes spiny (except lacking spines in *M. orbicularis*).

4 Stipules entire or slightly dentate (*M. minima*) or the base only of the stipule lacerate (*M. laciniata*); plants pilose (*M. minima*) or glabrous (*M. laciniata*).

5 Stipules lacerate at the base; plant glabrous ..... ***M. laciniata***

5 Stipules entire or slightly dentate; plant pilose ..... ***M. minima***

4 Stipules lacerate; plants glabrous or sparsely pubescent.

6 Legume lacking spines; stipules deeply lacerate, the sinuses extending nearly to the base ..... ***M. orbicularis***

6 Legume spiny; stipules **either** deeply lacerate (*M. polymorpha*) or shallowly lacerate (*M. arabica*).

7 Leaflets 0.7-1.1× as long as wide, usually marked with a central dark spot; leaflet tip usually strongly notched; stipules shallowly lacerate, the sinuses extending < ½ way to the base ..... ***M. arabica***

7 Leaflets 1-2× as long as wide, not marked with a central dark spot; leaflet tip not strongly notched; stipules deeply lacerate, the sinuses extending > ½ way to the base ..... ***M. polymorpha***

* ***Medicago arabica*** (Linnaeus) Hudson, Spotted Medick, Spotted Bur-clover. Cp (FL, GA, NC, SC), Pd (GA, NC, SC), Mt (GA, VA): fields, roadsides, disturbed areas; uncommon, native of Mediterranean Europe. April-August. [= RAB, F, G, I, K, S, SE]

* ***Medicago falcata*** Linnaeus, Yellow Alfalfa, Sickle Medick. Mt? (VA?): disturbed areas; rare, native of n. Eurasia. April-July. The occurrence of this taxon in our area requires verification. [= F, G, I, S, SE; = *M. sativa* Linnaeus ssp. *falcata* (Linnaeus) Arcangeli – C, K]

* ***Medicago laciniata*** (Linnaeus) P. Miller. Cp (SC): waste areas aropund wool-combing mills; rare, native of Europe, perhaps merely a waif. [= F, I, K]

* ***Medicago lupulina*** Linnaeus, Black Medick, Yellow Trefoil. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): fields, roadsides, disturbed areas; common, native of Europe. April-August. [= RAB, C, G, I, K, S, SE, W, WH; > *M. lupulina* var. *lupulina* – F; > *M. lupulina* var. *glandulosa* Neilreich – F]

* ***Medicago minima*** (Linnaeus) Linnaeus, Downy Bur-clover, Bur Medick. Cp (FL, NC, SC, VA): fields, roadsides, disturbed areas; rare, native of Eurasia. April-August. [= RAB, C, G, I, K, S, SE, WH; > *M. minima* var. *minima* – F; > *M. minima* var. *compacta* Neyraut – F; > *M. minima* var. *longiseta* A.P. de Candolle – F]

* ***Medicago orbicularis*** (Linnaeus) Bartalini. Pd (GA, NC), Cp (FL): lawns, disturbed areas; rare, native of Mediterranean Europe and n. Africa. April-July. [= RAB, G, I, K, SE, WH]

* ***Medicago polymorpha*** Linnaeus, Smooth Bur-clover, Toothed Medick. Cp (FL, GA, NC, SC), Pd (SC): fields, roadsides, lawns, disturbed areas; uncommon, native of Mediterranean Europe. March-April. [= RAB, C, I, K, SE, WH; = *M. hispida* Gaertner – F, G, S]

* ***Medicago sativa*** Linnaeus, Alfalfa, Lucerne, Blue Alfalfa. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): roadsides, fields, disturbed areas; common, native of se. Europe. April-July. [= RAB, F, G, I, S, SE, W, WH; = *M. sativa* Linnaeus ssp. *sativa* – C, K]

Melilotus P. Miller 1754 (Melilot, Sweetclover, Sourclover)

A genus of about 20 species, annual and perennial herbs, of temperate Eurasia and Africa. References: Stace (1997)=Z; Isely (1998)=I. Key based in part on Stace (1997).

1 Flowers white ..... ***M. albus***
1 Flowers yellow.
  2 Flowers 2-3.5 mm long; fruits < 3 mm long ..... ***M. indicus***
  2 Flowers > 4 mm long; fruits > 3 mm long.
    3 Fruits > 5 mm long, mostly 2-seeded, black when ripe, pubescent (at 10× magnification); keel about equalling the wings ***[M. altissimus]***
    3 Fruits < 5 mm long, mostly 1-seeded, brown when ripe, glabrous; keel shorter than the wings ..... ***M. officinalis***

* ***Melilotus albus*** Medikus, White Melilot, White Sweetclover. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common, native of Eurasia. April-October. *M. albus* and *M. officinalis*, nearly identical except in flower color, are apparently incompatible (Isely 1998); they should not be synonymized, as was done by K. Other differences useful in the determination of faded herbarium specimens are given but Isely (1998): corolla 3.5-5 mm long, the wing petals about as long as the keel (*M. albus*) vs. corolla 5-7 mm long, the wing petals generally longer than the keel (*M. officinalis*). [= I, WH, Z; = *M. alba* – RAB, C, F, G, S, SE, W, orthographic variant; < *M. officinalis* – K]

* ***Melilotus indicus*** (Linnaeus) Allioni, Small Melilot, Sourclover. Cp (FL, GA, NC, SC, VA), Pd (GA, SC): roadsides, disturbed areas; uncommon, native of Mediterranean Europe. April-October. [= I, K, WH, Z; = *M. indica* – RAB, C, F, G, S, SE, orthographic variant]

* ***Melilotus officinalis*** (Linnaeus) Pallas, Yellow Melilot, Yellow Sweetclover, Ribbed Melilot. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common (rare in FL), native of Eurasia. April-October. [= RAB, C, F, G, I, S, SE, W, WH, Z; < *M. officinalis* – K (also see *M. albus*)]

* *Melilotus altissimus* Thuiller, Tall Melilot, another Eurasian weed, is known to be naturalized as far south as e. PA (Rhoads & Klein 1993). It likely occurs in our area. It superficially resembles *M. officinalis*; see key for distinguishing characteristics. [= I, Z; = *Melilotus altissima* – C, F, G, orthographic variant]

Mimosa Linnaeus 1753 (Mimosa)

A genus of about 500 species, herbs, shrubs, trees, and vines, of tropical, subtropical, and warm temperate areas, especially America. Barneby (1991) and Beard (1963) argue that there are no characters which serve to separate *Schrankia* from *Mimosa*. References: Barneby (1991)=Y; Isely (1973)=Z; Isely (1998)=I.

Identification notes: Unmistakable in our flora for its bipinnate leaves, with tiny (2-4 mm long) leaflets, responding to touch by closing.

1 Plant unarmed ..... ***M. strigillosa***
1 Plant armed.
  2 Leaflets (2-) 4 per leaf ..... ***M. pudica***
  2 Leaflets 8-24 per leaf.

3 Leaflets without apparent secondary veins; pinnae 4-8 (-11) pairs ..... ***M. microphylla***
3 Leaflets with evident (sometimes weakly so) secondary veins; pinnae 3-5 (-6) pairs ..... ***M. quadrivalvis* var. *floridana***

Mimosa microphylla Dryander, Eastern Sensitive-brier. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): dry woodlands and forests, especially sandhills, disturbed areas; common (rare in VA). June-September; August-November. DE, WV, and MO south to FL and e. TX. A form with smaller fruits (3-5 cm long vs. 5-12 cm long) has been variously treated as a species [*Leptoglottis chapmanii* – S, *Schrankia chapmanii*] or a "recurrent fruit-form genotype" [phase *brachycarpa* of Isely (1973)]. [= K; = *Mimosa quadrivalvis* Linnaeus var. *angustata* (Torrey & A. Gray) Barneby – C, I, WH, Y; = *Schrankia microphylla* (Dryander) J.F. Macbride – RAB, F, G, W; = *Schrankia microphylla* (Dryander) J.F. Macbride var. *microphylla* – SE; > *Leptoglottis microphylla* (Dryander) Britton & Rose – S; > *Leptoglottis chapmanii* Small ex Britton & Rose – S; > *Schrankia microphylla* "phase *brachycarpa*" – Z; > *Schrankia chapmanii* (Small ex Britton & Rose) F.J. Hermann]

Mimosa pudica Linnaeus, Sensitive Plant, Shameplant. Cp (FL): disturbed areas; rare, perhaps only a waif in our area. [= I, K, S, SE, WH]

Mimosa quadrivalvis Linnaeus *var. **floridana*** (Chapman) Barneby, Florida Sensitive-briar. Cp (FL, GA): xeric sandhills and other dry, sandy habitats; uncommon. A Southeastern Coastal Plain endemic: GA south into FL. This taxon is distinct at the specific level from *M. quadrivalvis* and nomenclatural adjustments are forthcoming (Flores-Cruz et al. 2004). [= I, K, WH, Y; = *Leptoglottis floridana* (Chapman) Small ex Britton & Rose – S; = *Schrankia microphylla* (Dryander) J.F. MacBride var. *floridana* (Chapman) Isely – SE]

Mimosa strigillosa Torrey & A. Gray, Powderpuff Mimosa. Cp (FL, GA): floodplain forests, open wet areas; uncommon. A Southeastern Coastal Plain endemic: e. GA south to FL, west to TX. It might be expected in se. SC (see SE, Y, Z). [= I, K, S, SE, WH, Y, Z]

Mucuna Adanson 1763 (Velvetbean)

A genus of about 100 species, perennial herbs, annual herbs, and woody vines, of tropical regions of Old World and New World. References: Isely (1998)=I.

* ***Mucuna pruriens*** (Linnaeus) A.P. de Candolle. Velvetbean, Bengal Bean, Florida Bean. Cp (NC, SC): disturbed areas, fields, cultivated and sporadically established in disturbed areas; rare, native of se. Asia. [= I, SE; > *M. pruriens* var. *pruriens* – K; > *Stizolobium deeringianum* Bort – S; > *M. deeringiana* (Bort) Merrill]

Neptunia Loureiro 1790 (Neptunia)

A genus of about 12 species, herbs, of the tropics and subtropics of America and Eurasia. References: Isely (1998)=I; Windler (1966)=Z.

1 Leaflets 9-15 pairs per pinna; stipules 2-4 mm long; all flowers perfect, with functional stamens; stipe of fruit 4-14 mm long ..... ***N. lutea***
1 Leaflets (12-) 15-25 pairs per pinna; stipules 4-10 mm long; flowers in the lower part of the inflorescence with flattened staminodes; stipe of fruit 2-5 mm long ..... ***N. pubescens* var. *pubescens***

Neptunia lutea (Leavenworth) Bentham, Yellow Neptunia. Cp (AL, LA, MS): savannas, prairies, roadsides. AL west to OK and TX. [= I, K, S, SE, Z]

Neptunia pubescens Bentham *var. **pubescens***, Tropical Neptunia. Cp (AL, FL, LA, MS): savannas, sandhills, scrub, prairies, roadsides. AL and FL west to TX and south to Argentina. [= I, K, SE, Z; > *N. floridana* Small – S; < *N. pubescens* – WH; > *Neptunia pubescens* var. *floridana* (Small) B.L.Turner]

Orbexilum Rafinesque 1832 (Scurfpea, Sampson's-snakeroot)

A genus of about 9 species, perennial herbs, of s. North America and Mexico (south to Chiapas). References: Grimes (1988, 1990)=Z; Isely (1998)=I.

1 Leaves unifoliolate; [subgenus *Poikadenia*] ..... ***O. virgatum***
1 Leaves with 3-7 leaflets.
  2 Leaves palmately (3-) 5-7 foliolate, the leaflets linear to very narrowly oblanceolate, 2-7 cm long, 0.5-2.0 (-3.5) mm wide, > 10× as long as wide; [subgenus *Orbexilum*] ..... ***O. lupinellum***
  2 Leaves pinnately 3-foliolate, the leaflets orbicular, ovate, elliptic or lanceolate, > 8 mm wide, 1-8× as long as wide.
    3 Leaflets 1.5-7 cm wide, 1-2.5× as long as wide; [subgenus *Orbexilum*].
      4 Upper leaf surfaces lacking glands; leaflets 3.7-5.5 cm long; [endemic to Rock Island, Jefferson Co. KY and now considered extinct] ..... ***O. stipulatum***
      4 Upper leaf surfaces glandular; leaflets 4-12 cm long.
        5 Leaflets subcordate, 4-7 cm wide, 1-1.5× as long as wide, glandular-punctate above and below, the apex obtuse; calyx stipitate-glandular; petals 8-10 mm long; [endemic to Polk Co. NC] ..... ***O. macrophyllum***
        5 Leaflets rounded at base, 2-4 cm wide, 1.5-2.5× as long as wide, eglandular or sparsely glandular above, the apex acute; calyx lacking stipitate glands; petals 5-7 mm long; [widely scattered from w. VA and w. NC westward] ..... ***O. onobrychis***
    3 Leaflets 0.8-2 cm wide, 2.5-7.5× as long as wide; [subgenus *Poikadenia*].

6 Flowers 8-10 mm long; [of s. AL westward] ..... ***[O. simplex]***
6 Flowers 5-7 mm long; [collectively widespread in our area].
7 Calyx tube, fruits, and bracts of the inflorescence eglandular (rarely slightly glandular-punctate); leaflets eglandular below (rarely slightly punctate); hairs on calyx 0.7-1.0 mm long; upper 2 calyx teeth 1.0-1.5 mm long, lateral teeth 1.5-2.0 mm long, lower calyx tooth 2.0-3.0 mm long ..... ***O. pedunculatum var. pedunculatum***
7 Calyx tube, fruits, and bracts of the inflorescence conspicuously glandular-punctate; leaflets conspicuously glandular-punctate below; hairs on calyx 0.3-0.5 mm long; upper 2 calyx teeth 0.7-1.0 mm long, lateral teeth 1.2-1.5 mm long, lower calyx tooth 1.7-2.0 mm long ..... ***O. pedunculatum var. psoralioides***

Orbexilum lupinellum (Michaux) Isely, Lupine Scurfpea. Cp (FL, GA, NC, SC): sandhills; uncommon (rare in NC). May-July; July-October. This peculiar species is a Southeastern Coastal Plain endemic, ranging from sc. and se. NC, south to c. peninsular FL, s. AL, and e. GA. The very peculiar leaves, palmately 5-7-foliolate with "oblinear" leaflets, make the species unmistakable. First reported for SC by McMillan et al. 2002). [= K; = *Psoralea lupinellus* Michaux - RAB; = *Orbexilum lupinellus* – I, SE, WH, Z, orthographic variant; = *Rhytidomene lupinellus* (Michaux) Rydberg – S]

Orbexilum macrophyllum (Rowlee in Small) Rydberg, Bigleaf Scurfpea. Mt (NC): wooded slopes of mountain on Blue Ridge escarpment, precise habitat not known (probably nutrient-rich dry woodlands); rare (US Species of Concern, NC Endangered). June; July-August? This species was discovered on 18 June 1897 and subsequently collected on 8 June 1899 by E.C. Townsend, somewhere on the double peak of Tryon Mountain and White Oak Mountain, Polk County, NC, a phytogeographically interesting area with disjunct, endemic, and relictual species largely of midwestern affinities. It is currently presumed to be extinct, following a number of unsuccessful attempts to relocate it. Isely (1990) is correct in stating that the assignment of "this distinctive species" to *Orbexilum* is "reasonably assumptive," since fruits have never been seen. [= I, K, S, SE, Z; = *Psoralea macrophylla* Rowlee in Small – RAB, W]

Orbexilum onobrychis (Nuttall) Rydberg, Lanceleaf Scurfpea. Mt (NC, VA): habitat in our area not known, elsewhere usually in nutrient-rich, open or semi-open areas; rare. June-July; August-October. Primarily a species of prairies and prairie-like areas of OH and KY west to se. IA and e. MO, *O. onobrychis* also occurs (at least formerly) as a rare disjunct in the mountains of w. NC, nw. SC, w. VA, and e. TN. The only report for NC was in the 1800's. [= C, I, K, S, SE, Z; = *Psoralea onobrychis* Nuttall – RAB, F, G, W]

Orbexilum pedunculatum (P. Miller) Rydberg *var.* ***pedunculatum***, Western Sampson's-snakeroot. Mt (GA, NC, SC), Pd, Cp (GA, SC): open woodlands; rare (NC Watch List). May-July; July-September. Var. *pedunculatum*, the western and more widespread variety, occurs primarily west of the Blue Ridge, with scattered occurrences in and east of the Blue Ridge. Its range is s. OH, s. IN, s. IL, c. MO, and se. KS, south to sw. NC, sc. SC, sw. GA, s. AL, s. LA, and e. TX. [= C, I, K, SE, Z; = *Psoralea psoralioides* (Walter) Cory var. *eglandulosa* (Elliott) F.L. Freeman – RAB, F, G, GW, W; = *Orbexilum pedunculatum* – S]

Orbexilum pedunculatum (P. Miller) Rydberg *var.* ***psoralioides*** (Walter) Isely, Eastern Sampson's-snakeroot. Cp (FL, GA, NC, SC, VA), Pd (NC, SC, VA): savannas, open woodlands; uncommon (rare in FL). May-July; July-September. Var. *psoralioides*, the eastern variety, occurs primarily on the Atlantic Coastal Plain, ranging from e. VA to ne. FL and Panhandle FL, inland to the Piedmont of NC and SC. [= K; = *Psoralea psoralioides* (Walter) Cory var. *psoralioides* – RAB, F, G, GW; = *Orbexilum pedunculatum* var. *gracile* (Torrey & A. Gray) Grimes – C, I, SE, Z; = *Orbexilum gracile* (Torrey & A. Gray) Rydberg – S; < *Orbexilum pedunculatum* – WH]

Orbexilum stipulatum (Torrey & Gray) Rydberg. Ip (KY): rocky limestone glade; rare. So far as is known, once endemic to Rock Island in the Ohio River, Jefferson Co., KY, and now presumed extinct because of near obliteration of the only known site by dam-building and industrial construction (Baskin, Isely, & Baskin 1986). [= C, I, K, SE, Z; = *Psoralea stipulata* Torrey & Gray – F, G]

Orbexilum virgatum (Nuttall) Rydberg, Slender Leather-root. Cp (FL, GA, SC?): sandhills; uncommon (rare in GA). Se. GA (or SC?) south to ne. FL. A collection by Curtiss is labeled as from South Carolina. [= I, K, S, SE, WH, Z; = *Psoralea virgata* Nuttall]

Orbexilum simplex (Nuttall ex Torrey & Gray) Rydberg. {AL, LA, MS}: prairies, open woodlands. AR and OK south to s. AL, MS, e. and w. LA, and e. TX; perhaps disjunct in IL. [= I, K, S, SE, Z]

Parkinsonia Linnaeus 1753 (Jerusalem Thorn)

A genus of about 10-30 species (if circumscribed to include *Cercidium*), shrubs and trees of sw. North America, Central America, and Africa. References: Isely (1975)=Z; Robertson & Lee (1976)=Y; Isely (1998)=I.

* ***Parkinsonia aculeata*** Linnaeus, Jerusalem Thorn, Retama, Horse-bean, Mexican Palo Verde. Cp (FL, GA, SC): disturbed areas; rare, native of sw. North America. May. Rarely established or spread from cultivation in our area, more commonly so in much of FL. [= I, K, S, SE, Y, WH, Z]

Pediomelum Rydberg 1919 (Buckroot, Prairie-turnip)

A genus of about 22 species, perennial herbs, of North America. References: Allison, Morris, & Egan (2006)=Y; Grimes (1988, 1990)=Z; Isely (1998)=I.

1 Plants acaulescent, 1-2 dm tall; leaves (4-) 5-7-foliolate; [plants of calcareous glades of the Interior (nw. GA, TN, n. AL)]; [subgenus *Disarticulatum*] ..... ***P. subacaule***

1 Plants caulescent, 3-10 dm tall; leaves 3-foliolate; [plants of sandhills of the Coastal Plain and rocky woodlands of the lower Coastal Plain]; [subgenus *Pediomelum*].
2 Inflorescence loose (much of the axis exposed); leaflets (1-) 3; leaflets < 2× as long as wide, petiolules 5-9 mm long; [of longleaf pine sandhills of the Coastal Plain] ..... ***P. canescens***
2 Inflorescence congested (the axis usually concealed); leaflets 3 (-5); leaflets > 2× as long as wide, petiolules 1.8–3 mm; [of rocky woodlands of the lower Piedmont] ..... ***P. piedmontanum***

Pediomelum canescens (Michaux) Rydberg, Buckroot, Eastern Prairie-turnip, Hoary Scurfpea. Cp (FL, GA, NC, SC, VA): sandhills; uncommon (rare north of FL). May-July; July-October. A Southeastern Coastal Plain endemic: se. VA south to c. peninsular FL, Panhandle FL, and s. AL. This uncommon species tends to occur as very widely scattered individuals in sandhill habitats, rarely with more than a few seen at a time. It is related to *P. esculentum* (Pursh) Rydberg, the "prairie potato," prized by early travelers across the prairies for its edible tubers. An interesting collection label (by R.E. Wicker, collected in 1942, the specimen at NCU) mentions both the edible tubers and the characteristically sparse population structure of the species. "Not uncommon near Pinehurst in ... open places in sandy pine woods..., but usually only one plant at a time. Tuber hard, dark brown, about size of a medium-sized Irish potato, somewhat ventral-elongated with roots coming from pointed base. Internal pure white, apparently almost entirely starch... Mr. Wicker says that he rather likes to take a bit of it and chew when fresh, has a rather condiment taste, but does not think it well to eat..." Because of its rarity, *P. canescens* should not (of course) be eaten. Because of its habit, that of a very bushy, tumbleweed-like plant, it superficially most closely resembles various *Baptisia* species, but it is easily separated by its rather dense and soft pubescence (our *Baptisia* are all glabrous or rather inconspicuously puberulent, except the very unifoliolate *B. arachnifera*). [= C, I, K, S, SE, WH, Z; = *Psoralea canescens* Michaux – RAB, F, G]

Pediomelum piedmontanum J.R. Allison, M.W. Morris, & A.N. Egan, Piedmont Buckroot. Pd (GA, SC): open, rocky woodlands in the lower Piedmont; rare. Late May-late June (-late July); July-August (-September). Apparently endemic to the lower Piedmont of c. SC and e. GA. See Allison, Morris & Egan (2006) for additional details. [= Y]

Pediomelum subacaule (Torrey & A. Gray) Rydberg, Nashville Breadroot. Mt (GA): limestone glades; rare. E. TN and nw. GA west to c. TN and nw. AL. [= I, K, SE, Z; = *P. subacaulis* – S, orthographic variant]

Pediomelum sp. 1, Gray Scurf-pea. Prairies. KY to MT, south to TX and n. Mexico; disjunct in MS. A recent study (Egan & Crandall 2008) shows that this species belongs in *Pediomelum*, not *Psoralidium*; the new combination has not yet been made. [= *Psoralidium tenuiflorum* (Pursh) Rydberg – C, I, K, SE, Z; = *Psoralea tenuiflora* Pursh – F, G] {not yet keyed}

Phaseolus Linnaeus 1753 (Bean)

A genus of about 50-65 species, annual and perennial herbs, of tropical and warm temperate America (now widely distributed worldwide in cultivation). References: Isely (1998)=I; Maréchal, Mascherpa, & Stainier (1978)=Z; Freytag & Debouck (2002)=Y. Key based on SE.

1 Raceme axes slender, flexuous; [plants native perennials]; [section *Paniculati*; subsection *Volubili*].
2 Stems climbing and twining on other vegetation; leaflets 3-10 cm long, usually not lobed and only slightly reticulate; [plants of various habitats] ..... ***Ph. polystachios***
2 Stems trailing across ground; leaflets 1-4 cm long, usually strongly 3-lobed and strongly reticulate; [plants of sandhill habitats of the Coastal Plain] ..... ***Ph. sinuatus***
1 Raceme axes stout, stiff; [plants alien annuals, only weakly naturalized].
3 Corolla 1.5-2 cm long, scarlet red or bright lavender; racemes exserted; plants twining; [section *Coccinei*] ..... ***Ph. coccineus ssp. coccineus***
3 Corolla ca. 1 cm long, pink-purple, greenish white, or bicolored pink and white; racemes short or exserted; plants bushy-erect (rarely twining).
4 Legumes distinctly flattened at maturity, 15-20 mm wide; corolla usually greenish white; [section *Paniculati*; subsection *Volubili*] ..... ***Ph. lunatus***
3 Legumes nearly terete at maturity, about 8 mm in diameter; corolla usually pink-purple, at least in part; [section *Phaseoli*] .....
4 ..... ***Ph. vulgaris***

* ***Phaseolus coccineus*** Linnaeus *ssp. coccineus*, Scarlet Runner Bean. Cp, Pd, Mt (GA, NC, SC, VA): infrequently cultivated, mostly as an ornamental in home gardens, rarely found as a waif, native of tropical America. [= Z; < *Ph. coccineus* – C, F, G, I, K, SE; > *Ph. coccineus* ssp. *coccineus* var. *coccineus* – Y]

* ***Phaseolus lunatus*** Linnatus, Lima Bean. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): frequently cultivated (both commercially and in home gardens), rarely found as a waif, native of tropical America. [= I, K, S, SE, WH, Y, Z; = *Ph. limensis* Macfadyen – F]

Phaseolus polystachios (Linnaeus) Britton, Sterns, & Poggenburg, Wild Bean, Wild Kidney Bean. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): thickets, woodlands; uncommon. July-September; August-October. S. ME west to OH, IL, and MO, south to s. FL and TX. [= RAB, C, G, I, SE, W; > *Ph. polystachios* var. *polystachios* – F; > *Ph. polystachios* var. *aquilonius* Fernald – F; = *Ph. polystachios* var. *polystachios* – K, WH; = *Ph. polystachyus* – S, orthographic variant; = *Ph. polystachyus* ssp. *polystachyus* – Y; = *Ph. polystachyus* var. *polystachyus* – Z]

Phaseolus sinuatus (Nuttall) Torrey & A. Gray, Sandhills Bean. Cp (FL, GA, NC, SC): sandhills; uncommon (rare in GA, NC, SC). July-September; August-October. Sc. NC south to s. FL, west to s. MS, a Southeastern Coastal Plain endemic. Freytag & DeBouck (2002) describe *Ph. sinuatus* and *Ph. polystachios* as being "very distinct and there seems to be no intergradation;" I choose to recognize them as species. Not easy to distinguish in sterile condition from *Strophostyles*. [= RAB, I, S, SE, W; = *Ph. polystachios* (Linnaeus) Britton, Sterns, & Poggenburg var. *sinuatus* (Nuttall) R. Marechal, J.M. Mascherpa,

& F. Stainier – K, WH; = *Ph. polystachyus* ssp. *sinuatus* (Nuttall) Freytag – Y; = *Ph. polystachyus* var. *sinuatus* (Nuttall) R. Marechal, J.M. Mascherpa, & F. Stainier – Z]

* ***Phaseolus vulgaris*** Linnaeus, Garden Bean, Green Bean, Snap Bean, String Bean, Kidney Bean, Pole Bean, Bush Bean. Cp, Pd, Mt (GA, NC, SC, VA): frequently cultivated (both commercially and in home gardens), rarely found as a waif, native of tropical America. [= C, F, G, I, K, S, SE; > *Ph. vulgaris* var. *vulgaris* – F; > *Ph. vulgaris* var. *humilis* Alefeld – F; < *Ph. vulgaris* var. *vulgaris* – Z]

Pisum Linnaeus 1753 (Pea)

A genus of 2-3 species, annual herbs, native to the Mediterranean region. References: Isely (1998)=I.

* ***Pisum sativum*** Linnaeus, Pea, Garden Pea, English Pea. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): commonly cultivated in home gardens, rarely found as a waif. March-May. [= I, K, SE, WH; > *P. sativum* var. *sativum* – F; > *P. sativum* var. *arvense* (Linnaeus) Poiret – RAB, F]

Pueraria A.P. de Candolle 1825 (Kudzu)

A genus of about 15 species, perennial vining herbs and shrubs, of tropical and subtropical Asia. References: Isely (1998)=I; Ward (1998)=Z.

* ***Pueraria montana*** (Loureiro) Merritt *var.* ***lobata*** (Willdenow) van der Maesen & S. Almeida, Kudzu. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): roadsides, waste areas; common, native of e. Asia. July-October. Kudzu was strongly promoted in the 1920's and 1930's in the Southeastern United States as a stabilizer of eroded areas. Hundreds of Kudzu Clubs formed, and Kudzu Songbooks were published. It is now notorious as a weed and symbol of the South. Despite its notoriety in the popular press, kudzu is an ecologically relatively trivial (though conspicuous) weed, since it rarely produces viable seeds in our area, and generally does not invade high quality natural areas. The thickened rhizome can weigh as much as 100 kg, and is the source of a high quality cooking starch prized in the Orient. The purple flowers smell like artificial grape flavoring. The leaves are very frost-sensitive. [= I, K, WH, Z; = *P. lobata* (Willdenow) Ohwi – RAB, C, F, G, SE, W; = *P. thunbergiana* (Siebold & Zuccarini) Bentham – S]

Rhynchosia Loureiro 1790 (Snoutbean)

A genus of about 200-230 species, perennial herbs, of tropical and warm temperate regions, nearly cosmopolitan. References: Grear (1978)=Z; Isely (1998)=I.

1 Leaves unifoliolate (rarely with a few upper leaves trifoliolate).
  2 Plant prostrate, trailing, usually with many leaves; stipels absent; [plant very rare in our area, probably introduced]..... ***Rh. michauxii***
  2 Plants erect or ascending, usually with fewer than 6 leaves; stipels present; [plant common in the Coastal Plain in our area] ..... ***Rh. reniformis***
1 Leaves trifoliolate (rarely with a few lowermost leaves unifoliolate, these generally withering before flowering and fruiting).
  3 Plant trailing or twining; pubescence of the lower leaf surface mostly restricted to the veins.
    4 Calyx 8-10 (-12) mm long, about as long as the corolla; [plants widespread in our area] ..... ***Rh. difformis***
    4 Calyx 2.5-3 (-4) mm long, clearly shorter than the corolla; [plants of e. GA southward]..... ***Rh. minima***
  3 Plant erect; pubescence of the lower leaf surface not restricted to the veins, grayish tomentose and velvety to the touch.
    5 Inflorescence a single exserted terminal raceme, 5-20 cm long; stipules caducous; [plants of s. SC southward] ..... ***Rh. tomentosa var. mollissima***
    5 Inflorescences several and axillary, 1-3 cm long; stipules persistent; [plants widespread in our area]..... ***Rh. tomentosa var. tomentosa***

Rhynchosia difformis (Elliott) A.P. de Candolle. Cp (FL, GA, NC, SC, VA), Pd (SC): sandhills; common. June-August; July-October. Se. VA south to c. peninsular FL, west to e. TX. [= RAB, C, F, G, I, K, SE, WH; = *Rh. tomentosa* – S, misapplied]

Rhynchosia michauxii Vail. Cp (FL, GA*?, NC*?): sandhills, dry hammocks, disturbed areas; rare. June-August; August-October. Se. NC (one record) and e. GA (one record) south to s. peninsular FL, west to Panhandle FL. The disjunct sites are of uncertain origin. [= I, K, S, SE; = *Rh. americana* (Houston ex P. Miller) M.C. Metz – RAB (based on misidentification of specimen)]

Rhynchosia minima (Linnaeus) A.P. de Candolle. Cp (FL, GA): hammocks, dry pine flatwoods, coastal sands; uncommon. E. GA, south to s. FL, west to s. TX. The species also occurs in the Old World, and the New World distribution is sometimes considered a result of introduction. [= I, K, SE, WH; = *Dolicholus minimus* (Linnaeus) Medikus – S]

Rhynchosia reniformis A.P. de Candolle, Dollarweed. Cp (FL, GA, NC, SC): sandhills; common. June-September; August-October. Se. NC south to s. FL, west to e. TX; disjunct (introduced?) in e. TN (Chester, Wofford, & Kral 1997). [= RAB, K, SE, WH; = *Rh. simplicifolia* (Walter) Wood – S]

Rhynchosia tomentosa (Linnaeus) Hooker & Arnott *var.* ***mollissima*** (Elliott) Torrey & A. Gray. Cp (FL, GA, SC): sandhills, uncommon (rare in GA and SC). June-August; August-October. Se. SC (Beaufort County, documented by an old

specimen [GH] by Mellichamp from the vicinity of Bluffton, where it was probably native) and e. GA south to c. peninsular FL. [= I, K, SE, WH; = *Rh. mollissima* (Elliott) S. Watson – S]

Rhynchosia tomentosa (Linnaeus) Hooker & Arnott *var.* ***tomentosa***. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): xeric woodlands and forests, sandhills, edges, open areas; common. June-August; August-October. DE south to n. peninsular FL, west to LA, and north in the interior to e. and c. TN. [= C, I, K, SE, WH; < *Rh. tomentosa* – RAB, F, G, W; > *Rh. erecta* (Walter) A.P. de Candolle – S; > *Rh. intermedia* (Torrey & Gray) Small – S]

Rhynchosia cinerea Nash, Sandhill Snoutbean. Cp (FL): sandhills, scrub; rare. Ne. FL south to s. FL. [= I, K, S, SE, WH] {not yet keyed}

Rhynchosia cytisoides (Bertol.) Wilbur. Cp (FL): sandhills; common. Panhandle FL and s. AL west to MS. [= I, K, SE, WH; = *Pitcheria galactioides* Nuttall – S] {not yet keyed}

Robinia Linnaeus 1753 (Locust)

A genus of 5-8 species, shrubs and trees, of e. and sw. North America. The Southern Appalachians are a center of diversity of *Robinia*, with active hybridization, introgression, and formation of local (sterile) races involved; a fully satisfying taxonomic treatment of such a situation is not possible. Isely & Peabody's (1984) treatment seems a reasonable approach, and I have largely followed it here, differing in the rank of some of the taxa. The key is differently structured than that in RAB or SE; it is presented as an alternative. {NOTE: This treatment may be altered substantially prior to publication.} References: Isely & Peabody (1984)=Z; Ashe (1922)=Y; Isely (1998)=I.

1 Corolla white, 1.5-2.0 cm long; peduncles, pedicels, and calyces velvety-puberulent, the hairs neither glandular nor hispid; plant a small to large tree ..... ***R. pseudoacacia***
1 Corolla pink to pink-purple (rarely white or nearly so), (1.5-) 2.0-2.5 cm long; peduncles, pedicels, and calyces glandular-pubescent, hispid, or with short-stalked to sessile glands; plant a shrub to small tree.
  2 Twigs and leafstalks conspicuously hispid with hairs 1-5 mm long, these stiff, thick-based, and typically persistent several years.
    3 Plants fruiting abundantly; shrubs 0.6-2 (-3) m tall; leaflets relatively broad, mostly 1.2-1.8× as long as wide ..... ***R. hispida var. fertilis***
    3 Plants sterile (rarely fruiting scantily); shrubs 0.5-1.5 m tall; leaflets relatively narrow, mostly 1.8-2.5× as long as wide ..... ***R. hispida var. hispida***
  2 Twigs and leafstalks either viscid with sessile or short-stalked glands, or densely glandular-pubescent (the hairs 0.5-2 mm long), or tomentulose, or sparsely hispid with weak, non-persistent hairs.
    4 Leaflets usually 13-21, permanently but inconspicuously appressed-pubescent beneath; bracts (evident only before anthesis) aristate; plants never with long, hispid pubescence.
      5 Twigs and peduncles finely glandular-pubescent with hairs 1 (-2) mm long; plants abundantly pod-forming ..... ***R. hartwigii***
      5 Twigs and peduncles viscid with sessile or short-stalked glands (the racemes sometimes with some glandular pubescence); plants sterile or forming pods ..... ***R. viscosa***
    4 Leaflets usually 9-13, initially appressed-silky but later glabrate beneath; bracts (evident only before anthesis) not aristate; plants with or without sparse long, hispid pubescence.
      6 Plants fruiting abundantly; shrubs 1-3 m tall ..... ***R. hispida var. kelseyi***
      6 Plants sterile (rarely fruiting scantily); shrubs or small trees 0.4-3 (-8) m tall.
        7 Shrubs or small trees, 1-3 (-8) m tall, much branched, the stems and branches relatively straight, the nodes usually lacking spines; leaflets 1.5-3 cm long ..... ***R. hispida var. rosea***
        7 Shrubs, 0.4-1 m tall, little branched, the stems and branches typically zigzag (bent at each node), the nodes usually with spines; leaflets 1-2 (-3) cm long ..... ***R. nana***

Robinia hartwigii Koehne, Granite Dome Locust, Highlands Locust, Hartwig's Locust. Mt (NC, SC): forests and outcrop edges on high elevation granitic domes, also clearings; rare (NC Rare). June-July; August-September. Apparently endemic to several mountains within a 5 km radius of Highlands, NC. While certainly related to and apparently hybridizing with *R. viscosa*, *R. hartwigii* seems worthy of recognition as a species. The original spelling (in Koehne 1913) is "*hartwigii*;" it is not clear why the variants (see synonymy) arose. [= RAB, S; = *R. viscosa* var. *hartwegii* (Koehne) Ashe – K, orthographic variant; = *R. viscosa* var. *hartwigii* – SE, Z; < *R. viscosa* – W; = *R. viscosa* var. *hardwegii* – Y, orthographic variant]

Robinia hispida Linnaeus *var.* ***fertilis*** (Ashe) Clausen, Arnot Bristly Locust. Mt (NC): woodlands and forests; rare (NC Rare). May-June; July-August. Apparently endemic to the Southern Appalachians of w. NC and e. TN. A horticultural selection of var. *fertilis*, the Arnot Bristly Locust, is used as a soil binder. [= C, F, K, SE, Z; < *R. hispida* – RAB; > *R. fertilis* Ashe – S; > *R. grandiflora* Ashe – S, Y; > *R. pedunculata* Ashe – S; < *R. hispida* – W]

Robinia hispida Linnaeus *var.* ***hispida***, Common Bristly Locust. Mt, Pd* (GA, NC, SC, VA), Cp* (FL, GA, NC, SC, VA); woodlands and forests, and as an escape in disturbed areas and roadsides; common (uncommon in Piedmont and Coastal Plain, where mostly or entirely introduced). May-June. Probably originally endemic to the Southern Appalachians (and perhaps adjacent provinces) of NC, SC, GA, and VA, now widely distributed in e. North America as an escape from cultivation. [= C, F, K, SE, Z; < *R. hispida* – RAB (also see *R. hispida* var. *fertilis*); = *R. hispida* – G, S, WH, Y; > *R. hispida* – S; > *R. pallida* Ashe – S; > *R. speciosa* Ashe – S; < *R. hispida* – W, WH]

Robinia hispida Linnaeus *var.* ***kelseyi*** (Cowell ex Hutchinson) Isely, Kelsey's Locust. Mt (NC, SC), Pd* (VA*): mountain woodlands, introduced elsewhere; rare. April-July; July-October. Traditionally considered an endemic originally restricted to w. NC, but SE and Z suggest that var. *kelseyi* may have been only of horticultural origin. [= K, SE, Z; = *R. kelseyi* Cowell ex Hutchinson – RAB, G, S, Y; < *R. hispida* – W]

Robinia hispida Linnaeus *var.* ***rosea*** Pursh, Boynton's Locust. Mt (GA, NC, SC, VA): mountain woodlands; rare (NC Watch List). April-July. Originally distributed from w. NC and e. TN south to nw. SC, n. GA, and ne. AL, now occasionally found outside that range as an escape from cultivation. [= C, K, SE, Z; = *R. boyntonii* Ashe – RAB, G, S, Y; < *R. hispida* – W]

Robinia nana Elliott, Dwarf Bristly Locust. Cp, Pd, Mt (GA, NC, SC): sandhills, dry rocky forests (especially associated with chestnut oak); uncommon (rare in Piedmont and escarpment region of Mountains). April-June; July-October. Se. and nc. NC south through SC to GA and AL. This species flowers infrequently. [= RAB, S, Y; = *R. hispida* Linnaeus var. *nana* (Elliott) A.P. de Candolle – K, SE, Z; = *R. elliottii* (Chapman) Ashe ex Small – RAB, F, G, S; < *R. hispida* – W; > *R. nana* – Y; > *R. elliottii* – Y]

Robinia pseudoacacia Linnaeus, Black Locust. Mt, Pd (GA, NC, SC, VA), Cp (FL*, GA, NC, SC, VA): forests, woodlands, disturbed areas, roadcuts; common (rare in FL). April-June; July-November. Native in the s. and c. Appalachians, from PA south to GA and AL, now much more widespread, throughout e. and c. North America, also widely cultivated and escaped in Europe. Generally considered a weed tree. [= C, K, SE, WH, Z; = *R. pseudo-acacia* – RAB, F, S, orthographic variant; > *R. pseudo-acacia* var. *pseudo-acacia* – G, orthographic variant; > *R. pseudo-acacia* var. *rectissima* (Linnaeus) Raber – G]

Robinia viscosa Ventenat, Clammy Locust. Mt (GA, NC, SC), Pd* (NC), Cp* (NC): mountain forests and woodlands, roadsides, disturbed areas; rare in wild, uncommon as an escape (NC Watch List). May-July; July-August. Originally a Southern and Central Appalachian endemic, ranging from PA south through w. MD, w. VA, e. WV, w. NC, and e. TN, to n. GA and n. AL, now much more widespread as an escape from cultivation. [= RAB, F, G, S; = *R. viscosa* var. *viscosa* – C, K, SE, Y, Z; < *R. viscosa* – W (also see *R. hartwigii*)]

A variety of hybrids (including some cultivars) are known, including the following:

Robinia ×*longiloba* Ashe (pro sp.) [*R. hispida* × *viscosa*]. Known from NC and SC.
Robinia ×*margarettae* Ashe (pro sp.) [*R. hispida* × *pseudoacacia*]. Known from NC, SC, and GA.
Robinia ×*ambigua* Poiret (pro sp.) [*R. pseudoacacia* × *viscosa*]. Known from NC.
Robinia hartwigii × *hispida*. Known from Whiteside Mountain, Jackson County, NC.
Robinia hartwigii × *viscosa*. Known from Whiteside Mountain, Jackson County, NC.

Securigera A.P. de Candolle 1805 (Crown-vetch)

A genus of about 12-13 species, annual and perennial herbs, of Eurasia. This genus is sometimes included in *Coronilla*, but is apparently better separated (Isely 1998). References: Isely (1998)=I.

1 Corolla yellow; annual; [rare waif] ..... ***S. securidaca***
1 Corolla white and pink; perennial; [common alien, planted and established] ..... ***S. varia***

* ***Securigera securidaca*** (Linnaeus) Degen & Dörfler. Cp (SC): disturbed areas; rare, native of Europe. Reported by Small (1933); rejected by Isely (1990) on the basis of no material seen to document the occurrence. This taxon's status as part of our flora is uncertain. [= I, SE; = *Bonaveria securidaca* (Linnaeus) Reichenbach – S; = *Coronilla securidaca* Linnaeus – K]

* ***Securigera varia*** (Linnaeus) Lassen, Crown-vetch. Mt, Pd (GA, NC, SC, VA), Cp (FL, VA): roadbanks, woodland borders; common (rare in Piedmont south of NC, rare in FL), native of Europe. This species, generally known as *Coronilla varia*, is now widely used to stabilize road-cuts. [= I; = *Coronilla varia* Linnaeus – RAB, C, F, G, K, SE, W, WH]

Senna P. Miller 1754 (Senna, Sicklepod, Wild Coffee)

A genus of about 295-350 species, trees, shrubs, and herbs, of tropical and warm temperate areas. References: Isely (1975)=Z; Irwin & Barneby (1982)=Y; Robertson & Lee (1976)=X; Isely (1998)=I; Marazzi et al. (2006).

1 Racemes spike-like, 3-6 (-10) dm long; legume winged; [section *Senna*, series *Pictae*] ..... ***S. alata***
1 Racemes not spike-like, <3 dm long; legume not winged; [section *Chamaefistula*].
  2 Plant a shrub, 1-3 m tall; gland between the lowest pair of the acute or acuminate leaflets; [plants aliens, barely established in the vicinity of cultivation]; [section *Chamaefistula*, series *Coluteoideae*].
    3 Gland between the lowest pair of leaflets only; leaflets 3-5× as long as wide ..... ***S. corymbosa***
    3 Glands between each pair of leaflets; leaflets 2-3× as long as wide, acuminate ..... ***S. septemtrionalis***
  2 Plant an herb, 0.1-1.5 m tall; gland near the base of the petiole (except in *S. occidentalis* which has leaflets rounded to emarginate at the apex); [plants natives, or aliens generally well-established and weedy].
    4 Leaflets obovate, the apex rounded to emarginate, 1.3-2× as long as wide; gland between the lowest pair of leaflets; [section *Chamaefistula*, series *Trigonelloideae*] ..... ***S. obtusifolia***
    4 Leaflets ovate or narrowly elliptic, the apex acute or acuminate, 2-3.5× as long as wide; gland near the base of the petiole.
      5 Leaflets 1.5-3.0 cm wide, in 3-6 pairs; racemes with 1-5 flowers; [section *Chamaefistula*, series *Basiglandulosae*] ..... ***S. occidentalis***
      5 Leaflets 0.7-2.0 cm wide, in 6-10 pairs; racemes with 5-10 (-25) flowers; [series *Temperatae*].
        6 Legume 5.5-8 mm wide, with broad, nearly square segments, usually pilose initially, the hairs up to 0.8-2 mm long (sometimes glabrate); ovary lanate with hairs to 1 mm long; ovules 10-15 (-18); petiolar gland broadest above the middle ..... ***S. hebecarpa***
        6 Legume 8-11 mm wide, with narrow segments (much shorter than broad), glabrous (or with a few hairs, these < 0.6 mm long); ovary strigulose with hairs to 0.5 mm long; ovules 20-25 (-30); petiolar gland usually broadest at or below the middle ..... ***S. marilandica***

* ***Senna alata*** (Linnaeus) Roxburgh, Emperor's Candlesticks, Candlestick Plant. Cp (FL) {LA}: disturbed areas; rare, native of tropical America. September-November. Planted and slightly naturalized from s. AL and FL west to OK and TX. [= I, K, SE, WH, Y; = *Cassia alata* Linnaeus – Z]

* ***Senna corymbosa*** (Lamarck) Irwin & Barneby. Cp (FL, GA, SC), Pd (GA): cultivated as an ornamental, rarely persistent or spreading to disturbed areas; rare, native of South America. August-September. [= I, K, SE, WH, Y; = *Adipera corymbosa* (Lamarck) Britton & Rose – S; = *Cassia corymbosa* – X, Z]

Senna hebecarpa (Fernald) Irwin & Barneby, Northern Wild Senna. Pd (GA?, NC, VA), Mt (NC, VA), Cp (VA): open wet habitats, moist forests; uncommon in VA Mountains and VA Piedmont, rare in VA Coastal Plain and NC (NC Watch List). July-August; August-November. MA and s. NH west to s. WI, south to sc. NC, e. TN, s. IN, and c. IL. [= C, I, K, SE, Y; = *Cassia hebecarpa* Fernald – RAB, G, W, X, Z; > *C. hebecarpa* var. *hebecarpa* – F; > *C. hebecarpa* var. *longipila* E.L. Braun – F; = *Ditremexa marilandica* (Linnaeus) Britton & Rose – S, misapplied]

Senna marilandica (Linnaeus) Link, Maryland Wild Senna. Pd (GA, NC, SC, VA), Mt (GA, NC, VA), Cp (FL, GA, NC, VA): dry to moist forests, especially on greenstone and diabase barrens and rocky woodlands, thickets, woodland borders, sometimes somewhat weedy; uncommon (rare in FL and NC). July-August; August-November. S. MA and s. NY west to e. NE, south to c. peninsular FL and c. TX. [= C, I, K, SE, WH, Y; = *Cassia marilandica* Linnaeus – RAB, F, G, W, X, Z; = *Ditremexa medsgeri* (Shafer) Britton & Rose – S]

* ***Senna obtusifolia*** (Linnaeus) Irwin & Barneby, Sicklepod, Coffeeweed. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, VA), Mt (GA): fields (especially soybean fields), disturbed areas; common (uncommon in VA), probably native of the New World Tropics. July-September; August-November. The species is now pantropical. [= C, I, K, SE, WH, X, Y; = *Cassia obtusifolia* Linnaeus – RAB, W, Z; < *Cassia tora* Linnaeus – F, G, misapplied; < *Emelista tora* (Linnaeus) Britton & Rose – S, misapplied]

* ***Senna occidentalis*** (Linnaeus) Link, Coffee Senna. Cp (FL, GA, NC, SC), Pd (GA, NC, SC), Mt (VA): disturbed places; common (rare north of FL), native of the Old World Tropics. July-August; August-November. The species is now pantropical. [= C, I, K, SE, WH, Y; = *Cassia occidentalis* Linnaeus – RAB, F, G, X, Z; = *Ditremexa occidentalis* (Linnaeus) Britton & Rose ex Britton & Wilson – S]

* ***Senna septemtrionalis*** (Viviani) Irwin & Barneby. Cp (NC): disturbed areas; rare, native of the tropics, probably originally from tropical America, perhaps not truly established, though Isely (1990) states that "the weedy nature of this species suggests that it is almost certainly somewhat established." [= I, K, SE, Y; = *Cassia laevigata* Willdenow – Z]

Sesbania Adanson 1760 (Rattlebox, Sesban)

A genus of about 50-60 species, annual herbs, perennial herbs, shrubs, and trees, of tropical, subtropical, and less commonly warm temperate regions of the Old and New World, here circumscribed to include *Glottidium*, following Lewis et al. (2005). References: Isely (1998)=I.

1 Corolla 8-9 mm long; legume flat; leaves with 8-13 pairs of leaflets ..... ***S. vesicaria***
1 Corolla 10-25 mm long; legume quadrangular or 4-winged; leaves with 10-35 pairs of leaflets.
  2 Legume quadrangular in cross-section, the corners not winged, 15-20 cm long, 0.3-0.5 cm wide; corolla 10-15 (-20) mm long, yellow, often marked with purple; leaves with 15-35 pairs of leaflets; [plant a robust herb, to 4 m tall]..... ***S. herbacea***
  2 Legume conspicuously 4-winged longitudinally, 3-8 cm long, 1-1.5 cm wide; corolla 13-25 mm long, yellow, orange, or scarlet; leaves with 10-20 pairs of leaflets; [plant a shrub, to 4 m tall].
    3 Corolla yellow; pedicels 0.5-1.0 cm long; legume blunt or short-acuminate to a beak..... ***S. drummondii***
    3 Corolla orange or red; pedicels 0.5-1.2 (-1.5) cm long; legume acuminate or tapering to a beak..... ***S. punicea***

* ***Sesbania drummondii*** (Rydberg) Cory, Rattlebox, Poison-bean. Cp (FL, GA, SC): disturbed areas, spoil, marsh edges, ditches; rare, introduced. First reported for GA and SC by Townsend et al. (2000). [= GW, I, K, SE, WH; = *Daubentonia drummondii* Rydberg – S]

*? ***Sesbania herbacea*** (P. Miller) McVaugh, Sesban, Coffee-weed, Indigo-weed, Peatree. Cp (FL, GA, NC, SC, VA), Pd (NC): ditches, wet fields; common (rare in Piedmont), perhaps native only in the deeper South. July-September; August-November. [= K, WH; = *S. exaltata* (Rafinesque) Cory – RAB, C, F, G, I, SE; = *Sesbania macrocarpa* Muhlenberg ex Rafinesque – GW; = *Sesban exaltatus* (Rafinesque) Rydberg – S]

* ***Sesbania punicea*** (Cavanilles) Bentham, Rattlebox, Scarlet Wisteria-tree, Purple Sesban. Cp (FL, GA, NC, SC, VA), Pd (GA): ditches, wet fields, marshes, ponded wetlands, wet pinelands; common, presumably native of South America. June-October; August-November. [= GW, I, K, SE, WH; = *Daubentonia punicea* (Cavanilles) A.P. de Candolle – RAB, S]

Sesbania vesicaria (Jacquin) Elliott, Bladderpod, Bagpod. Cp (FL, GA, NC, SC), Pd (GA): ditches, marshes, disturbed wet areas; common. The native status of *S. vesicaria* is uncertain; its distribution is from ne. NC south to s. FL, west to e. OK and se. TX, and Isely (1998) states that it is unknown from outside the United States. July-September; August-November. [= GW, WH; = *Glottidium vesicarium* (Jacquin) R.M. Harper – RAB, I, K, S, SE]

* ***Sesbania virgata*** (Cavanilles) Poiret. Cp (FL): disturbed areas; rare. [= I, K, SE, WH] {not yet keyed}

Strophostyles Elliott 1823 (Sand Bean, Woolly Bean, Wild Bean)

A genus of 3 species, annual and perennial herbs, of North America. References: Pelotto & Martínez (1998)=Z; Isely (1998)=I. Key adapted from SE.

1 Legumes 2-4 cm long, permanently pubescent; corolla 5-8 mm long; leaves permanently pubescent on the upper surface; seeds glabrous ..... ***S. leiosperma***
1 Legumes 3-8 cm long, glabrate at maturity; corolla 8-15 mm long; leaves usually glabrate on the upper surface; seeds pubescent.

2 Bracteoles (immediately subtending the calyx) 2-3 mm long, equalling or exceeding the calyx tube; leaflets usually prominently 3-lobed; terminal leaflet 2.5-3.5 cm wide; plant an annual ..... ***S. helvola***
2 Bracteoles (immediately subtending the calyx) 0.5-1.0 (-1.5) mm long, shorter than the calyx tube; leaflets not lobed; terminal leaflet 0.3-2.0 cm wide; plant a perennial ..... ***S. umbellata***

Strophostyles helvola (Linnaeus) Elliott, Annual Sand Bean. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): coastal dunes, beaches, dry sandy woodlands, disturbed areas; common. June-September; August-October. Québec west to MN and SD, south to n. peninsular FL and e. TX. See Isely (1986b) for a discussion of the orthography of the epithet. [= RAB, C, G, S, WH; = *S. helvula* (Linnaeus) Elliott – K, SE, W, Z, orthographic variant; > *S. helvola* var. *helvola* – F; > *S. helvola* var. *missouriensis* (S. Watson) Britton – F]

Strophostyles leiosperma (Torrey & A. Gray) Piper, Small-flowered Sand Bean. Cp (FL, VA*): disturbed areas; rare. This species is native east to KY and TN; it should be sought inland in prairies, glades, and barrens with midwestern affinities. [= C, F, G, K, SE, WH, Z; *S. pauciflora* (Bentham) S. Watson – S]

Strophostyles umbellata (Muhlenberg ex Willdenow) Britton, Perennial Sand Bean. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry sandy or rocky woodlands, disturbed areas; common. June-September; August-October. S. NY west to s. IN, s. MO, and KS, south to c. peninsular FL and s. TX. [= RAB, C, F, G, K, S, SE, W, WH, Z; > *S. umbellata* var. *umbellata* – F; > *S. umbellata* var. *paludigena* Fernald – F]

Stylosanthes Swartz 1788 (Pencil-flower)

A genus of about 25-50 species, annual and perennial herbs, pantropical and less commonly temperate. References: Isely (1998)=I.

Stylosanthes biflora (Linnaeus) Britton, Sterns, & Poggenburg, Pencil-flower. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): sandhills, dry to moist (but not wet) pine savannas and flatwoods, dry forests, woodlands, woodland borders, glades, barrens, rock outcrops; common. June-August; July-October. S. NY west to OH, s. IL, and KS, south to c. peninsular FL and e. TX. The large, adnate stipules are distinctive. Variation in this species (see synonymy) needs additional study. [= RAB, C, I, K, SE, W, WH; > *S. biflora* var. *biflora* – F, G; > *S. biflora* var. *hispidissima* (Michaux) Pollard & Ball – F, G; > *S. riparia* Kearney – G, S; > *S. riparia* var. *riparia* – F; > *S. riparia* var. *setifera* Fernald – F; > *S. biflora* – S]

Styphnolobium Schott 1830 (Pagoda Tree)

A genus of about 9 species, trees, shrubs, of central and South America and e. Asia. References: Isely (1998)=I; Isely (1981)=Z; Sousa S. & Rudd (1993)=Y; Palomino et al. (1993).

* *Styphnolobium japonicum* (Linnaeus) Schott, Pagoda Tree. Pd (GA, NC, SC, VA), Mt (VA): cultivated ornamental, native of China. Reported as "slightly escaped" in the United States by Isely (1981), but all specimens seen are from cultivated plants. Also reported for VA, MD, PA, and OH (Kartesz 1999). [= Y; = *Sophora japonica* Linnaeus – I, K, Z]

Tephrosia Persoon 1807 (Goat's-rue)

A genus of about 350-400 species, perennial herbs, of tropical and warm temperate regions of the Old World and New World. References: Isely (1998)=I; Ward (2004c)=Z; Wood (1949)=Y. Key adapted from SE.

1 Corolla bicolored, the standard yellow and the wings pink; racemes terminal; stems erect; stamens monadelphous; leaves with (9-) 13-23 (-37) leaflets.
  2 Inflorescence reduced, foliose, flowers solitary or in small clusters overtopped by leaves; plants < 25 cm tall; leaflets generally < 10 mm long and < 5 mm wide; [restricted to the West Gulf Coastal Plain of sw. GA, adjacent FL and westward] ..... ***T. mohrii***
  2 Inflorescence terminal, not foliose and overtopped by leaves; plants > 25 cm tall; leaflets generally > 10 mm long and > 5 mm wide; [widespread in our area] ..... ***T. virginiana***
1 Corolla unicolored, initially white or pink, darkening in age to a dark maroon or purple; racemes opposite the leaves (the uppermost appearing terminal); stems decumbent or ascending; stamens diadelphous; leaves with (3-) 5-23 (-27) leaflets.
  3 Upper stamen fused with the staminal sheath for part or most of its length (submonadelphous); leaves with (9-) 13-23 (-27) leaflets; [plants from s. AL westward] ..... ***[T. onobrychoides]***
  3 Upper stamen completely separate from the staminal sheath (diadelphous); leaves with (3-) 5-17 (-19) leaflets; [plants collectively widespread in our area].
    4 Petiole 1-4× as long as the lowest leaflets of the leaf; peduncle and rachis of inflorescence strongly flattened (2-angled, or rarely, 3-angled) in cross-section; leaflets averaging 25 mm long and 12 mm wide ..... ***T. florida***
    4 Petiole 1/3-1× as long as the lowest leaflets of the leaf; peduncle and rachis of inflorescence terete or inconpicuously 2-4-angled in cross-section; leaflets averaging smaller.
      5 Leaves with (3-) 5-7 leaflets; petiole 0-5 mm long; stem and fruit hairs < 0.5 mm long ..... ***T. chrysophylla***
      5 Leaves with (7-) 9-17 (-19) leaflets; petiole 2-15 mm long; some stem and fruit hairs > 0.5 mm long.
        6 Inflorescence with 1-3 (-5) nodes; plants inconpicuously pubescent with gray hairs (the hairs appressed or spreading, short to fairly long); leaflets (3-) avg. 5-6 (-7) mm wide, mostly acute; [plants of the Coastal Plain of NC and SC] ..... ***T. hispidula***
        6 Inflorescence with 2-20 nodes; plants conspicuously tawny long-pilose with rusty brown hairs; leaflets (6-) avg. 8 (-12) mm wide, mostly obtuse; [plants widespread in our area] ..... ***T. spicata***

Tephrosia chrysophylla Pursh, Sprawling Goat's-rue. Cp (FL, GA): sandhills; common (rare in GA). E. GA s. to s. FL, and west to s. MS. [= I, K, SE, WH, Y; = *Cracca chrysophylla* (Pursh) Kuntze – S]

Tephrosia florida (F.G. Dietrich) C.E. Wood, Florida Goat's-rue. Cp (FL, GA, NC, SC): pine savannas and other pinelands; common. May-July; June-September. E. NC south to s. FL, west to se. LA, a Southeastern Coastal Plain endemic. [= RAB, I, K, SE, WH, Y; = *Cracca ambigua* (M.A. Curtis) Kuntze – S]

Tephrosia hispidula (Michaux) Persoon. Cp (FL, GA, NC, SC, VA?): pine savannas and other pinelands; common. May-August; July-October. E. NC (se. VA?) south to c. peninsular FL, west to se. LA, a Southeastern Coastal Plain endemic. Fernald (1950) reports this species from se. VA. [= RAB, F, I, K, SE, WH, Y; = *Cracca hispidula* (Michaux) Kuntze – S]

Tephrosia mohrii (Rydberg) Godfrey, Dwarf Goat's-rue. Cp (FL, GA): sandhills, dry savannas; uncommon (rare in GA). GA and westward in the East Gulf Coastal Plain. Perhaps not distinct from *T. virginiana*, but not easily dismissed as "little more than a freak" (Wood 1949); see Godfrey & Kral (1958). [= K; < *T. virginiana* – I, SE, WH, Y; = *Cracca mohrii* Rydberg – S; = *T. virginiana* var. *mohrii* (Rydberg) D.B. Ward – Z]

Tephrosia spicata (Walter) Torrey & A. Gray. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): woodlands; common. June-August; July-October. S. DE south to s. FL, west to w. LA, north in the interior to se., sc., and sw. TN and se. KY. [= RAB, C, G, K, SE, W, WH, Y; > *T. spicata* var. *semitonsa* Fernald – F; > *T. spicata* var. *spicata* – F; = *Cracca spicata* (Walter) Kuntze – S]

Tephrosia virginiana (Linnaeus) Persoon, Virginia Goat's-rue. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): sandhills, other pinelands, xeric and/or rocky woodlands and forests, outcrops, barrens, dry roadbanks; common. May-June; July-October. S. NH west to WI, se. MN, and c. KS, south to c. peninsular FL, c. TX, and nw. TX. [= RAB, C, I, K, SE, W; > *T. virginiana* var. *glabra* Nuttall – F, G; > *T. virginiana* var. *virginiana* – F, G; < *T. virginiana* – I, SE, WH, Y (also see *T. mohrii*); = *Cracca virginiana* Linnaeus – S; = *T. virginiana* var. *virginiana* – Z]

Tephrosia onobrychoides Nuttall. Cp: dry pinelands; rare. S. AL, n. AR, e. OK, south to s. LA, and sc. TX. [= I, K, SE, Y; = *Cracca onobrychoides* (Nuttall) Kuntze – S]

Tephrosia rugelii Shuttleworth ex B.L. Robinson. Cp (FL): sandhills: rare. Ne. and Panhandle FL south to s. FL. [= I, K, SE, WH; = *Cracca rugelii* (Shuttleworth ex B.L. Robinson) A.A. Heller – S] {add to key; add synonymy}

Thermopsis R. Brown ex Aiton & Aiton f. 1811 (Golden-banner)

A genus of 8-23 species, perennial herbs, of temperate e. North America, w. North America, and e. Asia. References: Larisey (1940b); Chen, Mendenhall, & Turner (1994)=Y; Isely (1981)=Z; Isely (1998)=I.

1 Legumes erect or strongly ascending, densely villous; stipules clasping, those of the principal leaves (20-) 35-65 mm long, 10-30 mm wide; pedicels 2-3 mm long; plants mostly 6-20 dm tall, strict or few-branched ..... ***Th. villosa***
1 Legumes spreading to ascending, glabrate or pubescent; stipules not clasping, those of the principal leaves 12-25 (-32) mm long, 1-5 mm wide; pedicels 4-20 mm long; plants mostly 3-10 dm tall, branched.
  2 Plants from a single woody rootstock, mostly 5-10 dm tall; calyx glabrous or very sparsely pubescent, often also glaucous, the lobes often only 1-1.5 mm long; pedicels glabrate, (4-) 7-20 mm long (as long as or longer than the bracts); racemes terminal or lateral; plants flowering (late May-) early June-July; [plants of moderate to high elevations, (300-) 700-2000 m] ..... ***Th. fraxinifolia***
  2 Plants from extensive rhizomes, mostly 3-6 dm tall; calyx pubescent, the lobes 2-2.5 mm long; pedicels villosulous, 2-6 (-10) mm long (shorter than the bracts); racemes terminal; plants flowering late April-early May (-June); [plants of low to moderate elevations, 200-800 m] ..... ***Th. mollis***

Thermopsis fraxinifolia (Nuttall ex Torrey & A. Gray) M.A. Curtis, Ash-leaf Golden-banner. Mt, Pd (GA, NC, SC): dry slopes and ridges; rare. Late May-July; July-October. A Southern Appalachian endemic: w. NC and e. TN south to nw. SC and n. GA. In addition to the key characters above, *Th. fraxinifolia* tends to have thinner stems than *Th. mollis*, to average taller, and to have the inflorescence generally arching to reclining (vs. erect to sometimes arching). The phenologic separation (peak flowering times separated by about 6-7 weeks, generally with a 2 week period between the last flowering of *Th. mollis* and the first flowering of *Th. fraxinifolia*) provides strong support to the recognition of *Th. fraxinifolia* and *Th. mollis* at the species level. [= RAB, K, S, W, Y; = *Th. mollis* var. *fraxinifolia* (Nuttall ex Torrey & A. Gray) Isely – I, SE, Z]

Thermopsis mollis (Michaux) M.A. Curtis ex A. Gray, Appalachian Golden-banner. Pd, Mt (GA, NC, SC, VA): dry slopes and ridges; rare. April-May; June-August. Centered in the Southern Appalachians, but mostly in the Piedmont and lower elevation periphery of the mountains, ranging from sc. VA south through w. and c. NC and e. TN to nw. SC, n. GA, and ne. AL. See comments under *Th. fraxinifolia*. [= RAB, C, F, G, K, W, Y; = *Th. mollis* var. *mollis* – I, SE, Z; > *Th. hugeri* Small – S; > *Th. mollis* – S]

Thermopsis villosa (Walter) Fernald & Schubert, Aaron's-rod, Blue Ridge Golden-banner. Mt (GA, NC, VA*): floodplains, mesic disturbed areas, woodland edges, roadbanks; rare. May-June; July-September. A Southern Appalachian endemic: w. NC and e. TN to n. GA, and escaped from cultivation more widely, as in w. VA, s. MD, c. TN, and WV probably representing escapes from cultivation. *Th. villosa* is a more erect and unbranched plant than our other 2 species. It is generally found in disturbed sites, its natural habitat somewhat of a mystery. [= RAB, C, I, K, SE, W, Y, Z; = *Th. caroliniana* M.A. Curtis – S]

Trifolium Linnaeus 1753 (Clover)

FABACEAE

A genus of about 240-250 species, annual and perennial herbs, nearly cosmopolitan (primarily north temperate). References: Zohary & Heller (1984)=Z; Isely (1998)=I. Draft key adapted from various published sources, including SE and C.

1 Flowers bright yellow (fading brown); [section *Chronosemium*].
  2 Leaves palmately trifoliolate (all leaflets essentially sessile); heads 10-13 mm in diameter; flowers 5-7 mm long ..... ***T. aureum***
  2 Leaves pinnately trifoliolate (the lateral leaflets essentially sessile, the terminal leaflet with a petiolule 0.8-3 mm long; heads 5-13 mm in diameter; flowers 2.5-5 mm long.
    3 Standard with 5 obvious diagonal veins (striations); heads 8-13 mm in diameter, generally with 20-30 flowers; flowers 3.5-5 mm long; petiolule of the terminal leaflet 1-3 mm long ..... ***T. campestre***
    3 Standard inconspicuously veined; heads 5-8 mm in diameter, generally with 5-15 (-20) flowers; flowers 2.5-3.5 m long; petiolule of the terminal leaflet ca. 1 mm long ..... ***T. dubium***
1 Flowers not bright yellow.
  4 Flowers borne on distinct pedicels, (1-) 2-10 mm long, these often curving or reflexing in age; flowers white, fading pink with age in most species; [native and alien species]; [section *Lotoidea*].
    5 Plants stoloniferous, all or some of the leaves alternate from ground level and long petioled.
      6 Calyx lobes narrowly triangular, about as long as the calyx tube; peduncles axillary along the stolons; stipules scarious-membranaceous; [plant an abundant introduced weed] ..... ***T. repens***
      6 Calyx lobes subulate, distinctly longer than the calyx tube; peduncles terminal, either at tips of the stolons, or at tips of erect flowering branches; stipules green, foliaceous; [plants rare natives].
        7 Peduncle terminal, at the tip of the stolon, lacking leaves; pedicels 2-3 mm long ..... ***T. calcaricum***
        7 Peduncle terminal at tip of erect flowering branches, subtended by a pair of opposite or subopposite, short-petioled leaves; pedicels (2-) 4-8 mm long ..... ***[T. stoloniferum]***
    5 Plants not stoloniferous, clumped (though sometimes with prostrate or lax stems).
      8 Calyx lobes narrowly triangular, about as long as the calyx tube (or longer in *T. hybridum*); stipules scarious-membranaceous; [plants introduced].
        9 Calyx lobes not scarious-margined, straight, equal to or longer than the tube ..... ***T. hybridum***
        9 Calyx lobes scarious-margined, becoming divergent and twisted, about equal to the tube ..... ***[T. nigrescens]***
      8 Calyx lobes subulate to lanceolate, distinctly longer than the calyx tube; stipules green, foliaceous; [plants rare natives].
        10 Flowers 4-6 mm long; calyx lobes lanceolate, foliaceous, 3-nerved, 0.4-0.8 mm wide ..... ***T. carolinianum***
        10 Flowers 8-12 mm long; calyx lobes subulate, setaceous, 1-nerved, < 0.4 mm wide.
          11 Leaflets 1-2.8× as long as wide; stems erect or ascending; flowers purplish; plant an annual or biennial; [plants of a variety of natural woodlands, widespread in our area] ..... ***T. reflexum***
          11 Leaflets 3-7× as long as wide; stems prostrate; flowers creamy white and purple-veined; plant a perennial; [plants of shale barrens and other rock outcrops, from VA northward] ..... ***T. virginicum***
  4 Flowers sessile or on very short pedicels (usually < 1 mm long); flowers pink, purplish, white, or scarlet; [alien species].
    12 Plants stoloniferous, all or some of the leaves alternate from ground level and long petioled.
      13 All flowers with petals; fruiting heads enlarging, becoming a reddish brown, pubescent ball ca. 2 cm in diameter, remaining aerial; [section *Vesicaria*] ..... ***T. fragiferum***
      13 Only 2-5 outer flowers of the head with petals, the others lacking petals and sterile; fruiting heads becoming a subterranean bur, buried by curvature and growth of the peduncle; [section *Trichocephalum*] ..... ***T. subterraneum***
    12 Plants not stoloniferous, the leaves clustered at or near ground level and/or produced on aerial stems.
      14 Heads subtended by a pseudo-involucre of 2 (-3) enlarged stipules and/or opposite or subopposite leaves; [section *Trifolium*].
        15 Flowers white (fading pink), 7-8 mm long; calyx tube **both** externally glabrous **and** 20-nerved ..... ***T. lappaceum***
        15 Flowers red, pink-purple, or bicolored, **either** 11-20 mm long **or** 4-6 mm long; calyx tube not **both** externally glabrous **and** 20-nerved (externally pubescent, or 10-nerved, or both).
          16 Flowers 4-6 mm long ..... ***T. striatum***
          16 Flowers 11-20 mm long.
            17 Stipules gradually tapering to a long slender tip, longer than the fused part; calyx densely hirsute; stem soft pubescent with deflexed to spreading hairs ..... ***T. hirtum***
            17 Stipules abruptly narrowed to a short awn; calyx glabrous to pilose; stem appressed pubescent ..... ***T. pratense***
      14 Heads not subtended by a pseudo-involucre of leaves or expanded stipules.
        18 Heads axillary, sessile, in the axils of subtending leaves; calyx tube glabrous (except for a few hairs at apex); [section *Lotoidea*] ..... ***T. glomeratum***
        18 Heads terminal or axillary; calyx tube pubescent.
          19 Calyx bladdery-inflated in fruit; corolla resupinate (inverted 180 degrees, such that the standard is lowermost); [section *Vesicaria*].
            20 Inflorescence with a prominent peduncle; head lobed in fruit ..... ***T. resupinatum***
            20 Inflorescence subsessile to shortly peduncled; head spherical in fruit ..... ***T. tomentosum***
          19 Calyx not bladdery-inflated in fruit; corolla orientation normal (standard uppermost).
            21 Corolla 3-6 mm long; [section *Trifolium*] ..... ***T. arvense***
            21 Corolla 10-18 mm long.
              22 Corolla crimson, 10-13 (-15) mm long; floral bracts absent; heads 1-1.5 (-2) cm in diameter; [section *Trifolium*] ..... ***T. incarnatum***
              22 Corolla white, 15-18 mm long; floral bracts present; heads 2.5-3 cm in diameter; [section *Mistyllus*] ..... ***T. vesiculosum***

* ***Trifolium angustifolium*** Linnaeus, Narrowleaf Clover. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif. Reported for SC (Kartesz 1999), based on specimen at NCU {check}. [= I, K] {not yet keyed}

* ***Trifolium arvense*** Linnaeus, Rabbitfoot Clover. Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA), Mt (NC, SC, VA): disturbed areas; common (uncommon in FL), native of the Mediterranean region. April-August. [= RAB, C, F, G, I, K, S, SE, W, WH]

* ***Trifolium aureum*** Pollich, Large Hop Clover, Yellow Clover. Mt, Pd, Cp (NC, VA): fields, roadsides, disturbed areas; uncommon, native of Eurasia. May-August. [= C, I, K, SE, W; = *T. agrarium* Linnaeus – RAB, F, G, S, misapplied]

Trifolium calcaricum J.L. Collins & Wieboldt. Mt (VA): limestone glades; rare. In c. TN (Chester, Wofford, & Kral 1997). For additional information, see Collins & Wieboldt (1992). [= I, K]

* ***Trifolium campestre*** Schreber, Hop Clover. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): roadsides, fields, lawns, disturbed areas; common, native of Eurasia. April-October. [= RAB, C, I, K, SE, W, WH; *? T. procumbens* Linnaeus – F, G, S, misapplied]

Trifolium carolinianum Michaux, Wild White Clover, Carolina Clover. Cp (FL, GA, NC, SC), Pd (GA, SC): open woodlands, woodland edges, pine savannas, thin soils around rock outcrops, disturbed areas; uncommon (rare north of FL). April-July. [= RAB, C, F, G, I, K, S, SE, W, WH; > *T. carolinianum* – S; > *T. saxicola* Small – S]

* ***Trifolium cernuum*** Brotero, Nodding-head Clover. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif. [= K] {not yet keyed}

* ***Trifolium depauperatum*** Desvaux *var.* ***depauperatum.*** Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif. [= I, K] {not yet keyed}

* ***Trifolium dubium*** Sibthorp, Low Hop Clover. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): roadsides, lawns, disturbed areas; common, native of Europe. April-September. [= RAB, C, F, G, I, K, S, SE, W, WH]

* ***Trifolium fragiferum*** Linnaeus, Strawberry Clover. Pd (GA): disturbed areas; rare, native of Middle East. Introduced in c. GA (Jones & Coile 1988) and reported from an old collection from se. PA (Rhoads & Klein 1993). [= C, F, G, I, K, SE]

* ***Trifolium glomeratum*** Linnaeus, Cluster Clover. {AL, FL}: {habitat}; rare, native of Mediterranean region. Also reported for SC by Kartesz (1999), but the specimen is actually *T. cernuum*. [= I, K, S, SE]

* ***Trifolium gracilentum*** Torrey & A. Gray. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif. [> *T. gracilentum* var. *gracilentum* – K] {not yet keyed; add synonymy}

* ***Trifolium hirtum*** Allioni, Rose Clover. Pd (NC, VA): roadsides, disturbed areas; rare, native of Eurasia and n. Africa. April-July. [= RAB, C, G, I, K, SE]

* ***Trifolium hybridum*** Linnaeus, Alsike Clover. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): lawns, fields, roadsides, disturbed areas; common, native of Europe. April-September. [= RAB, C, G, I, K, S, SE, W, WH; > *T. hybridum* var. *hybridum* – F; > *T. hybridum* var. *elegans* (Savi) Boiss. – F]

* ***Trifolium incarnatum*** Linnaeus, Crimson Clover. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, disturbed areas; uncommon, native of Europe. April-June; June-August. [= RAB, C, F, G, I, K, S, SE, W, WH]

* ***Trifolium lappaceum*** Linnaeus, Lappa Clover, Burdock Clover. Cp (FL, NC): disturbed areas; rare, native of Mediterranean Eurasia and Africa. April-August. [= RAB, I, K, S, SE, WH]

* ***Trifolium pratense*** Linnaeus, Red Clover. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): fields, roadsides, disturbed areas; common, native of Europe. April-September. [= RAB, C, G, I, K, S, SE, W, WH; > *T. pratense* var. *pratense* – F; > *T. pratense* var. *sativum* (P. Miller) Schreber – F]

Trifolium reflexum Linnaeus, Buffalo Clover. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (GA, SC): open woodlands, woodland edges; rare. April-August. [= RAB, C, I, K, S, SE, W, WH; > *T. reflexum* var. *reflexum* – F, G; > *T. reflexum* var. *glabrum* Lojacono – F, G]

* ***Trifolium repens*** Linnaeus, White Clover, Dutch Clover, Ladino Clover. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): lawns, roadsides, disturbed areas; common, native of Eurasia. April-September. [= RAB, C, F, G, I, K, S, SE, W, WH]

* ***Trifolium resupinatum*** Linnaeus, Persian Clover, Reversed Clover. Cp (FL, NC, SC), Pd (GA): lawns and disturbed areas; rare, introduced Mediterranean region and w. Asia. April-July. [= RAB, C, F, G, I, K, S, SE, WH]

* ***Trifolium striatum*** Linnaeus, Knotted Clover. Pd (GA, NC), Cp (SC): roadsides, disturbed areas, waste areas near wool-combing mills; rare, native of Europe. April-August. [= RAB, C, F, G, I, K, S, SE]

* ***Trifolium subterraneum*** Linnaeus, Subterranean Clover. Pd (GA), {prov.} (NC, SC): disturbed areas, waste areas near wool-combing mills; rare, native of Europe, Asia, and n. Africa. Reported for NC and SC by Isely (1990); reported for Piedmont of GA by Jones & Coile (1988), and collected in MS (Stone County) (S.W. Leonard, pers. comm. 2007). [= I, K, SE]

* ***Trifolium tomentosum*** Linnaeus. {prov.} (NC), Cp (FL, SC): waste areas near wool-combing mills, other disturbed areas; rare, native of Mediterranean region. Reported for NC by Isely (1998). [= I, K, WH]

* ***Trifolium vesiculosum*** Savi, Arrowleaf Clover. Pd (GA, SC), Cp (FL, GA): roadsides, disturbed areas; uncommon, native of s. Europe. First reported for South Carolina by Hill & Horn (1997). [= I, K, SE, WH]

Trifolium virginicum Small, Kates Mountain Clover, Shale-barren Clover. Mt, Pd (VA): shale barrens, other rock outcrops; uncommon (rare in Piedmont). May-June. Ranges from sc. PA through w. MD south to w. VA and e. WV. [= C, F, G, I, K, SE, W]

* *Trifolium medium* Linnaeus, Zigzag Clover. Introduced in MD (Kartesz 1999). [= K] {not keyed}

* *Trifolium nigrescens* Viviani, Ball Clover. Cp (FL): Introduced in c. TN (Chester, Wofford, & Kral 1997). [= I, K, S, SE, WH]

* ***Trifolium spumosum*** Linnaeus, Pink Clover. Cp (FL): [= K, WH]

Trifolium stoloniferum Muhlenberg ex Eaton, Running Buffalo-clover, a rare native, occurs (at least formerly) in dry upland woodlands and prairies from WV, OH, n. IN, IL, MO, and e. KS, south to KY and AR. [= C, F, G, I, K, S, SE]

Ulex Linnaeus 1753 (Gorse)

A genus of 10-20 species, shrubs, of Europe and n. Africa. References: Isely (1998)=I.

* ***Ulex europaeus*** Linnaeus, Gorse, Furze. Cp (VA): disturbed areas; rare, native of Europe. June. Not cited in Harvill et al. (1992), but naturalized in sandy soils in York County, VA. Also reported from WV and PA. [= C, F, G, I, K, SE]

Vachellia Wight & Arnott 1834 (Acacia)

A genus of about 163 species, of tropical and subtropical America, Africa, Asia, and Australia. Formerly considered part of *Acacia*. References: Isely (1998)=I; Isely (1969)=Z; Ebinger, Seigler, & Clarke (2002)=Y; Seigler & Ebinger (2005)=X; Maslin, Miller, & Seigler (2003).

1 Leaves with 2-4 (-6) pairs of pinnae; each pinna with 10-20 pairs of leaflets ..... ***A. farnesiana var. farnesiana***
1 Leaves with 10-15 (-20) pairs of pinnae; each pinna with 20-30 pairs of leaflets ..... ***A. macracantha***

Vachellia farnesiana (Linnaeus) Wight & Arnott *var.* ***farnesiana***, Sweet Acacia, Huisache. Cp (AL, FL, GA, LA, MS): sandy flats on barrier islands, maritime scrub, shell middens; rare. E. GA, along the coast, south to s. FL, west to TX and Tamaulipas, across the sw. United States and south into Mexico. The GA occurrence appears native; see Duncan (1985). [= X; < *Acacia farnesiana* (Linnaeus) Willdenow – I, K, SE, WH, Z; > *Vachellia farnesiana* (Linnaeus) Wight & Arnott – S; = *Acacia farnesiana* ssp. *farnesiana* – Y; > *Acacia smallii* Isely – I, SE, Z; > *Vachellia densiflora* Alexander ex Small – S]

* ***Vachellia macracantha*** (Humboldt & Bonplandt ex Willdenow) Seigler & Ebinger, Apopanax, Longspine Acacia. Cp (FL, GA): planted as an ornamental and rarely naturalized; rare, native of further south in FL. [= X; = *Acacia macracantha* Humboldt & Bonplandt ex Willdenow – I, K, SE, WH, Z]

Vicia Linnaeus 1753 (Vetch, Tare)

A genus of about 150-160 species, annual and perennial herbs, of temperate Eurasia and North America. References: Isely (1998)=I; van de Wouw, Maxted, & Ford-Lloyd (2003)=Y. Key adapted from I.

1 Inflorescence nearly sessile, of 1-4 flowers clustered in the leaf axil; [alien species].
  2 Leaves with 2-6 leaflets, succulent; leaflets 3-7 cm long; legume with pectinate sutures ..... ***[V. narbonensis]***
  2 Leaves with 4-20 leaflets, not succulent; leaflets 0.3-3.5 cm long; legume not pectinate (except *V. lutea*).
    3 Corolla 5-6 mm long; leaves with 4-6 (-8) leaflets ..... ***V. lathyroides***
    3 Corolla 10-30 mm long; leaflets 6-16 (-20).
      4 Calyx lobes conspicuously unequal; legumes pilose with pustulate-based hairs ..... ***V. lutea***
      4 Calyx lobes more or less equal; legumes glabrous at maturity, or very finely pubescent with non-pustulate-based hairs.
        5 Calyx lobes all shorter than the calyx tube; corolla yellow, often streaked with purple, 25-30 mm long ..... ***V. grandiflora***
        5 Calyx lobes (at least the longer) about as long as the calyx tube; corolla pink, purple, lavender, white, or creamy yellow, 10-25 (-30) mm long.
          6 Standard pubescent dorsally; corolla 15-25 (-30) mm long, creamy yellow to purple; legume pubescent, with a basal stipe ..... ***V. pannonica***
          6 Standard glabrous; corolla 10-25 (-30) mm long, pink, purple, lavender, or whitish; legume glabrous, sessile.
            7 Calyx 7-11 (-12) mm long; corolla pink-purple to whitish, 10-18 mm long; leaflets 4-10× as long as wide ..... ***V. sativa ssp. nigra***
            7 Calyx 10-15 mm long; corolla generally pink-purple, 18-25 (-30) mm long; leaflets 2-5 (-7)× as long as wide ..... ***V. sativa ssp. sativa***

1 Inflorescence pedunculate, of 2-many flowers along a well-developed raceme; [alien and native species].
  8 Peduncles 1-10 mm long; raceme axis 2-10 mm long, with 2-7 (-10) flowers.
    9 Plant a robust annual, 10-20 dm tall; tendrils absent; leaves with (2-) 4-6 leaflets; leaflets 5-10 cm long; corolla 20-30 mm long ..... ***[V. faba]***
    9 Plant a trailing perennial, 3-10 dm tall; tendrils present; leaves with 8-16 leaflets; leaflets 2-3.5 cm long; corolla 10-15 mm long ..... ***[V. sepium]***
  8 Peduncles usually >10 mm long; raceme axis usually >10 mm long, with (1-) 2-many flowers.
    10 Corolla 10-25 mm long.
      11 Stipules dimorphic, one of each pair entire, the other palmately lacerate; flowers 1 (-2) per inflorescence ..... ***[V. articulata]***
      11 Stipules of a pair alike; flowers 1-numerous per inflorescence.
        12 Flowers 15-22 (-25) mm long; legumes with a basal stipe 2-5 mm long; leaves with 8-16 leaflets ..... ***V. americana var. americana***
        12 Flowers 8-16 (-18) mm long; legumes with a basal stipe 1-3 mm long; leaves with 8-22 leaflets.
          13 Calyx swollen on one side; plant an annual; inflorescence secund.
            14 Plant glabrate or with pubescence of hairs < 1 mm long; lower calyx lobe lanceolate to linear-lanceolate, 1-2 (-2.4) mm long ..... ***V. villosa ssp. varia***
            14 Plant conspicuously villous, the hairs 1-2 mm long; lower calyx lobe acicular or weak, 2-4 mm long ..... ***V. villosa ssp. villosa***
          13 Calyx not swollen on one side; plant a rhizomatous perennial; inflorescence not secund.
            16 Flowers white to lavender, the keel spotted; legumes 4-5 mm wide; inflorescence not second ..... ***V. caroliniana***
            16 Flowers blue-violet or purple; legumes 6-8 mm wide; inflorescence generally second ..... ***V. cracca***
    10 Corolla 2.5-8 (-10) mm long.
      17 Plant an annual.
        18 Legume symmetrically rounded at the apex; inflorescence with 1-2 (-4) flowers ..... ***V. tetrasperma***
        18 Legume asymmetrically acute at the apex; inflorescence with 1-15 flowers.
          19 Legume finely hirsute; leaves with (8-) 10-16 leaflets ..... ***V. hirsuta***
          19 Legume glabrous to inconspicuously puberulent; leaves with 2-4 leaflets ..... ***V. minutiflora***
      17 Plant a rhizomatous perennial.
        20 Leaves with 2-4 (-6) leaflets; [plants of s. SC southward, native, of the Coastal Plain].
          21 Legumes 2.5-3.0 cm long; leaflets 1.5-4.5 cm long, oblong to linear, 8-20× as long as wide ..... ***V. acutifolia***
          21 Legumes 0.8-1.5 cm long; leaflets 1-1.5 cm long, usually elliptic, 2-4 (-10)× as long as wide ..... ***V. floridana***

20 Leaves with 10-25 leaflets; [plants collectively widespread in our area, native or alien].
22 Flowers white to lavender, the keel spotted; legumes 4-5 mm wide; inflorescence not second ..... ***V. caroliniana***
22 Flowers blue-violet or purple; legumes 6-8 mm wide; inflorescence generally secund ..... ***V. cracca***

Vicia acutifolia Elliott, Fourleaf Vetch. Cp (FL, GA, SC): pond margins, pine flatwoods, ditches; rare. April-May; May-June. Se. SC south to s. FL, west to e. Panhandle FL. [= RAB, GW, I, K, S, SE, WH]

Vicia americana Willdenow *var.* ***americana***, American Vetch, Purple Vetch, Tare. Mt (VA): {habitat}; rare. May-June. Var. *americana* ranges from Québec west to AK, south to w. VA, MO, OK, TX, Mexico. Var. *minor* Hooker occurs in w. North America. [= C, F, G, I, SE; = *V. americana* ssp. *americana* – K; < *V. americana* – W]

Vicia caroliniana Walter, Pale Vetch, Wood Vetch, Carolina Vetch. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): forests, woodlands, and disturbed areas; common (rare in FL). April-June; May-July. NY west to WI, south to s. GA, s. MS, and c. TX. [= C, F, G, I, K, SE, W, WH; > *V. caroliniana* – RAB, S; > *V. hugeri* Small – RAB, S]

* ***Vicia cracca*** Linnaeus, Tufted Vetch, Cow Vetch, Canada-pea. Cp, Pd (VA), Mt (NC): disturbed areas; rare, native of Europe. May-July; June-August. [= RAB, C, G, S, SE; > *V. cracca* var. *cracca* – F, I; > *V. cracca* ssp. *cracca* – K]

Vicia floridana S. Watson, Florida Vetch. Cp (FL, GA): moist soils of hammocks, ditches, roadbanks; rare. E. GA (McIntosh Co.) south to c. peninsular FL. [= GW, I, K, S, SE, WH]

* ***Vicia grandiflora*** Scopoli, Large Yellow Vetch. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): disturbed areas; uncommon (rare in FL), native of Europe. April-June; May-July. [= C, I, F, G, K, SE, W, WH; > *V. grandiflora* var. *kitaibeliana* W.D.J. Koch – RAB]

* ***Vicia hirsuta*** (Linnaeus) S.F. Gray, Tiny Vetch, Hairy Tare. Cp (FL, GA, NC, VA), Pd (GA, NC, SC, VA), Mt (SC, VA): disturbed areas, uncommon, native of Europe. April-June; May-July. [= RAB, C, F, G, I, K, S, SE, WH]

* ***Vicia lathyroides*** Linnaeus, Spring Vetch. Cp (NC, SC, VA), Pd (GA, NC): lawns, disturbed areas; rare, native of Europe. April-June; May-July. [= RAB, C, I, F, G, K, SE]

* ***Vicia lutea*** Linnaeus, Yellow Vetch. Pd (NC): disturbed areas; rare, native of Europe. [= I, K, SE]

Vicia minutiflora F.G. Dietrich, Smallflower Vetch. Cp (FL, GA): woodlands, dry hammocks; rare. TN, Panhandle FL, and sw. GA west to OK and TX. [= GW, I, K, SE, WH, Y; = *V. micrantha* Nuttall ex Torrey & A. Gray – F, G, S]

* ***Vicia pannonica*** Crantz, Hungarian Vetch. Pd (GA): disturbed areas; rare, introduced. Introduced in c. GA. Reported for NC (Isely 1998). {investigate} [= I, K, SE]

* ***Vicia sativa*** Linnaeus *ssp.* ***nigra*** (Linnaeus) Ehrhart, Narrowleaf Vetch. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): disturbed areas; common (uncommon in FL), native of Mediterranean Europe. March-June; May-July. [= I, K, SE; = *V. angustifolia* Linnaeus – RAB, C, S, W; *V. sativa* var. *angustifolia* (Linnaeus) Ehrhart; > *V. angustifolia* var. *angustifolia* – F, G; > *V. angustifolia* var. *segetalis* (Thuill.) Ser. – F, G; > *V. angustifolia* var. *uncinata* (Desv.) Rouy – F]

* ***Vicia sativa*** Linnaeus *ssp.* ***sativa***, Common Vetch. Pd (GA, NC, VA), Mt (NC), Cp (VA): disturbed areas; rare, native of Mediterranean Europe. April-June; May-July. [= I, K, SE; = *V. sativa* – RAB, C, G, S; > *V. sativa* var. *sativa* – F; > *V. sativa* var. *linearis* Lange – F]

* ***Vicia tetrasperma*** (Linnaeus) Schreber, Slender Vetch, Smooth Tare, Lentil Vetch. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): disturbed areas; uncommon, native of Europe. April-June; May-July. [= RAB, C, G, I, K, S, SE, WH; > *V. tetrasperma* var. *tetrasperma* – F; > *V. tetrasperma* var. *tenuissima* Druce – F]

* ***Vicia villosa*** Roth *ssp.* ***varia*** (Host) Corbière, Winter Vetch. Mt, Pd, Cp (GA, NC, SC, VA) {FL}: disturbed areas; common, native of Europe. May-September. [= I, K, SE; = *V. dasycarpa* Tenore – RAB, C, F, G, W; < *V. villosa* – WH]

* ***Vicia villosa*** Roth *ssp.* ***villosa***, Hairy Vetch, Fodder Vetch. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA) {FL}: disturbed areas; common, native of Europe. May-September. [= I, K, SE; = *V. villosa* – RAB, C, F, G, W; < *V. villosa* – WH]

* *Vicia articulata* Hornemann, Monantha Vetch. Probably only cultivated. [=I, K, SE]

* *Vicia faba* Linnaeus, Horse Bean, Faba Bean, Broad Bean. Introduced in se. PA (Rhoads & Klein 1993). Also reported for VA (Kartesz 1999). {investigate} [= C, F, G, I, K, SE]

Vicia ludoviciana Nuttall ssp. *leavenworthii* (Torrey & A. Gray) Lassetter & Gunn. MS and MO west to NM and TX. In our area is Race 2 ("*louisianica*" race) of ssp. *leavenworthii* (Isely 1998). [= I, K, SE] {not yet keyed; add to synonymy}

Vicia ludoviciana Nuttall *ssp.* ***ludoviciana***, Louisiana Vetch. Cp (FL*): disturbed areas; rare. AL and Panhandle FL west to OR and CA. In our area is Race 1 ("*ludoviciana*" race) of ssp. *ludoviciana* (Isely 1998). [= I, K, SE; = *V. ludoviciana* -- WH] {not yet keyed; add to synonymy}

* *Vicia narbonensis* Linnaeus, Narbonne Vetch. Introduced in MD and DC (Fernald 1950). [= C, F, G, I, K, SE]

* *Vicia sepium* Linnaeus, Bush Vetch, Wild Tare. Introduced south to WV and in e. PA (Rhoads & Klein 1993). [= C, G, I, SE; > *L. sepium* var. *sepium* – F, K]

Vigna Savi 1824 (Cow Pea)

A genus of about 100-150 species, annual and perennial herbs, pantropical, rarely extending into warm temperate regions. References: Isely (1998)=I; Maréchal, Mascherpa, & Stainier (1978)=Z.

1 Corolla yellow, 1.5-1.7 cm long; leaves somewhat fleshy-thickened; [plant native or introduced in maritime situations]; [section *Vigna*] ..... ***V. luteola***
1 Corolla pink to purple, 1.5-2.5 cm long; leaves herbaceous; [plant a cultivated introduction]; [section *Catiang*] ..... ***V. unguiculata***

Vigna luteola (Jacquin) Bentham, Wild Cow Pea. Cp (FL, GA, NC, SC): edges of freshwater tidal marshes, beaches, hammocks, disturbed areas, railroad embankments, low fields, in the outer Coastal Plain; uncommon (rare in GA, NC, and SC).

July-September; August-October. Se. NC south to s. FL, west to se. TX, and in the New World tropics. Often weedy in appearance, and its nativity at a particular location difficult to judge. [= RAB, GW, I, K, Z; *? V. repens* (Linnaeus) Kuntze – S; = *V. marina* (Burmann) Merrill (the correct name according to some authors, based on uncertain typification)]

* ***Vigna unguiculata*** (Linnaeus) Walpers, Black-eyed Pea, Field Pea, Cow Pea. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): commonly cultivated in commercial and home gardens, rarely persistent or occurring as a waif, native of tropical Africa or Asia; common in cultivation, rarely persistent or as a waif. June-August; July-September. [= RAB, I, K; *? V. sinensis* (Linnaeus) Savi – F, S; > *V. unguiculata* var. *unguiculata* – Z]

Wisteria Nuttall 1818 (Wisteria)

A genus of about 6 species, woody vines, shrubs, and small trees, of temperate e. Asia and e. North America. Some research suggests that the Asian species should be placed in a separate genus (see Isely 1998). References: Isely (1998)=I; Valder (1995)=Z; Stritch (1984)=Y.

Identification notes: Twining direction can be determined by looking at (or imagining) the vine twining around a branch or pole. Look at the pole or branch from the base (from the direction from which the vine is growing). If the vine is circling the branch or pole in a clockwise direction, that is dextrorse; if counterclockwise, that is sinistrorse.

1 Legume and ovary glabrous; pedicels 5-10 (-15) mm long; standard reflexed near the middle; seeds reniform; [native species of swamps and bottomland forests and thickets] ..... ***W. frutescens***
1 Legume and ovary velvety pubescent; pedicels 15-20 mm long; standard reflexed at the base; seeds lenticular; [introduced species, naturalized in a wide variety of situations].
  2 Standard 20-23.5 mm long, 21-23 mm wide; leaflets (7-) 9-11 (-13) per leaf; raceme to 33 cm long, with 25-95 flowers opening nearly simultaneously; vine twining clockwise (dextrorse; from lower left ascending to upper right) ..... ***W. sinensis***
  2 Standard 16-18 mm long, 16-18 mm wide; leaflets 7-17 (-19) per leaf; raceme to 132 cm long, with 25-170 flowers opening nearly simultaneously or sequentially; vine twining counter-clockwise (sinistrorse; from lower right ascending to upper left).
    3 Auricles of the standard's callosity 1.1-1.2 mm long; leaflets (11-) 13-17 (-19) per leaf; raceme to 132 cm long, with the 50-170 flowers opening successively from base to the tip of the inflorescence, those at the base withering before those at the tip have opened ..... ***W. floribunda***
    3 Auricles of the standard's callosity 0.7-0.8 mm long; leaflets 7-17 per leaf; racemes to 36 cm long ..... ***W. ×formosa***

* ***Wisteria floribunda*** (Willdenow) A.P. de Candolle, Japanese Wisteria. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): cultivated, escaped to urban, suburban, and rural forests and woodlands, native of Japan; commonly cultivated, uncommonly escaped (rare in FL). April-July; July-November. [= RAB, C, F, G, I, K, SE, WH, Z; = *Kraunhia floribunda* (Willdenow) Taubert – S; = *Rehsonia floribunda* (Willdenow) Stritch – Y]

* ***Wisteria ×formosa*** Rehder, Hybrid Asian Wisteria. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): cultivated, escaped to urban, suburban, and rural forests and woodlands, native of Japan; commonly cultivated, uncommonly escaped (rare in FL). April-July; July-November. [= WH; = *Rehsonia ×formosa* (Rehder) Stritch – Y]

Wisteria frutescens (Linnaeus) Poiret, American Wisteria, Swamp Wisteria, Atlantic Wisteria. Cp (GA, NC, SC, VA), Pd (GA, NC), Mt (GA, VA): swamp forests, wet thickets; common. April-May; June-September. E. VA south to n. peninsular FL, west to TX, north in the interior to AR, s. IN, and s. MO. The issue of the distinctiveness of *W. frutescens* and *W. macrostachya* needs further study. Harvill et al. (1992) reports *W. macrostachya* from Northumberland and Shenandoah counties, VA. [= RAB, GW, I, K, SE, W, WH; > *W. frutescens* – C, F, G, Z; > *W. macrostachya* (Torrey & A. Gray) Nuttall ex B.L. Robinson & Fernald – C, F, G, Z; > *Kraunhia frutescens* (Linnaeus) Greene – S; > *Kraunhia macrostachya* (Torrey & A. Gray) Small – S]

* ***Wisteria sinensis*** (Sims) A.P. de Candolle, Chinese Wisteria. Cp (FL, GA, NC, VA), Pd (GA, NC, VA), Mt (GA): cultivated, escaped to urban, suburban, and rural forests and woodlands, native of China; commonly cultivated, commonly escaped. April-July; July-November. [= RAB, C, F, I, K, SE, WH; = *Rehsonia sinensis* (Sims) Stritch – Y]

Zornia J. F. Gmelin 1792 (Zornia)

A genus of about 50-90 species, perennial herbs, of tropical and warm temperate regions. References: Isely (1998)=I.

Identification notes: The palmately 4-foliolate leaves are unique in the flora of our area.

Zornia bracteata Walter ex J.F. Gmelin, Zornia. Cp (FL, GA, NC, SC, VA): flatwoods, sandhills, sandy roadsides; common. June-August; July-October. Se. VA south to s. FL, west to TX and e. Mexico, endemic to the Southeastern Coastal Plain. [= RAB, C, F, G, K, S, SE, WH]

FAGACEAE Dumortier 1829 (Beech Family)

A family of about 8 genera and 620-1050 species, trees and shrubs, mostly of the Northern Hemisphere, but extending into se. Asia and Australia. References: Nixon in FNA (1997); Govaerts & Frodin (1998); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Elias (1971a).

1 Fruits partially enclosed in a scaly cup; leaves lobed, toothed, crenate, or entire ..... ***Quercus***

1 Fruits enclosed in a spiny or prickly bur; leaves toothed.
  2 Nuts rounded or flattened on one or two sides; bur with long, straight spines; winter buds < 1 cm long; leaves elliptic or oblanceolate, some of them usually > 12 cm long..... ***Castanea***
  2 Nuts sharply triangular; bur with short, recurved prickles; winter buds 1.5-2.5 cm long; leaves ovate, 6-12 cm long..... ***Fagus***

Castanea P. Miller 1754 (Chestnut, Chinquapin)

A genus of 8-10 species, trees and shrubs, of temperate regions of the Northern Hemisphere. References: Johnson (1988)=Z; Nixon in FNA (1997); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Stanford (1998). Key adapted from Z.

1 Leaves elliptic to oblanceolate, mostly < 15 cm long, the apices acute to obtuse; twigs puberulent; spine-covered husk of fruit splitting into 2 sections, enclosing 1 nut; nut circular in cross-section, 7-19 mm in diameter; pistillate dichasia of 1 flower; leaves with stellate trichomes, with few bulbous-based trichomes when young, puberulent, pilose, tomentulose, or tomentose in age (usually rather densely so).
  2 Longest spines of the fruit husk usually >10 mm long; young twigs glabrous; petiole 8-10 (-15) mm long; [plants of n. AL and westward].. ..... ***[C. ozarkensis]***
  2 Longest spines of the fruit husk usually <10 mm long; young twigs puberulent; petiole 3-7 (-10) mm long; [plants widespread in our area]. ..... ***C. pumila***
1 Leaves elliptic, oblanceolate or lanceolate, 8-30 cm long, the apices acuminate, sometimes only shortly so; spine-covered husk of fruit splitting into 4 sections, enclosing (2-) 3 (-5) nuts; nut flattened on at least one side, 18-25 mm in diameter; pistillate dichasia of 3 flowers; leaves usually without stellate trichomes; twigs puberulent or glabrous.
  3 Undersurface of leaves densely covered with bulbous-based trichomes when young, essentially glabrous in age; leaves mostly > 15 cm long, generally long-acuminate; twigs glabrous..... ***C. dentata***
  3 Undersurface of leaves persistently and densely tomentose beneath; leaves mostly < 15 cm long, generally short-acuminate; twigs puberulent..... ***C. mollissima***

Castanea dentata (Marshall) Borkhausen, American Chestnut. Mt (GA, NC, SC, VA), Pd (GA, NC, VA), Cp (FL, GA, VA): mesic and xeric forests; common (uncommon in Piedmont, rare in Coastal Plain). June-July; September-October. Formerly one of the most important, largest, and most abundant forest trees in the Mountains of our area, *C. dentata* was severely affected by chestnut blight, *Cryphonectria parasitica* (Murrill) Barr, introduced at New York City in 1904 on nursery stock of *C. mollissima*. Blight spread steadily southward, reaching our area in the 1920's and 1930's. *C. dentata* remains rather abundant, but now occurs only as stump sprouts and small trees, usually reinfected by blight persisting on oaks and killed at about the size of first fruit production. The accidental introduction of chestnut blight and the subsequent profound alteration of the role of chestnut is one of the most tragic ecological disasters to have affected our area. [= RAB, C, F, FNA, G, K, S, W, WH, Z]

* ***Castanea mollissima*** Blume, Chinese Chestnut. Pd, Mt (NC), Cp (FL): forests; rare, native of China. June; September. This species is relatively resistant to chestnut blight and has been planted widely as an ornamental and nut tree; it sometimes naturalizes and appears nearly native. Reported for NC (Macon County) by Pittillo & Brown (1988). [= C, FNA, K, WH]

Castanea pumila (Linnaeus) P. Miller, Common Chinquapin. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): xeric forests and woodlands, generally in fire-maintained habitats; common (uncommon north of FL). May-July; September-October. NJ, s. PA, s. OH, n. KY, and s. MO, south to c. peninsular FL and se. TX. It is relatively resistant to chestnut blight. [= FNA, WH; = *C. pumila* var. *pumila* – C, K, Z (in a broad sense, in relation to var. *ozarkensis*); > *C. pumila* var. *pumila* – RAB, F (in a narrow sense); > *C. pumila* var. *ashei* Sudworth – RAB, F; > *C. alnifolia* Nuttall var. *alnifolia* – RAB; > *C. alnifolia* var. *floridana* Sargent – RAB; > *C. pumila* – G, S, W; > *C. ashei* (Sudworth) Sudworth – S; > *C. floridana* (Sargent) Ashe – S; > *C. alnifolia* – S]

Castanea ×*neglecta* Dode (pro sp.) [*C. dentata* × *pumila*], occurs in our area; "the leaves of the hybrid resemble those of *C. dentata* in size and shape but have the vestiture and stellate trichomes of *C. pumila*" (Johnson 1988). [= K, Z] {not keyed}

Castanea ozarkensis W.W. Ashe, Ozark Chinquapin, is mainly distributed in the Ozarks and Ouachitas of AR, MO, and OK, but also occurs (at least formerly) as a disjunct in nc. AL. It is affected by the chestnut blight. Related to *C. pumila*, though showing some relation as well to *C. dentata*, is *C. ozarkensis* Ashe [sometimes treated as *C. pumila* var. *ozarkensis* (Ashe) Tucker]. *C. ozarkensis* is more susceptible to blight, and occurs in s. MO, e. OK, and w. AR, and disjunct in c. AL, where now apparently extirpated by blight. [= FNA, S; = *C. pumila* P. Miller var. *ozarkensis* (W.W. Ashe) G.E. Tucker – K, Z]

* *Castanea sativa* P. Miller, Spanish Chestnut. Reported as naturalized in KY, AL, PA, and elsewhere in e. North America (Clark et al. 2005). [= K] {not yet keyed; synonymy incomplete}

Fagus Linnaeus 1753 (Beech)

A genus of about 10 species, trees, of temperate regions of the Northern Hemisphere. Our native trees belong to subgenus *Fagus*, section *Grandifolia* (Shen 1992). References: Cooper & Mercer (1977)=Z; Nixon in FNA (1997); Shen (1992)=X; Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Elias (1971a)=Y; Stanford (1998); Govaerts & Frodin (1998)=V.

1 Leaves denticulate; cupule prickles 1-2.5 (-4) mm long, slightly to strongly recurved; cupule valves generally ovate, the apex obtuse, reddish in color; leaves with fairly dense white acicular trichomes on the lower leaf surface at maturity; leaf base sometimes clearly cordate; [plants of the Coastal Plain, Piedmont, and low to moderate elevations (mostly below 1050 m or 3500 feet) in the Mountains] ..... ***F. grandifolia var. caroliniana***
1 Leaves sharply serrate; cupule prickles (3-) 4-10 mm long, projecting forward; cupule valves generally narrowly triangular, the apex acute, grayish-yellow in color; leaves usually lacking white acicular trichomes on the lower surface at maturity, instead with yellowish glandular

hairs (acicular trichomes often present on the veins); leaf base not clearly cordate; [plants of moderate to high elevations (mostly above 1050 m or 3500 feet) in the Mountains]..... ***F. grandifolia var. grandifolia***

Fagus grandifolia Ehrhart *var.* ***caroliniana*** (Loudon) Fernald & Rehder, White Beech, American Beech. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): moist forests, from near sea level to low elevations in the Mountains, mostly below 1050 meters (3500 feet); common (uncommon in Coastal Plain south of VA). March-April; September-October. Se. MA, OH, IN, s. IL, s. MI (?), and MO south to Panhandle FL and e. TX. Several subspecies, varieties, or phases of *Fagus grandifolia* have been described, and their taxonomic recognition is controversial. The most recent monographer, Shen (1992), recognizes three subspecies, one of which is limited to Mexico, the other two as treated here but at the subspecific level. I have here chosen to recognize 2 intergradient varieties in our area. A third variety, var. *mexicana* (Martínez) Little, of the mountains of México, is apparently most closely related to var. *grandifolia*. Cooper & Mercer (1977) studied variation in NC, concluding that two genetic races or varieties were present, the montane var. *grandifolia* and the Piedmont and Coastal Plain var. *caroliniana*, but that patterns of variation were complicated. Hardin & Johnson (1985) and Hardin (1992, 1985) note that variation is "more-or-less" clinal, variation within populations is great, and they do not favor recognition of infraspecific taxa. Depending on one's tolerance or intolerance for intergradational varieties, one may choose to recognize one or two taxa in our area. [= C, F, G, Y; < *F. grandifolia* – RAB, FNA, K, S, W, Z; < *F. grandifolia* ssp. *grandifolia* – V; = *F. grandifolia* ssp. *caroliniana* (Loudon) Camp ex Shen – X, nomen nudum; = *F. ferruginea* Aiton]

Fagus grandifolia Ehrhart *var.* ***grandifolia***, Gray Beech, Red Beech, American Beech. Mt (NC, VA): moderate to high elevation forests, especially on high elevation ridges, gaps, and open slopes, often forming clonal dwarfed thickets in the most exposed situations; common. April; September-October. Nova Scotia, New Brunswick, and s. Québec west to s. Ontario and n. MI, south to VA, w. NC, n. GA, e. TN, and n. OH. "Red beech" is alleged to differ from "gray beech" in having the involucral segments not covering the nutlets at maturity. Hardin & Johnson (1985), Hardin (1985), and Shen (1992) point out that var. *mexicana* (Martínez) Little, of the mountains of México, is more closely related to our montane variety or phase than to the lower elevation variety or phase. [= C, F, G, Y; < *F. grandifolia* – RAB, FNA, K, S, W, Z; < *F. grandifolia* ssp. *grandifolia* – V; = *F. grandifolia* ssp. *grandifolia* – X]

* *Fagus sylvatica* Linnaeus, European Beech, Copper Beech, of subgenus *Fagus*, section *Fagus*, is sometimes cultivated, but is not known to escape in our area. It has only 5-10 (-12) lateral veins, as opposed to (12-) 15-18 (-20) in *F. grandifolia*. {not keyed} [= V; *? F. sylvatica* ssp. *sylvatica* – X]

Quercus Linnaeus 1753 (Oak)

A genus of about 350-530 species, trees and shrubs, of temperate, subtropical, and rarely tropical regions of the Northern Hemisphere. Oaks are the predominant tree of our area, with a variety of species dominating much of the landscape in nearly every ecological situation. Only in a few specialized (and usually in some sense edaphically extreme) communities are oaks generally entirely absent: deepest Coastal Plain swamps, some Coastal Plain depression ponds, wettest pine savannas, pocosins, spruce-fir forests, highest elevation northern hardwood forests, and mountain bogs. Our oaks are divided into two well-marked sections; other sections occur outside our area. Red oaks (section *Lobatae*, sometimes treated as subgenus *Erythrobalanus*) are characterized by acorns maturing in two years (in one year in *Qu. elliottii*), styles elongate, abortive ovules are at the top of the seed, leaves and leaf lobes bristle-tipped, inner surface of the acorn shell velvety-pubescent, and acorns rooting in spring. Twenty-one of our *Quercus* species are in this group: *Qu. arkansana, Qu. coccinea, Qu. elliottii, Qu. falcata, Qu. georgiana, Qu. hemisphaerica, Qu. ilicifolia, Qu. imbricaria, Qu. incana, Qu. laevis, Qu. laurifolia, Qu. marilandica* var. *marilandica, Qu. myrtifolia, Qu. nigra, Qu. pagoda, Qu. palustris, Qu. phellos, Qu. rubra* var. *ambigua, Qu. rubra* var. *rubra, Qu. shumardii var. shumardii,* and *Qu. velutina.*

White oaks (section *Quercus*, sometimes treated as subgenus *Quercus*) are characterized by acorns maturing in a single year, styles short or absent, abortive ovules at the base of the seed, leaves and leaf lobes not bristle-tipped, inner surface of the acorn shell smooth, and acorns rooting in autumn. Twenty of our *Quercus* species are in this group: *Qu. alba, Qu. austrina, Qu. bicolor, Qu. boyntonii, Qu. chapmanii, Qu. geminata, Qu. lyrata, Qu. macrocarpa, Qu. margarettae, Qu. michauxii, Qu. minima, Qu. montana, Qu. muehlenbergii, Qu. oglethorpensis, Qu. prinoides, Qu. robur, Qu. similis, Qu. sinuata* var. *sinuata, Qu. stellata,* and *Qu. virginiana.* Hybrids within each section are frequent and diverse; hybrids do not naturally occur between the two sections. The live oaks of the southeastern Coastal Plain and Central America are subsection *Virentes*; other white oaks are subsection *Quercus*. References: Nixon in FNA (1997) (overall treatment); Jensen in FNA (1997) (red oaks); Nixon & Muller in FNA (1997) (white oaks); Godfrey (1988); Stein, Binion, & Acciavatti (2003); Cronquist (1991); Duncan & Duncan (1988); Hunt (1990)=Z; Hunt (1994); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: Many oak species are well-adapted to ecological situations in which fires frequently burn the ground layer. Fire-maintained communities of the Piedmont and Mountains typically have oaks such as *Qu. stellata, Qu. marilandica* var. *marilandica, Qu. ilicifolia,* and *Qu. prinoides*. The two latter species are normally shrubby, and have become rarer because of fire suppression (they require fire to prevent larger trees from outcompeting them). In contrast, *Qu. stellata* and *Qu. marilandica* var. *marilandica* become larger and more frequent in fire-suppressed conditions.

Fifteen oak species in our area are typical of upland Coastal Plain communities with at least occasional fire: *Qu. arkansana, Qu. chapmanii, Qu. geminata, Qu. hemisphaerica, Qu. incana, Qu. laevis, Qu, margerettiae, Qu. marilandica* var. *marilandica, Qu. minima, Qu. myrtifolia, Qu. stellata*, and less typically *Qu. falcata, Qu. nigra, Qu. velutina,* and *Qu. virginiana*. Fire suppression of Coastal Plain communities, especially of sandhills, leads to an unnatural increase in the stature and abundance of oaks present. In frequent fire conditions, most oaks will persist as short,

shrubby fire sprouts. Additional suggestions of how to recognize fire sprouts of hese species are given below. In general, leaves of fire sprouts are larger and more deeply lobed than normal leaves. In species of the red oak group, the bristle tips are larger and more pronounced. Increased size in leaves is particularly noticeable when an area previously long fire-suppressed is burned (the large underground root system and nutritional resources of a small tree destroyed by fire being devoted to a few very vigorous sprouts). Fire sprouts are often in sunny conditions, which tend to make oak leaves more deeply lobed and more coriaceous than shaded leaves.

White oaks with lobed leaves:
Qu. margarettae – Often forms dense clonal, stoloniferous patches in frequent fire conditions. Tends to retain standard leaf characteristics.
Qu. stellata – Less prone to formal clonal patches. Sprout leaves often very large, with exaggerated lobing.

Red oaks normally with deeply lobed leaves:
Qu. laevis – Not clonal. Vigorous sprouter, leaves more deeply lobed than any other fire red oak. Small sprouts often have vertical leaf orientation characteristic of adults, though vigorous fire sprouts sometimes have more normally disposed leaves. Sprout leaves sometimes very large, with very long, curving lobes.
Qu. falcata – Not clonal. Sprout leaves generally less lobed than typical adult leaves, more like forma *triloba*, but larger and coarser in texture, difficult to distinguish in shape from *Qu. marilandica* var. *marilandica* and *Qu. velutina*. See pubescence differences in main key.
Qu. velutina – Not clonal. Leaves variable, sometimes minimally lobed and closely resembling *Qu. marilandica* var. *marilandica* and *Qu. falcata*. See pubescence differences in main key.

Red oaks normally with unlobed leaves:
Qu. marilandica var. *marilandica* – Sprout leaves sometimes coarsely (though never deeply) lobed. Texture often very coriaceous, shiny, and very stiff. See pubescence characters in main key.
Qu. nigra – Not very typically in fire-prone situations, but sometimes so. Young saplings, as well as fire sprouts, often with wildly different leaves than the typical adult form, frequently deeply lobed (for excellent illustrations showing variability in leaf shapes, see p. 329 of Godfrey, 1988 and pp. 51-52 of Godfrey & Wooten, 1981). Leaves always smaller and more glabrous than those of other fire oaks (except *Qu. hemisphaerica*).
Qu. incana – Generally not strongly clonal and stoloniferous even in frequently burned situations. Fire sprouts and vigorous shoots more prone to lobing than adult trees. Even fire shoots, though, usually with only one to several lobes, and the characteristic bluish-green characteristic holds. See comments above on *Qu. elliottii*.
Qu. elliottii – Strongly clonal via a stoloniferous "runner", never tree-like. Leaves never lobed, even on fire sprouts, though fire sprout leaves can be larger (to 15 cm long and 5 cm wide). Very difficult to tell from fire sprouts or seedlings of *Qu. incana*, best separated by leaf pubescence (white in *Qu. elliottii*, gray in *Qu. incana*), margin (slightly revolute in *Qu. elliottii*, flat in *Qu. incana*), leaf vernation (planate in *Qu. incana*, rolled in *Qu. elliottii*), and acorn maturation (1 year in *Qu. elliottii*, with acorns often on small plants, 2 years in *Qu. incana*, with small plants rarely produing acorns).
Qu. hemisphaerica – Not clonal. Leaves of vigorous shoots and fire sprouts often shallowly lobed, the lobing usually fairly neat and regular, triangular-ascending, and with bristle tips.

Live oaks:
Qu. geminata – Sometimes clonal. Leaves, even of sprouts, not normally with lobes or teeth.
Qu. virginiana – Sometimes clonal. Leaves of vigorous summer shoots (but apparently not spring shoots) often coarsely toothed, very similar to similar leaves of *Qu. hemisphaerica*, but lacking bristle tips (instead the translucent margin with a darker, thickened callus at the tip of the tooth).
Qu. minima – Always clonal. Leaves often with teeth or lobes.

Some oaks with ambiguous leaves are keyed in both Key A and Key D or in both Key B and Key C. The leaves of juvenile (seedling or sapling) branches, fire-sprout shoots, or other vigorous shoots (resulting from similar stimuli such as insect damage) are often much different than typical leaves and are not accounted for in these keys (see discussion at end of generic treatment). Hybrids are frequently encountered; they, too, are not keyed here, but can usually be identified (with difficulty) by their intermediate morphology and by parental context. Trichome types are useful in making and confirming identifications of oaks, since certain types are restricted to various groups of species. Hand lenses of 10× or 20× can be useful, but a compound microscope is far preferable. See Hardin (1992, 1976, 1979), and Thomson & Mohlenbrock (1979).

1 Most of the leaves on a relatively mature tree entire and unlobed (some species frequently with some leaves on a tree, especially those on young or vigorous growth, that are toothed or shallowly lobed, the teeth or lobes generally few and irregular in size or location); [primarily either "laurel oaks" of section *Lobatae* or "live oaks"'of section *Quercus*] ..... **Key A**
1 Most of the leaves on a relatively mature tree lobed or toothed.
  2 Venation of the leaves neatly and evenly pinnate, the 3-17 (or more) main lateral veins on each side distinctly parallel to each other, each ending in a tooth or shallow, crenate lobe extending < ¼ of the way to the midrib; ["chestnut oaks" of sections *Quercus* and *Cerris*] ..... **Key B**
  2 Venation of the leaves pinnate, but more branched and irregular, the 1-7 main lateral veins on each side rebranching into prominent side veins, the leaf usually distinctly lobed, at least some of the lobes of some of the leaves of a tree extending > ¼ of the way to the midrib.
    3 Apices of the lobes or teeth obtuse (rarely acute), lacking bristle tips; ["white oaks" of section *Quercus*] ..... **Key C**
    3 Apices of the lobes or teeth acuminate (rarely acute), and with bristle tips; ["red oaks" of section *Lobatae*] ..... **Key D**

Key A – Leaves (most of them) entire and unlobed (Laurel Oaks and Live Oaks)

1 Leaves broadly obovate or spatulate, 1-2.5 (-3)× as long as wide.
  2 Leaves 10-30 cm long, with rounded, subcordate, truncate, or oblique bases; lower leaf surfaces thinly to densely pubescent with tawny to orange glandlike hairs; [section *Lobatae*] ..... ***Qu. marilandica* var. *marilandica***
  2 Leaves 2-10 (-15) cm long, mostly with cuneate or rounded bases (in some species sometimes subcordate, truncate, or oblique); lower leaf surfaces glabrous, glabrescent, or pubescent, but the pubescence not orange and glandlike.
    3 Twigs of the current year densely and finely hairy, obscuring the surface; [scrubby trees of sandhills from se. SC southward]; [section *Quercus*] ..... ***Qu. chapmanii***
    3 Twigs of the year glabrous or sparsely pubescent; [shrubs, scrubby small trees, or large trees of various habitats].

4 Leaves grayish beneath; [section *Quercus*] ..... ***Qu. sinuata* var. *sinuata***
4 Leaves bright green beneath; [section *Lobatae*].
5 Leaves evergreen, (including the petiole) usually < 4 cm long (sometimes to 9 cm long) and < 2 cm wide (to 6 cm wide); lower leaf surface usually entirely glabrous at maturity (rarely with pubescence in the vein axils); leaf blades rarely lobed; [shrub to scrubby tree of sandhills in se. SC and southward] ..... ***Qu. myrtifolia***
5 Leaves deciduous, (including the petiole) usually > 5.5 cm long (rarely smaller) and usually 3-5 cm wide; lower leaf surface usually with tufts of hairs in the main vein axils beneath; leaf blades often lobed.
6 Leaves with broadly cuneate to rounded leaf bases, the blades 5-15 cm long; lower leaf surfaces generally pubescent across the surface, and also with tufts in the axils; [of sw. GA westward] ..... ***Qu. arkansana***
6 Leaves with cuneate bases, the blades 5-10 (-15) cm long; lower leaf surfaces glabrous, except for tufts of hairs in the vein axils; [widespread in our area] ..... ***Qu. nigra***

1 Leaves linear, elliptic, or narrowly obovate, 2-10× as long as wide.
7 Leaves (at maturity) glabrous or at most sparsely pubescent on the surface below, though often with tufts of hairs in the main vein axils.
8 Twigs of the year densely and finely hairy, obscuring the surface; leaves (at maturity) sparsely pubescent beneath; [scrubby trees of sandhills from se. SC south]; [section *Quercus*] ..... ***Qu. chapmanii***
8 Twigs of the year glabrous or sparsely pubescent; leaves (at maturity) bright green and glabrous beneath, though often with tufts of hairs in the main vein axils; [medium to large trees, more widespread, mostly of moist habitats, except *Qu. hemisphaerica*]; [section *Lobatae*].
9 Leaves predominantly lanceolate, mostly 6-12 cm long and 0.7-2 cm wide, most of them 5-8× as long as wide, the apex acute; mature leaves with tufts of hairs in the vein axils below, and sometimes also some pubescence on the blade surface near the midrib; blades never with lobes or teeth; leaves deciduous in autumn; young leaves bronze red, emerging tightly rolled lengthwise and appearing linear; [trees of bottomlands and upland depression swamps, mesic uplands, and also weedy and frequent in disturbed successional habitats] ..... ***Qu. phellos***
9 Leaves predominantly oblanceolate, obovate, or rhombic, mostly 2.5-10 cm long and 1.5-4 cm wide, most of them 2-5× as long as wide, the apex acute, obtuse, or rounded; mature leaves with or without tufts of hairs in the vein axils below, lacking pubescence on the blade surface; blades sometimes with 1-5 lateral lobes or teeth; leaves persisting until spring, or tardily and irregularly deciduous in winter; young leaves red, yellow, or green, not emerging tightly rolled lengthwise; [trees primarily either of swamp forests, maritime forests, or sandhills, not typically weedy].
10 Mature leaves entirely glabrous below; leaves mostly with acute apices and bristle tips (rarely a few rounded), mostly 2.5-8 cm long and 1-2 (-3) cm wide, the upper surface shiny, the vein network not readily visible when backlit; leaves evergreen (persisting until spring); petiole 0.5-2 mm long; leaves of vigorous growth often with dentate lobes; [trees of dry sandy habitats, such as sandhills and maritime forests] ..... ***Qu. hemisphaerica***
10 Mature leaves with tufts of stellate trichomes in the vein axils; leaves mostly with rounded apices (rarely a few acute and then bristle-tipped), mostly 5-10 cm long and (1.8-) 2-4 cm wide, the upper surface dull, the vein network readily visible when backlit; leaves tardily deciduous; petiole 2-6 mm long; leaves of vigorous growth rarely lobed, and then not dentate; [trees of moist habitats, such as floodplain forests] ..... ***Qu. laurifolia***
7 Leaves (at maturity) persistently and densely pubescent on the surface below, the pubescence in some species so dense and tight as to be difficult to perceive without at least 10× magnification.
11 Leaves bristle-tipped (sometimes the bristle fallen or broken off, but leaving a truncate scar), deciduous in autumn; multi-armed trichomes of the rosulate or multiradiate types, many of the arms ascending or erect (never with the stellate or fused-stellate trichomes characteristic of the live oaks); acorns maturing in 2 years (immature acorns present through the winter on fruiting trees); [section *Lobatae*].
12 Leaves (including petiole) mostly 10-17 cm long, 3.5-7 cm wide; lower leaf surface (at maturity) sparsely to moderately densely pubescent with soft hairs; leaves lustrous dark-green above; [trees of the Mountains, Piedmont, and rarely Coastal Plain] ..... ***Qu. imbricaria***
12 Leaves (including petiole) mostly 4-11 cm long, 0.5-3.0 cm wide; lower leaf surface densely covered with soft hairs; leaves lustrous dark-green or bluish-green above; [stoloniferous shrubs and small to medium trees of the Coastal Plain].
13 Leaves 0.5-1.5 cm wide, mostly 4-8× as long as wide, lustrous dark-green above; acorns 8-12 mm long; petioles 1-3 mm long; [plant a stoloniferous shrub, to 1 m tall (or to 2 m in fire-suppressed pinelands)] ..... ***Qu. elliottii***
13 Leaves 1.5-3.0 cm wide, mostly 2-4× as long as wide, dull bluish-green above; acorns 10-15 mm long; petioles 4-15 mm long; [plant a small to medium tree] ..... ***Qu. incana***
11 Leaves not bristle-tipped, evergreen (overwintering, falling with the expansion of new leaves in the spring) or deciduous (in *Qu. oglethorpensis*); multi-armed trichomes of the fused-stellate and stellate types, the arms parallel to the leaf surface, radiating from a well developed disc that appears as a white eye or dot at 20-40× magnification (or rosulate or multiradiate in *Qu. oglethorpensis*); acorns maturing in 1 year (immature acorns not present through the winter, unless aborted); [section *Quercus*].
14 Leaves deciduous in autumn; bark gray, resembling *Qu. alba*; [trees of bottomlands and upland clay flats of GA and SC] ..... ***Qu. oglethorpensis***
14 Leaves evergreen (overwintering, falling with the expansion of new leaves in the spring); bark (on the tree species) brownish, deeply furrowed; [trees and stoloniferous shrubs of sandy habitats of the Coastal Plain of GA, NC, SC, and VA].
15 Plant a stoloniferous shrub, to 1 m tall (or to 2 m in fire-suppressed pinelands) ..... ***Qu. minima***
15 Plant a small to large tree.
16 Leaf blades with the margins strongly revolute, and also the sides of the blades generally rolled downward and obscuring part of the lower surface, the leaf appearing boatlike (the depth of the "boat" often approaching the width of the leaf); midvein and major lateral veins impressed on the upper surface and raised on the lower surface (the lower surface therefore appearing rugose); pubescence of the lower surface stellate, both appressed and erect, the individual stellae readily visible at 20× magnification (sometimes at 10× magnification); acorns (1-) 2 (-6) per stalk; buds dark brown; cup scales gray-tipped; [typically a small tree of sandhills near the coast] ..... ***Qu. geminata***
16 Leaf blades flat, or the margins slightly to strongly revolute, the sides of the blade sometimes rolled downward, usually not obscuring part of the lower surface, the leaf not boatlike (the leaf much wider than deep); midvein and major lateral veins not impressed (or very slightly so) on the upper surface and only very slightly, if at all, raised on the lower surface (the lower surface therefore not appearing notably rugose); pubescence of the lower surface stellate, all of it tightly appressed, the individual stellae readily visible only at 30× magnification (sometimes barely distinguishable at 20× magnification); acorns 1-2 per stalk; buds red-brown; cup scales red-tipped; [typically a salt-pruned shrub to large tree of dunes, estuarine shorelines, and southward of upland flats and slopes] ..... ***Qu. virginiana***

Key B – Leaves with even crenations or teeth (Chestnut Oaks)

1 Scales of the acorn cup prolonged and long tapered; lateral veins terminating in a well-developed bristle; [species planted, rarely escaped]; [section *Cerris*] ..... ***Qu. acutissima***
1 Scales of the acorn cup acute to obtuse; lateral veins terminating in a minute mucro or hardened projection; [species native]; [section *Quercus*].
2 Acorns on peduncles (2-) 4-7 cm long; acorns 1.5-2.5 cm long; veins ending in crenations usually 6-10 on each side of leaf ..... ***Qu. bicolor***
2 Acorns sessile or on peduncles 0-1 cm long; acorns 1-2 cm or 2.5-3.5 cm long; veins ending in crenations usually 8-15 or 3-7 (if 3-7, then a stoloniferous shrub).
3 Leaves mostly obovate, with rounded teeth (crenations), the teeth sometimes with a minute mucro; hairs of the leaf undersurface clustered in sessile, stellate-appearing clusters of 2-8 hairs; acorns 2.5-3.5 cm long; large trees.
4 Hairs of the leaf undersurface in clusters with a diameter of 0.15-0.5 mm, dense to sparse; bark of mature trees light gray, loose, breaking into plates or scales ..... ***Qu. michauxii***
4 Hairs of the leaf undersurface asymmetric, appressed-stellate, with a diameter of 0.1-0.25 mm, sparse; bark of mature trees dark gray, tight, deeply furrowed ..... ***Qu. montana***
3 Leaves mostly narrowly elliptic, narrowly ovate, or narrowly obovate, with sharp ascending, often incurved teeth, the teeth ending in a hardened projection; hairs of the leaf undersurface tiny and stellate, with 6-10 rays parallel to the leaf surface; acorns 1-2 cm long; medium to large trees or stoloniferous shrubs.
5 Medium to large tree; veins ending in teeth usually 7-13 on each side of the leaf; leaves 8-20 cm long and 4-10 cm wide; [of dry to moist calcareous woodlands and forests] ..... ***Qu. muehlenbergii***
5 Stoloniferous shrub to 5 m tall; veins ending in teeth usually 3-8 (-9)on each side of the leaf; leaves 4-10 (-14) cm long and 2-6 (-8) cm wide; [of dry, often sandy and acid woodlands] ..... ***Qu. prinoides***

Key C – Leaves with lobes not bristle-tipped (White Oaks)

1 Lower surfaces of mature leaves glabrous.
2 Leaf lobes with acute apices; sinuses often both broad and "flat-bottomed" (with portions parallel to the midrib); acorn cup covering 2/3 to 3/4 of acorn ..... ***Qu. lyrata***
2 Leaf lobes with obtuse apices; sinuses narrow (often notch-like), narrowly to broadly rounded or triangular (lacking portions parallel to the midrib); acorn cup covering 1/4 to 1/2 of acorn.
3 Leaves mostly 4-10 (-17) cm long, 2-5 (-9) cm wide, with 1-5 shallow lobes or undulations, extending 1/8 to 1/2 of the way to the midrib; acorn cup flat at the base, covering < ¼ of the acorn ..... ***Qu. sinuata var. sinuata***
3 Leaves mostly 7-20 cm long, 3-10 cm wide, with 3-11 lobes, extending 1/4 to 5/6 of the way to the midrib (if the lobing < ½ of the way to the midrib, then the acorn cup rounded at the base and covering 1/4 to 1/2 of the acorn).
4 Leaf base deeply cordate; [alien, sometimes planted and persistent] ..... ***[Qu. robur]***
4 Leaf base cuneate; [native]
5 Leaves with 7-11 lobes (the sinuses usually deep, those of the larger leaves usually about 2/3 to 5/6 of the way to the midrib), 10-20 cm long, 5-10 cm wide; terminal bud rounded or globose; basal scales of acorn cup thickened, the thickening giving the cup a knobby texture ..... ***Qu. alba***
5 Leaves with 3-7 lobes (the sinuses usually shallow, those of the larger leaves usually ranging from 1/4 to 1/2 of the way to the midrib), 7-15 cm long, 3-8 cm wide; basal scales of the acorn cup thin, appressed, the cup having a rough but not knobby texture .. ***Qu. austrina***
1 Lower surfaces of mature leaves pubescent, the pubescence varying from dense to sparse (sometimes minute and requiring 10× magnification to be readily visible).
6 Lower surfaces of mature leaves whitish to pale green, with a mixture of minute, sessile, stellate hairs with horizontal tips and longer stellate hairs with erect ascending tips; leaves shallowly lobed (if so, the lobes 9-19) to deeply lobed (if so, the lobes with acute apices), the sinuses extending 1/4 to 4/5 of the way to the midrib.
7 Leaves mostly shallowly lobed at the base, the sinuses extending 1/4 to 1/2 of the way to midrib, grading into mere crenations toward the tip of the leaf, the total number of lobes/crenations usually 9-19; acorns borne on peduncles 2-10 cm long; acorn cup covering 1/3 to 1/2 of acorn, the upper scales with long-acuminate apices ..... ***Qu. bicolor***
7 Leaves mostly relatively deeply lobed throughout the length of the leaf, the sinuses extending 1/2 to 4/5 of the way to the midrib, the total number of lobes 3-13; acorns sessile or borne on peduncles up to 1 cm long; acorn cup covering 1/3 to 3/4 of acorn, the upper scales with acute, long-acuminate, to long-awned apices.
8 Upper scales of the acorn cups thin and acute; acorn cup covering ½ to 3/4 of the acorn; [swamps in the Coastal Plain and lower Piedmont of GA, NC, SC, and VA] ..... ***Qu. lyrata***
8 Upper scales of the acorn cups long-attenuate into nearly terete awns; acorn cup covering 1/3 to 1/2 of the acorn; [Mountains of VA] ..... ***Qu. macrocarpa var. macrocarpa***
6 Lower surfaces of mature leaves gray, green, pale green, or yellowish, glabrescent or densely pubescent, the hairs few-branched and erect; leaves mostly relatively deeply and obtusely lobed, rarely shallowly lobed (if so, the lobes 3-7), the sinuses extending 1/2 to 4/5 of the way to the midrib, the total number of lobes 3-7; acorns sessile or nearly so.
9 Leaf lobes with acute apices; acorn cup covering 2/3 to 3/4 of acorn ..... ***Qu. lyrata***
9 Leaf lobes with obtuse to rounded apices; acorn cup covering 1/3 to 1/2 of acorn.
10 Woody twigs of the season glabrous or with scattered, deciduous 2-forked hairs; petioles of mature leaves 3-10 (-15) mm long; leaf blades (2.5-) 4-8 (-13.5) cm long, irregularly and often rather shallowly 3-5 (-7) lobed, the overall form of the leaf only rarely cruciform; largest lateral lobes usually at the midpoint of the blade (or even below it), the lobes usually not sublobed, tapering from base to tip; [xeric sandy sites in the Coastal Plain from se. VA southward] ..... ***Qu. margarettae***
10 Woody twigs of the season densely and persistently stellate-pubescent, especially toward the tip of the twig; petioles of mature leaves 15-20 mm long (Qu. stellata) or 3-10 (-15) mm long (*Qu. boyntonii* and *Qu. similis*); leaf blades (5-) 7.5-15 (-20) cm long, usually 5-lobed, the overall form of the leaf typically cruciform (*Qu. stellata*) or not (*Qu. boyntonii* and *Qu. similis*); largest lateral lobes of the leaves usually above the midpoint of the blade, these lobes often sublobed or squarish in shape, usually wider near their

tips than at their bases (*Qu. stellata*) or not sublobed, tapering from base to tip (*Qu. boyntonii* and *Qu. similis*); [collectively widespread in our area].

11 Leaves usually cruciform, the largest lateral lobes often sublobed or squarish in shape, usually wider near their tips than at their bases, and borne at right angles to the midrib; [usually of dry to dry-mesic upland situations, widespread in our area]... ***Qu. stellata***

11 Leaves not cruciform, the largest lateral lobes usually not sublobed, tapering from base to tip, and borne at ascending angles relative to the midrib; [of temporarily flooded calcareous swamps of the Coastal Plain, from SC (NC?) southward in our area (*Qu. similis*) or localized on sandstone in nc. AL (*Qu. boyntonii*)].

12 Rhizomatous shrubs to small trees, generally < 2 m tall; [of sandstone outcrops in nc. AL]..... ***[Qu. boyntonii]***

12 Single-trunked large trees; [usually of temporarily flooded calcareous swamps of the Coastal Plain, from SC (NC?) southward in our area]..... ***Qu. similis***

Key D – Leaves with lobes or teeth bristle-tipped (Red Oaks)

1 Leaves shallowly 3-lobed near the broad apex (some leaves of sprout or juvenile shoots may be more lobed).

2 Leaf blades 5-15 cm long; lower leaf surfaces glabrous, except for tufts of hairs in the vein axils (or pubescent across the surface in *Qu. arkansana*].

3 Leaves with broadly cuneate to rounded leaf bases, the blades 5-15 cm long; lower leaf surfaces generally pubescent across the surface, and also with tufts in the axils; [of sw. GA westward] ..... ***Qu. arkansana***

3 Leaves with cuneate bases, the blades 5-10 (-15) cm long; lower leaf surfaces glabrous, except for tufts of hairs in the vein axils; [widespread in our area]..... ***Qu.nigra***

2 Leaf blades 10-30 cm long; lower leaf surfaces pubescent across the surface (and often also with denser tufts of hairs in the vein axils).

4 Petioles short and stout, 5-15 mm long; lower leaf surfaces thinly to densely pubescent with a mixture of tawny or orange glandlike hairs and stellate hairs whose structure is easily visible at 10× magnification ..... ***Qu. marilandica var. marilandica***

4 Petioles long and slender, (14-) 20-50 mm long; lower leaf surfaces densely puberulent with tawny stellate hairs whose structure is barely visible at 10× magnification..... ***Qu. falcata***

1 Leaves shallowly to deeply 5-12-lobed (some of the leaves of *Qu. georgiana* only 3-lobed), the lobes primarily lateral.

5 Mature leaves pubescent beneath on the surface with stellate hairs.

6 Leaves 5-10 (-12) cm long, 5-lobed; shrub or small tree; [w. NC northward] ..... ***Qu. ilicifolia***

6 Leaves (8-) 10-20 cm long, 5-12-lobed; small to large trees[collectively widespread in our area].

7 Petioles 0.5-1.0 (-1.8) cm long, generally twisted such that the blade is oriented in a vertical plane; leaves all deeply lobed, some of the sinuses extending > 4/5 of the way to the midrib; pubescence of the lower leaf surface greenish yellow, matted, and glandlike, usually sloughing off by late in the year ..... ***Qu. laevis***

7 Petioles 2-5 cm long, not twisted so that the blade is oriented in a vertical plane; leaves shallowly to deeply lobed, some of the leaves on a tree generally shallowly lobed, none of the sinuses extending > 2/3 of the way to the midrib; pubescence of the lower leaf surface tawny or gray, stellate, not glandlike, persistent or sloughing off by late in the year.

8 Acorns 12-20 mm long, in a cup 15-25 mm across and 10-12 mm deep; mature leaves loosely and rather coarsely pubescent (the stellate hairs conspicuous and readily distinguishable at 10× magnification), often becoming nearly or entirely glabrous by late in the year (except for tufts of hairs in the vein axils); terminal bud 4-angled, 7-10 mm long, densely gray-tomentose..... ***Qu. velutina***

8 Acorns 10-15 mm long, in a cup 12-14 mm across and 4-5 mm deep; mature leaves densely and finely pubescent (the stellate hairs minute and scarcely distinguishable at 10× magnification), the pubescence permanent; terminal bud only obscurely angled (if at all), 5-8 mm long, brown-puberulent.

9 Base of blades of sun-leaves typically rounded, thus forming a U-shape (some leaves cuneate, angled, or oblique); terminal lobe of leaves generally long-attenuated, narrow (its sides nearly parallel for much of its length), and curved to one side (falcate) (note that trees with the trilobed leaf form will key out above); leaves with 3-7 well-developed lobes, these often very irregular in size, shape, spacing, and orientation; pubescence of lower leaf surface normally tawny (when fresh)..... ***Qu. falcata***

9 Base of blades of sun-leaves typically cuneate or angled, thus forming a V-shape (some leaves somewhat U-shaped or oblique); terminal lobe of leaves generally short, broadly triangular (its sides normally tapering toward the tip for most of their length), not strongly curved to one side; leaves with 5-9 well-developed lobes, these generally rather uniform in size, shape, spacing, and orientation; pubescence of leaf surface gray ..... ***Qu. pagoda***

5 Mature leaves glabrous beneath on the surface, with tufts of hairs in the main vein axils beneath.

10 Petioles 0.5-1.0 (-1.8) cm long, generally twisted such that the blade is oriented in a vertical plane; inner cup-scales of the acorn cup inflexed, thus the cup appearing to have a broadly rounded rim..... ***Qu. laevis***

10 Petioles 2.5-7 cm long, not twisted so that the blade is oriented in a vertical plane; inner cup-scales of the acorn cup not inflexed, thus the cup appearing to have a sharp rim appressed against the acorn.

11 Terminal buds 4-angled, 7-10 mm long, the bud scales densely gray-tomentose..... ***Qu. velutina***

11 Terminal buds not 4-angled, 3-5 (-7) mm long, the bud scales glabrous or with ciliate margins.

12 Leaves relatively shallowly lobed, the sinuses extending up to 2/3 of the way to the midrib; upper leaf surface dull, not lustrous.

13 Acorn cup covering about 1/4 of acorn; leaf sinuses extending about 1/4 of the way to the midrib; bark of mature trees dark gray to black; [widespread in our area, at low to medium elevations] ..... ***Qu. rubra var. rubra***

13 Acorn cup covering about 1/3 of acorn; leaf sinuses extending about 1/3 of the way to the midrib; bark of mature trees medium gray; [of the Mountains, mostly at 1000 m and above] ..... ***Qu. rubra var. ambigua***

12 Leaves relatively deeply lobed, the sinuses extending 2/3 to 9/10 of the way to the midrib; upper leaf surface lustrous.

14 Larger lateral lobes of most leaves with 1 bristle per lobe (-2 on some lobes) ..... ***Qu. georgiana***

14 Larger lateral lobes of most leaves with 2 or more bristles.

15 Mature leaves mostly 7-12 cm long, 5-11 cm wide (averaging about 9 cm long and 8 cm wide), with 5-7 lobes; acorns (8-) 10-13 (-15) mm long; acorn cup nearly flat at base, covering about 1/4 of the acorn..... ***Qu. palustris***

15 Mature leaves mostly 10-20 cm long, 8-15 cm wide (averaging about 12-15 cm long and 10-12 cm wide), with 5-11 lobes; acorns (12-) 15-25 (-37) mm long; acorn cup nearly flat, turbinate, or rounded, covering 1/4 to 1/2 of the acorn.

16 Acorn cup turbinate, covering about 1/2 of the acorn; acorn (12-) 15-20 mm long, with 1-3 concentric grooves near the tip; upper surface of leaves bright green ..... ***Qu. coccinea***

16 Acorn cup nearly flat at base, covering about 1/4 to 1/3 of the acorn; acorn 15-37 mm long, lacking concentric grooves near the tip; upper surface of leaves dark green..... ***Qu. shumardii var. shumardii***

* ***Quercus acutissima*** Carruthers, Sawtooth Oak. Pd (NC, VA), Mt (TN): commonly cultivated as a suburban street tree and also widely planted in "wildlife food plots"; commonly cultivated, rarely (at this time) persistent and spreading, native of Japan. This species has been a popular recommendation for "wildlife plantings" in the recent past, and entire stands can be encountered in relatively remote areas, planted by federal and state land management agencies; why "wildlife" species in our area need more oak trees is somewhat mystifying! See Whittemore (2004) for additional information. Spreading from plantings in Knoxville, TN (D. Estes, pers. comm. 2007). [= K; *? Qu. acutissima* ssp. *acutissima*]

Quercus alba Linnaeus, White Oak. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): mesic to xeric forests; common. April; September-November (of the same year). ME west to MN, south to Panhandle FL and e. TX. Historically, one of the most valuable timber trees of eastern North America. *Qu. alba* is probably the most abundant native plant in our area, and in eastern North America, based on biomass, leaf area, and ubiquity. Hardin (1975) discusses introgression between *Qu. alba* and many other species of *Quercus* subgenus *Quercus*. [= RAB, C, F, FNA, G, K, W, WH; < *Qu. alba* – S (also see *Qu. austrina*)]

Quercus arkansana Sargent, Arkansas Oak. Cp (FL, GA): dry bluffs; rare. Sw. and wc. GA and Panhandle FL west in a fragmented distribution to sw. AR and e. TX. [= FNA, K, S, WH; > *Q. caput-rivuli* W.W. Ashe]

Quercus austrina Small, Bluff Oak. Cp (FL, GA, NC, SC), Pd (NC): river bluffs, natural levees of brownwater rivers, over mafic rocks in the Piedmont of NC, on shell or calcareous sediments on the Coastal Plain of SC (Charleston and Beaufort counties); rare. April; October (of the same year). Essentially a Southeastern Coastal Plain endemic, ranging from sc. NC south to n. FL and west to MS, nowhere common. [= RAB, FNA, K, WH; < *Qu. alba* – S (apparently)]

Quercus bicolor Willdenow, Swamp White Oak. Mt (VA), Pd (NC, SC, VA), Cp (NC, VA): upland depression swamp forests over mafic rocks such as gabbro or diabase, bottomland swamps with calcareous sediments; uncommon (rare south of VA). April; September (of the same year). Widespread in ne. North America, south to NC, SC (Nelson 1993), TN, n. AL, and MO. [= RAB, C, F, FNA, G, GW, K, S, W]

Quercus chapmanii Sargent, Chapman Oak. Cp (FL, GA, SC): dry pinelands, sandhills, scrub; uncommon (rare in GA and SC). February-March; September-November (of the same year). A Southeastern Coastal Plain endemic: se. SC south to s. FL, west to sw. AL. [= RAB, FNA, K, S, WH]

Quercus coccinea Muenchhausen, Scarlet Oak. Mt, Pd, Cp (GA, NC, SC, VA): xeric upland forests; common (uncommon in Coastal Plain south of VA). April; September-November (of the second year). Centered in the Appalachians, from s. ME south to c. AL, but ranging west to MS, ne. AR, s. IL, and s. MI. [= RAB, C, F, FNA, G, S, W; > *Qu. coccinea* var. *coccinea* – K; > *Qu. coccinea* var. *tuberculata* Sargent – K]

Quercus elliottii Wilbur, Running Oak. Cp (GA, NC, SC): pine flatwoods, especially on loamy soils in the Middle Coastal Plain; common (uncommon in GA and SC, rare in NC)). March-April; September (of the first year). A Southeastern Coastal Plain endemic: se. NC south to s. FL and west to s. MS. Wilbur (2002) discusses the reasons for rejecting the traditional use of *Qu. pumila* for this species; Walter's diagnosis states that *Qu. pumila* has leaves that are glabrous and glaucous below, ruling out application to this species. [= WH; = *Q. pumila* Walter – RAB, FNA, K, S, Z, apparently misapplied]

Quercus falcata Michaux, Spanish Oak, Southern Red Oak. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): upland forests, usually xeric; common (uncommon in Mountains). April; September-November (of the second year). Widespread in se. North America, north to e. OK, s. MO, s. IL, s. IN, s. OH, WV, se. PA, NJ, and reported (apparently without specimen documentation) from Long Island, NY. "*Qu. triloba* Michaux", the form with the leaves only shallowly trilobed at the apex, causes much confusion. Though even medium-sized trees sometimes have leaves only of this form (rather than the typical form, deeply 5-7-lobed, the terminal lobe long-attenuate and falcate), it has no taxonomic merit. [= C, FNA, K, W, WH; = *Qu. falcata* var. *falcata* – RAB, G, GW; > *Qu. falcata* var. *falcata* – F; > *Qu. falcata* var. *triloba* (Michaux) Nuttall – F (the juvenile form); = *Qu. rubra* – S, misapplied; *? Qu. digitata* Sudworth; > *Qu. triloba* Michaux]

Quercus geminata Small, Sand Live Oak. Cp (FL, GA, NC, SC): xeric sandhills (northwards restricted to areas very near the coast); common (uncommon in NC and SC). April; September-November (of the same year). A Southeastern Coastal Plain endemic: se. NC south to s. FL, and west to s. MS. The alleged occurrence of *Qu. geminata* as far north as se. VA is apparently based on ambiguous specimens that probably are only *Qu. virginiana* (the so-called var. *maritima*). The relative ranges, habitats, and abundance of this species and *Qu. virginiana* in NC are poorly understood. Apparently flowering about 2-3 weeks later than *Qu. virginiana* when growing in close proximity and in similar habitats. [= C, FNA, GW, K, S, WH; < *Qu. virginiana* – RAB; *? Qu. virginiana* var. *maritima* (Michaux) Sargent – F, misapplied]

Quercus georgiana M.A. Curtis, Georgia Oak. Pd (GA, SC): dry slopes and bluffs over granite; rare (SC Rare). April; September-October (of the second year). W. SC south and west through GA to c. AL. [= RAB, FNA, K, S]

Quercus hemisphaerica Bartram ex Willdenow, Sand Laurel Oak, Darlington Oak. Cp (FL, GA, NC, SC, VA): sandhills and other dry, sandy soils, an abundant component of maritime forests with *Qu. virginiana*, and widely planted as a street tree in most parts of our region; common (VA Rare). March-April; September-November (of the second year). Essentially a Southeastern Coastal Plain endemic: se. VA south to s. FL and west to s. TX, north uncommonly in the interior to nc. AL, n. MS, and s. AR. Often confused with *Qu. laurifolia* (see the key for distinctions). *Qu. hemisphaerica* is the semi-evergreen laurel oak planted widely as a street tree in southern cities, often intermixed with the strictly deciduous *Qu. phellos*. [= C, F, FNA, Z; < *Qu. laurifolia* – RAB, WH; = *Qu. laurifolia* – S, misapplied; > *Qu. hemisphaerica* var. *hemisphaerica* – K; > *Qu. hemisphaerica* var. *maritima* (Michaux) Muller – K]

Quercus ilicifolia Wangenheim, Bear Oak, Scrub Oak. Mt (VA), Pd (NC, VA): xeric soils in ridges in the Mountains and monadnocks in the upper Piedmont; common (rare in Piedmont and south of VA) (NC Rare). Late April-June; August (of the second year). Primarily Appalachian: s. ME south to w. VA, w. NC, and e. KY. This scrubby oak is limited in NC to dry summits and upper slopes of Piedmont monadnocks; it is rare and probably declining because of fire suppression (Barden 1985), though recent ice storms have opened the tree canopy at several of its NC sites. The occurrence of *Q. ilicifolia* in KY was confirmed at the Devil's Teatable, Floyd County (Clark et al. 1997). [= RAB, C, F, FNA, G, K, S, W]

Quercus imbricaria Michaux, Shingle Oak. Mt, Pd (NC, VA), Cp (VA): rich soils of upper floodplains of rivers and creeks, often at the base of the slope into the upland, also on lower slopes, and in forests over diabase in the Piedmont of VA and n. NC; uncommon (GA Special Concern). May; October (of the second year). Primarily midwestern, ranging from NJ, PA, n. OH, s. MI, n. IL, and c. IA, south to e. VA, nc. and w. NC, sc. TN, n. AL, and n. AR. [= RAB, C, F, FNA, G, K, S, W, Z]

Quercus incana Bartram, Bluejack Oak. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): sandhills, primarily in somewhat loamier textured, submesic soils; common (rare in Piedmont, rare in Rare). April; September-November (of the second year). Primarily a species of the Southeastern Coastal Plain, but rarely extending inland into the Piedmont (especially on coarse sandy alluvium): se. VA south to c. peninsular FL and west to e. TX, sw. AR, and se. OK. This oak is recognizable even at a distance by its bluish color. [= RAB, F, FNA, K, Z; = *Qu. cinerea* Michaux – C, G, S; *? Qu. humilis* Walter]

Quercus laevis Walter, Turkey Oak. Cp (FL, GA, NC, SC, VA): sandhills, primarily in very xeric soils of deep sandy deposits (Carolina bay rims, old beach dunes, early Cenozoic deposits of the Sandhills Province); common (rare in VA). April; September-October (of the second year). Essentially a Southeastern Coastal Plain endemic: se. VA south to s. FL and west to e. LA. The leaves turn an intense orange-red in the autumn (November). [= RAB, C, F, FNA, G, K, S, WH, Z; = *Qu. catesbaei* Michaux]

Quercus laurifolia Michaux, Laurel Oak. Cp (FL, GA, NC, SC, VA): mesic to seasonally flooded soils of floodplains, also (rarely) mesic slopes and swamps in maritime forests; common. March-April; September-November (of the second year). A Southeastern Coastal Plain endemic: se. VA south to s. FL and west to e. TX and s. AR. Sometimes confused with *Qu. hemispherica*, but (in addition to the key characters above) *Qu. laurifolia* has blunter leaf tips, flowers about 2 weeks earlier, and generally occupies much moister habitats. [= C, F, FNA, G, GW, K, Z; < *Qu. laurifolia* – RAB, WH (also see *Qu. hemisphaerica*); = *Qu. obtusa* (Willdenow) Ashe – S]

Quercus lyrata Walter, Overcup Oak. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): common in seasonally rather deeply and frequently flooded soils of floodplains of the Coastal Plain, less commonly in seasonally flooded swamps in Triassic basins in the lower Piedmont, and rarely in upland depression swamps of the Piedmont (developed over clays weathered from mafic rocks) and Coastal Plain; common (rare in Piedmont and Mountains). March-April; September-October (of the same year). Primarily a species of the Southeastern Coastal Plain: DE south to Panhandle FL, west to e. TX and se. OK, north in the inland to w. TN, s. IN, s. IL, and se. MO. Of our oaks, *Qu. lyrata* tolerates the wettest habitats, both in terms of depth and duration of flooding. [= RAB, C, F, FNA, G, GW, K, S, WH]

Quercus macrocarpa Michaux *var.* ***macrocarpa***, Bur Oak, Mossycup Oak. Mt (VA): bottomland forests; rare. New Brunswick and Québec west to s. Manitoba, south to nw. VA, KY, TN, LA, and TX. Variation in this species needs additional study; *Qu. macrocarpa* in our area is the typic variety or subspecies if other taxa are recognized. [= K; < *Qu. macrocarpa* – C, F, FNA, G, GW, S, W]

Quercus margarettae Ashe ex Small, Sand Post Oak. Cp (FL, GA, NC, SC, VA), Pd (GA): sandhills, typically in slightly loamy or clayey soils, not usual in the deepest and most xeric sands; common (rare in VA). April; September-November (of the same year). Primarily a species of the Southeastern Coastal Plain: se. VA south to FL and west to TX and se. OK. As stated by Fernald (1950), this oak was "chivalrously named [by W.W. Ashe] in 1903 for Margaret Henry Wilcox, who two years later became Mrs. Ashe." There has been controversy, however, over the spelling of the specific epithet; apparently it should be corrected to the genetive "*ae*" (K. Gandhi, pers. comm.. 2007). [= *Q. margaretta* – RAB, C, FNA, G, S, WH; = *Qu. margarettiae* Ashe ex Small – K, orthographic variant; = *Qu. stellata* var. *margaretta* (Ashe ex Small) Sargent – F]

Quercus marilandica Muenchhausen *var.* ***marilandica***, Blackjack Oak. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC, VA): uplands forests and woodlands, usually on periodically droughty soils, as over shrink-swell clays, sandstones, deep sands, and sands with clay lenses; common (uncommon in Mountains). April; September-November (of the second year). NY (Long Island), NJ, se. PA, w. VA, s. OH, s. IN, c. IL, s. IA, and se. NE south to s. GA, Panhandle FL, and sc. TX (west to the Prairie border). There are historical accounts of the existence of prairies or barrens in the vicinity of Charlotte in the late eighteenth century, known as the "the blackjack lands." These areas were described as open and prairie-like, until the early nineteenth century, when they became dominated by dense forests of blackjack oak. The previously open condition was almost certainly maintained by fire, perhaps set by the Waxhaw Indians. Blackjack oak has long been considered an indicator of poor soil, as in Guthrie (1820), who states in his discussion of NC, "the Black Jack land is generally poor, though it has sometimes a black appearance, it is wet and loose, and is avoided by farmers, as unproductive." Var. *marilandica* is the widespread taxon; var. *ashei* Sudworth [= *Qu. neoashei* Bush] is worthy of recognition at the varietal level at least, and occurs from s. MO and s. KS south to c. AR, e. TX, and sc. TX, especially on the Edwards Plateau (Hunt 1990). [= FNA, K, Z; < *Qu. marilandica* – RAB, C, F, G, S, W, WH]

Quercus michauxii Nuttall, Basket Oak, Swamp Chestnut Oak. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): bottomland forests, especially in fertile soils of upper terraces where flooded only infrequently and for short periods; common (uncommon in Piedmont). April; September-October (of the same year). NJ south to n. peninsular FL and west to e. TX and se. OK, north in the interior to s. IL and s. IN. See discussion under *Qu. montana* of the application of the name *Qu. prinus* Linnaeus. [= RAB, C, F, FNA, G, GW, K, W, WH; = *Qu. prinus* Linnaeus – S, possibly misapplied]

Quercus minima (Sargent) Small, Dwarf Live Oak. Cp (FL, GA, NC, SC): pine flatwoods, coastal fringe sandhills; uncommon (rare in NC). April; September-November (of the same year). A Southeastern Coastal Plain endemic: se. NC (New Hanover County) south to s. FL, west to s. MS. [= FNA, K, S, WH]

Quercus montana Willdenow, Rock Chestnut Oak. Mt, Pd (GA, NC, SC, VA), Cp (GA, NC, VA): xeric forests of ridges, slopes; common. April; September-November (of the same year). Primarily Appalachian but broadly distributed in e. North America: s. ME, NY, MI, s. UN, s. IL, and se. MO (Smith & Parker 2005) south to c. GA, c. AL, ne. MS (and LA?). The proper application of the Linnaean "*Qu. prinus*" is controversial and unclear, having been debated and variously applied for well over a century. I have here decided to err on the side of clarity. The name "*Qu. prinus*" has nomenclatural priority over either "*Qu. montana*" or "*Qu. michauxii*", but it is not clear which species was intended; Whittemore & Nixon (2005) have proposed its formal rejection. [= FNA, S, W; = *Qu. prinus* Linnaeus – RAB, C, F, G, K, probably misapplied]

Quercus muehlenbergii Engelmann, Yellow Oak, Chinquapin Oak. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, SC, VA): slopes and bluffs, on soils derived from calcareous or mafic rocks; common in VA Mountains (rare elsewhere). April; October-November (of the same year). S. New England and Ontario west to WI, se. MN, and IA, south to nw. FL, TX, and n. Mexico. The similar *Qu. montana* sometimes has a few leaves with somewhat sharply lobed leaves, but these are minutely mucronate and lack the well-developed callus of *Qu. muehlenbergii*. Additionally, *Qu. muehlenbergii* has a flaky, light gray bark, very different from the dark gray, deeply furrowed bark of *Qu. montana*. [= RAB, C, F, K, WH; = *Qu. muhlenbergii* – FNA, S, W, orthographic variant; = *Qu. prinoides* Willdenow var. *acuminata* (Michaux) Gleason – G]

Quercus myrtifolia Willdenow, Myrtle Oak. Cp (GA, SC): dry pinelands; uncommon (rare in GA and SC). February-March; September (of the second year). A Southeastern Coastal Plain endemic: se. SC south to s. FL, west to se. MS. [= RAB, FNA, K, S, WH, Z]

Quercus nigra Linnaeus, Water Oak, Paddle Oak. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): bottomland forests, especially on levees or second terraces where flooded infrequently and for short periods, less commonly on mesic slopes; common (uncommon in Piedmont). April; September-November (of the second year). Primarily a species of the Southeastern Coastal Plain: s. NJ south to s. FL and west to e. TX and se. OK, north in the interior to se. TN, c. TN, w. and sc. KY (Clark et al. 2005), se. MO, and e. OK. Seedlings and fire sprouts of this species are highly variable; see discussion at end of generic treatment. [= RAB, C, FNA, G, GW, K, S, W, WH, Z; > *Qu. nigra* var. *nigra* – F; > *Qu. nigra* var. *heterophylla* (Aiton) Ashe – F: = *Qu. aquatica* Walter]

Quercus oglethorpensis Duncan, Oglethorpe Oak. Pd (GA, SC): bottomland forests, upland oak flats over clays (Iredell and Enon soils); rare (GA Threatened, SC Rare). April; September-October (of the same year). Widely scattered from w. SC, to adjacent e. GA, nw. AL (Sorrie pers. comm. 2002), MS, and LA. [= RAB, FNA, GW, K]

Quercus pagoda Rafinesque, Cherrybark Oak, Swamp Spanish Oak. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): bottomland forests, especially on second terraces; common (rare in Piedmont, rare in FL). April; September-November (of the second year). A Southeastern Coastal Plain endemic: e. and c. VA south to nw. FL and west to se. TX and north in the interior to e. TN, s. IL, and s. IN. [= C, FNA, K, S, WH; = *Qu. falcata* var. *pagodifolia* Elliott – RAB, F, G, GW]

Quercus palustris Muenchhausen, Pin Oak. Pd (NC, VA), Cp (VA), Mt (GA, VA): swamps and bottomlands, especially the broader swamps developed in the sedimentary rocks of Triassic basins of the lower Piedmont, isolated upland sag ponds, also widely planted as a street tree in towns and cities; uncommon (rare south of VA). March-April; October-November (of the second year). MA and NY west to se. IA and e. KS, south to c. NC, nw. GA, sc. TN, n. AR, and e. OK. [= RAB, C, F, FNA, G, GW, K, S, W]

Quercus phellos Linnaeus, Willow Oak. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): bottomland forests, especially on natural levees and second terraces, also in upland depression swamps developed on clay soils, weedy and successional on slopes and upland sites following disturbance, and widely planted as a street tree in towns and cities; common (uncommon in Piedmont, rare in FL). March-April; September-November (of the second year). Primarily a species of the Southeastern Coastal plain: NY (Long Island), s. NJ, and se. PA south to s. GA and Panhandle FL, west to e. TX and se. OK, north in the interior to e. TN, s. KY, w. KY, s. IL, and se. MO, and e. OK. [= RAB, C, F, FNA, G, GW, K, S, W, Z]

Quercus prinoides Willdenow, Dwarf Chinquapin Oak. Pd, Mt (GA, NC, VA), Cp (VA): xeric uplands, especially on clay soils derived from mafic rocks, and probably in sites which naturally burned rather frequently; rare (GA Special Concern, NC Rare, VA Rare). April; August-September (of the same year). MA and s. MI south to NC, OK, and TX. Fire suppression in the Piedmont sites where this rare oak occurs has nearly or entirely extirpated it from much of our area. [= RAB, C, FNA, K, S, W; > *Qu. prinoides* var. *prinoides* – F; > *Qu. prinoides* var. *rufescens* Rehder – F; = *Qu. prinoides* var. *prinoides* – G]

Quercus rubra Linnaeus *var.* ***ambigua*** (A. Gray) Fernald, Gray Oak. Mt (NC, SC, VA), Pd (VA): forests on ridges, slopes, and coves, mostly at over 1000 meters elevation; common. May; September-October (of the second year). Fairly widespread in ne. North America south to PA, and in the Appalachians to w. NC, nw. SC, and n. GA. This and var. *rubra* tend to intergrade and their distinction as even varieties may not be warranted. For discussion of the two varieties, see McDougal & Parks (1984) and Jensen (1977). [= K; = *Qu. rubra* var. *borealis* (Michaux f.) Farwell – RAB, F, FNA; < *Qu. rubra* – C, W; = *Qu. borealis* Michaux f. var. *borealis* – G; = *Qu. borealis* – S]

Quercus rubra Linnaeus *var.* ***rubra***, Red Oak. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): moist to fairly dry forests of slopes, coves, and ravines, below 1000 meters elevation; common (rare in Coastal Plain). April; August-September (of the second year). Widespread in e. North America, south to e. VA, GA, AL, MS, AR, and OK. [= RAB, F, FNA, K; < *Qu. rubra* – C, W; = *Qu. borealis* Michaux f. var. *maxima* (Marshall) Ashe – G; = *Qu. maxima* (Marshall) Ashe – S]

Quercus shumardii Buckley *var.* ***shumardii***, Shumard Oak. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC, VA): moist and fertile soils of bottomlands and lower slopes, also in xeric sites over calcareous rocks (such as limestone); uncommon (rare in Coastal Plain and Mountains). April; September-October (of the second year). Sc. PA, OH, s. MI, IN, s. IL, MO, and e. KS south to n. peninsular FL and TX. A number of varieties have been recognized in *Qu. shumardii*, and the morphological and habitat variation needs additional study. Var. *schneckii* (Britton) Sargent is apparently more midwestern, but should be looked for in our area, especially on dry limestone slopes, its preferred habitat. It is allegedly distinguished by the acorn cups rounded to turbinate below (vs. flattened and saucer-shaped in var. *shumardii*). Hess & Stoynoff (1998) tentatively concluded that no varieties should be recognized within *Qu. shumardii*, but they plan additional studies. *Qu. acerifolia* (E.J. Palmer) Stoynoff & W.J. Hess (*Qu. shumardii* var. *acerifolia* Palmer] is an endemic of Magazine Mountain in n. AR and scattered sites in OK; it is best treated as a distinct species, though there has been much debate about its taxonomic status, with opinions ranging from full species to mere form (Smith 1988, Stoynoff & Hess 1990, Johnson 1992, Johnson 1994, Hess & Stoynoff 1998). [= F, FNA, G, K; < *Qu. shumardii* – RAB, C, S, W, WH]

Quercus similis Ashe, Swamp Post Oak, Delta Oak. Cp (GA, NC?, SC): calcareous stream flats; rare. SC south to GA, west to e. TX. *Qu. similis* resembles *Qu. stellata*, differing in its less definitely cross-shaped leaves and its distinctly wetland habitat. [= FNA, K; = *Qu. stellata* Wangenheim var. *paludosa* Sargent; = *Qu. ashei* Sterret]

Quercus sinuata Walter *var. **sinuata***, Bastard Oak. Cp (FL, GA, SC): alluvial and slope forests; rare. April-May; September-November (of the same year). Se. SC south to FL Panhandle, west to TX. [= FNA, K; > *Qu. durandii* Buckley – RAB, S; < *Qu. sinuata* – WH]

Quercus stellata Wangenheim, Post Oak. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC, VA): upland forests and woodlands, especially in clay or rocky soils and in fire communities; common (uncommon in Mountains). April; September-November (of the same year). Se. MA, s. NY, s. PA, s. OH, s. IN, s. IA, and e. KS south to n. peninsular FL and TX. In KS, OK, and TX, post oak is one of the trees that forms the Prairie boundary. There is no question of the distinctness of *Qu. margarettae* from *Qu. stellata*. See *Qu. similis*. [= RAB, C, FNA, G, K, S, W, WH; = *Qu. stellata* var. *stellata* – F; = *Qu. villosa* Walter]

Quercus velutina Lamarck, Black Oak. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): upland forests and woodlands, especially in fairly xeric and sandy soils; common. April; September-October (of the second year). ME west to MN and NE, south to Panhandle FL and TX. [= RAB, C, F, FNA, G, K, S, W]

Quercus virginiana P. Miller, Live Oak. Cp (FL, GA, NC, SC, VA): locally common to abundant in maritime forests and maritime scrub on barrier islands, more rarely inland (though regularly on the mainland from se. NC south, and extending substantially inland from s. SC south), sometimes in dry, fire-maintained habitats more usually occupied by *Qu. geminata*, also planted (especially in the outer Coastal Plain); uncommon (rare in VA). April; September-November (of the same year). A Southeastern Coastal Plain endemic: se. VA south to s. FL and west to TX. *Qu. fusiformis* Small of TX has sometimes been treated as a variety of *Qu. virginiana*, but is best separated as a species. Flowering before *Qu. geminata* when growing together. [= C, FNA, GW, K, S; < *Qu. virginiana* – RAB, G (also see *Qu. geminata*); < *Qu. virginiana* var. *virginiana* – F; ? *Qu. sempervirens* Walter]

Quercus boyntonii Beadle, Boynton Oak. Dry forests. Ne. AL and (possibly) TX. [= FNA, K, S; *Q. stellata* Wangenheim var. *boyntonii* (Beadle) Sargent]

Quercus inopina W.W. Ashe, Florida Scrub Oak. Cp (FL): scrub; rare. FL peninsula, north to St. Johns County. [= FNA, K, WH] {add to synonymy; not yet keyed}

* *Quercus robur* Linnaeus, English Oak, is cultivated in our area and sometimes persists or escapes in ne. United States, south at least to s. PA (Rhoads & Klein 1993; Rhoads & Block 2007). [= FNA, K]

Quercus texana Buckley, Nuttall Oak, Texas Red Oak. Floodplain swamps and bottomlands. AL, TN, w. KY (Clark et al. 2005), west to e. TX. [= FNA, K; = *Qu. nuttallii* E.J. Palmer – F, GW; = *Qu. shumardii* Buckley var. *texana* (Buckley) W.W. Ashe] {not yet keyed}

FUMARIACEAE A.P. de Candolle 1821 (Fumitory Family)

This family includes 15-20 genera and 500-600 species, herbs, mostly north temperate. The Fumariaceae are often now subsumed into the Papaveraceae (Lidén 1981, 1986; Lidén et al. 1997; Judd, Sanders, & Donoghue 1994), but the option remains to recognize three monophyletic clades as families: Pteridophyllaceae (not in our area), Papaveracaeae s.s., and Fumariaceae. References: Stern in FNA (1997); Hill (1992); Lidén (1986, 1981); Lidén et al. (1997); Lidén in Kubitzki, Rohwer, & Bittrich (1993).

1 Corolla with the 2 outer petals spurred or saccate at their bases; [tribe *Corydaleae*].
  2 Ultimate leaf segments 1-4 mm wide; plants with basal leaves only ..... ***Dicentra***
  2 Ultimate leaf segments 5-70 mm wide; plants of reproductive age with cauline leaves.
    3 Ultimate leaf segments 5-10 mm wide; herbaceous vine with cauline leaves (acaulescent in its first year, and appearing to be an herb); [native] ..... ***Adlumia***
    3 Ultimate leaf segments 20-70 mm wide; herb with basal and cauline leaves; [alien, cultivated and rarely persistent or naturalized] ..... ***[Lamprocapnos]***
1 Corolla with only 1 outer petal spurred or saccate at its base.
  4 Ovary and fruit subglobose, with 1 seed; [tribe *Fumarieae*] ..... ***Fumaria***
  4 Ovary and fruit elongate, with several to many seeds; [tribe *Corydaleae*].
    5 Flowers pink, the petals tipped with yellow; biennial; stem erect, 3-8 (-10) dm tall; capsules erect, 25-35 mm long ..... ***Capnoides***
    5 Flowers yellow; annual; stem erect, decumbent, or prostrate, 1-3 (-4) dm tall; capsules erect, ascending, divergent, or pendent, 10-20 (-25) mm long ..... ***Corydalis***

Adlumia Rafinesque ex A.P. de Candolle 1821 (Climbing Fumitory)

A genus of 2 species, herbs, of e. North America, Korea, and Manchuria. References: Boufford in FNA (1997); Lidén in Kubitzki, Rohwer, & Bittrich (1993).

Adlumia fungosa (Aiton) Greene ex Britton, Sterns, & Poggenburg, Alleghany-vine, Cliff-Harlequin, Climbing Fumitory. Mt (NC, VA): cliffs, talus, rocky slopes, rich stream-bottom forests, cool rocky forests; rare (NC Rare, VA Watch List). June-September. Québec west to WI and MN, south to DE, NC, TN, and IN. [= RAB, C, F, FNA, G, K, S, W]

Capnoides P. Miller 1754 (Rock Harlequin)

The genus is monotypic, an herb, of n. North America. Recent studies have emphasized its distinction from *Corydalis*, and its closer relationship to *Adlumia* and *Dicentra* than to *Corydalis* (Lidén 1981, 1986; Lidén et al. 1997). References: Stern in FNA (1997); Ownbey (1947)=Z; Lidén (1981, 1986); Lidén et al. (1997); Lidén in Kubitzki, Rohwer, & Bittrich (1993).

Capnoides sempervirens (Linnaeus) Borkhausen, Rock Harlequin, Tall Corydalis, Pink Corydalis, Pale Corydalis. Mt (GA, NC, SC, VA), Pd (NC, VA): rock outcrops, especially granitic exfoliation domes, but also quartzite, greenstone, and sandstone; uncommon (rare in NC and VA Piedmont) (GA Special Concern). April-June; May-July. Newfoundland west to AK, south to NJ, PA, in and near the mountains to ne. GA, n. OH, n. IN, MN, MT, and British Columbia. [= S; = *Corydalis sempervirens* (Linnaeus) Persoon – RAB, C, F, FNA, G, K, W, Z]

Corydalis A.P. de Candolle 1805 (Corydalis)

A genus of about 400 species, herbs, of temperate regions of the Northern Hemisphere (especially China and the Himalayas). References: Stern in FNA (1997); Ownbey (1947)=Z; Lidén in Kubitzki, Rohwer, & Bittrich (1993). [also see *Capnoides*]

1 Flowers pink, the petals tipped with yellow; biennial; stem erect, 3-8 (-10) dm tall; capsules erect, 25-35 mm long ..... ***[Capnoides]***
1 Flowers yellow; annual; stem erect, decumbent, or prostrate, 1-3 (-4) dm tall; capsules erect, ascending, divergent, or pendent, 10-20 (-25) mm long.
  2 Fruits pendent or divergent; spurred petal 7-9 mm long; pedicels 6-15 mm long; seeds 2-2.5 mm wide, with a narrow, acute ring-margin.... ***C. flavula***
  2 Fruits erect or ascending; spurred petal 10-15 mm long; pedicels 1-6 mm long (5-10 mm long in *C. aurea*); seeds 1.0-2.0 mm wide, without a narrow, acute ring-margin.
    3 Capsules mostly 15-20 mm long, ca. 1.0 mm in diameter, strongly constricted between the seeds at maturity; inflorescence long, usually far exceeding the poorly-developed upper leaves; ultimate leaf segments 0.5-1.5 (-3.0) mm wide; seeds < 1.5 mm wide; plant slightly to strongly glaucous; [of sandy soils of the outer Coastal Plain]..... ***C. halei***
    3 Capsules mostly 10-15 mm long, 1.5-2.0 mm in diameter, slightly or not at all constricted between the seeds at maturity; inflorescence relatively short, barely (if at all) overtopping the upper leaves; ultimate leaf segments 1.0-2.0 (-4.0) mm wide; seeds > 1.5 mm wide; plant green to slightly glaucous; [of circumneutral rock outcrops of the upper Piedmont and Mountains]..... ***C. micrantha***

Corydalis flavula (Rafinesque) A.P. de Candolle, Short-spurred Corydalis. Pd, Mt, Cp (GA, NC, SC, VA): rich moist forests, especially alluvial forests, glades and outcrops over mafic rocks (such as greenstone); common (rare in NC and SC Coastal Plain) (GA Special Concern). March-April; May-June. S. CT, NY, and s. Ontario west to SD, south to NC, AL, LA, and OK. [= RAB, C, F, FNA, G, K, W, Z; = *Capnoides flavulum* (Rafinesque) Kuntze – S]

Corydalis halei (Small) Fernald & Schubert, Southern Corydalis. Cp (GA, NC, SC): sandy roadsides and disturbed areas; uncommon. March-April; May-June. E. NC south to FL, west to TX, and inland north to MO and OK. F and S recognized it as a species distinct from *C. micrantha*; Ownbey reduced it to a subspecies, citing inadequate morphological differences and some alleged intermediates in OK and MO. The two taxa appear readily separable on morphological, ecological, and geographical grounds; species status seems warranted. [= F; = *Corydalis micrantha* (Engelmann ex A. Gray) A. Gray ssp. *australis* (Chapman) G.B. Ownbey – RAB, FNA, K, Z; = *Corydalis micrantha* (Engelmann ex A. Gray) A. Gray var. *australis* (Chapman) Shinners – C; < *Corydalis micrantha* – G; = *Capnoides halei* Small – S]

Corydalis micrantha (Engelmann ex A. Gray) A. Gray, Slender Corydalis. Mt, Pd (NC): circumneutral rock outcrops and adjacent glades and woodlands; rare (NC Rare). April; June. *C. micrantha* (in the narrow sense) is primarily midwestern, ranging from IL, WI, MN, and SD south to AR, TX, and OK, with disjunct outliers in e. TN and w. NC. Ownbey (1947) had no records of Southern Appalachian populations of *C. micrantha*, and considered "ssp. *micrantha*" to range no further east than IL and MO; RAB included montane populations in ssp. *australis*, stating "this is the only [subspecies] in our range." Morphologically, however, these populations closely resemble *C. micrantha*; their association in the Brushy Mountains with other species disjunct from western or prairie ranges (*Anemone berlandieri, Arabis hirsuta, Pellaea wrightiana*) provides phytogeographic corroboration. [= F; = *Corydalis micrantha* (Engelmann ex A. Gray) A. Gray ssp. *micrantha* – FNA, K, Z; = *Corydalis micrantha* (Engelmann ex A. Gray) A. Gray var. *micrantha* – C; < *Corydalis micrantha* – G; = *Capnoides micranthum* (Engelmann ex A. Gray) Britton – S]

Corydalis aurea Willdenow, south and east to MD, WV (?), and PA (Kartesz 1999). [= G, K; = *Corydalis aurea* var. *aurea* – C, F; = *Corydalis aurea* ssp. *aurea* – FNA; = *Capnoides aureum* (Willdenow) Kuntze – S] {not yet keyed}

Corydalis crystallina Engelmann, a species of the sc. United States, was collected in 1930 from an oat field at the Georgia Experiment Station in Laurens County. Presumably it was a one-time contaminant in seed and is a waif. Not considered a component of the flora of our area. [= FNA, F, G, K]

Dicentra Bernhardi 1833

A genus of about 12 species, perennial herbs, with a relictual north temperate distribution: e. North America, w. North America, and e. Asia. References: Stern in FNA (1997); Stern (1961)=Z; Lidén in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves cauline and basal ..... ***[see Lamprocapnos spectabilis]***
1 Leaves basal only.
  2 Flowers pink, in panicles; rootstock lacking bulblets; ultimate leaf segments generally 3-parted, each part 2-5 mm wide at base, gradually tapering to the tip.

3 Reflexed portions of the outer sepals 4-8 mm long; [native and cultivated]..... ***D. eximia***
3 Reflexed portions of the outer sepals 2-5 mm long; [cultivated] ..... ***[D. formosa ssp. formosa]***
2 Flowers white or yellowish (very rarely pinkish), in racemes; rootstock with bulblets; ultimate leaf segments not generally 3-parted, about 1 (-3) mm wide, with parallel sides for most of their length, then tapering suddenly to the tip.
4 Spurs of the corolla rounded, incurved, 2-5 mm long; bulblets yellow, spherical..... ***D. canadensis***
4 Spurs of the corolla elongate, divergent, 7-9 mm longl bulblets white to pink, tear-shaped (narrowed upward)..... ***D. cucullaria***

Dicentra canadensis (Goldie) Walpers, Squirrel Corn. Mt (GA, NC, VA), Pd, Cp (NC, VA): rich, moist forests, especially rich cove forests in the mountains; common (uncommon in VA Piedmont, rare in Coastal Plain, rare or extirpated in NC Piedmont) (GA Special Concern). April-May; June. S. ME west to s. MN, south to w. NC, n. GA, TN, and MO. [= RAB, C, F, FNA, G, K, W; = *Bicuculla canadensis* (Goldie) Millspaugh – S]

Dicentra cucullaria (Linnaeus) Bernhardi, Dutchman's Britches. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (NC): rich, moist forests, especially rich cove forests in the mountains; common (rare in NC and SC Piedmont and NC Coastal Plain) (SC Rare). March-April; May-June. Nova Scotia west to n. MN, south to GA, AR, and KS; disjunct in WA, OR, and ID. [= RAB, C, F, FNA, G, K, W; = *Bicuculla cucullaria* (Linnaeus) Millspaugh – S]

Dicentra eximia (Ker-Gawler) Torrey, Wild Bleeding Heart. Mt (GA, NC, SC, VA), Pd (NC, VA): cliffs, talus slopes, rocky slopes, rock outcrops, shale slopes; common in VA mountains (rare elsewhere) (GA Special Concern, NC Rare, SC Rare). April-June; July-August. An Appalachian endemic: NY and NJ south to NC and TN. [= RAB, C, F, FNA, G, K, W; = *Bicuculla eximia* (Ker-Gawler) Millspaugh – S]

* *Dicentra formosa* (Haworth) Walpers ssp. *formosa*, native from s. British Columbia south to c. CA, is frequently cultivated and resembles our native *D. eximia*. It has the reflexed portion of the outer petals 2-4 mm long. A variety of cultivars, some apparently derived from hybrids between the 2 species, make identification uncertain in some cases. [= FNA, Z]

Fumaria Linnae 1753 (Fumitory)

A genus of about 50 species, annual herbs, primarily Eurasian. References: Boufford in FNA (1997); Lidén in Kubitzki, Rohwer, & Bittrich (1993).

* ***Fumaria officinalis*** Linnaeus, Fumitory, Earthsmoke. Cp (GA, NC, SC, VA), Pd (NC, SC, VA), Mt (VA): sandy fields, disturbed places, escaped from gardens; rare, native of Europe. March-May. [= RAB, C, F, FNA, G, K, S; > *F. officinalis* ssp. *officinalis* – K; > *F. officinalis* ssp. *wirtgenii* (W.D.J. Koch) Arcangeli – K] {TN}

Lamprocapnos Endlicher 1850 (Asian Bleeding Heart)

A monotypic genus, a perennial herb of e. Asia. References: Lidén et al. (1997); Stern (1961)=Z.

Identification notes: *Lamprocapnos* differs from other "bleeding hearts" (the native *Dicentra eximia* and the western American *Dicentra formosa* ssp. *formosa*) in its leafy stem, the inflorescence borne terminally or opposite a leaf, the leaves much less finely divided, and the flowers about as broad as long (vs. much longer than broad in *Dicentra eximia* and *Dicentra formosa*).

* *Lamprocapnos spectabilis* (Linnaeus) Fukuhara, Bleeding Heart, native to e. Siberia, Korea, and n. China, is frequently cultivated and may persist or weakly naturalize. It is reported for KY (Kartesz 1999). [= K; = *Dicentra spectabilis* (Linnaeus) Lemaire – Z]

GARRYACEAE Lindley 1834 (Garrya Family)

Garryaceae is here circumscribed to include *Aucuba* (Bremer et al. 2002). References: Bremer et al. (2002)

Aucuba Thunberg (Aucuba, Japanese-laurel)

* ***Aucuba japonica*** Thunberg, Aucuba, Japanese-laurel, Spotted-laurel. Pd (NC): commonly planted throughout our area, rarely escaping and naturalizing in suburban woodlands; rare, native of Japan and se. Asia. The most frequently planted cultivars have the dark green leaves prominently speckled with yellow. [= K]

GELSEMIACEAE (G. Don) Struwe & V. Albert 1995 (Jessamine Family)

A family of 2 genera and about 10 species, shrubs and vines, of tropical and warm temperate America, Africa, and Asia. There is persuasive evidence that *Gelsemium* and *Mostuea* Didr., traditionally treated as part of a heterogeneous Loganiaceae, should be accorded family status as Gelsemiaceae (Backlund, Oxelman, & Bremer 2000; Struwe, Albert, & Bremer 1994; Sennblad & Bremer 1996). The Gelsemiaceae form a clade most closely related to the Apocynaceae (Backlund, Oxelman, & Bremer 2000). References: Backlund, Oxelman, & Bremer (2000); Struwe, Albert, & Bremer (1994); Sennblad & Bremer (1996); Rogers (1986).

Gelsemium Antoine Laurent de Jussieu (Yellow Jessamine)

A genus of 3 species, vines, our 2 species in se. North America (and also Central America) and 1 species in e. Asia. References: Wyatt et al. (1993); Duncan & Dejong (1964); Godfrey (1988); Rogers (1986)=Z; GW.

1 Sepals acuminate apically, persistent on the fruit; capsule elliptical, 1.0-1.6 cm long, 6-8 mm broad, the tapering tip bearing a definite beak about 3 mm long; seeds wingless; flowers odorless (rarely fragrant), usually golden-yellow ..... ***G. rankinii***
1 Sepals obtuse to broadly acute, not persistent on the fruit; capsule oblong, 1.5-2.5 cm long, 8-12 mm broad, very abruptly narrowed to a beak 1.5-2 mm long; seeds with a prominent membranous wing sharply differentiated from the body of the seed; flowers fragrant, usually lemon-yellow ..... ***G. sempervirens***

Gelsemium rankinii Small, Swamp Jessamine. Cp (GA, NC, SC): swamps of blackwater rivers, restricted in NC to the se. corner of the state, most notably the swamps of the Waccamaw and Black rivers; rare north of GA (NC Rare). March-April; September-October. Se. NC south through SC and GA to the FL panhandle, and west to e. LA. See Wyatt et al. (1993) and Duncan & Dejong (1964) for extensive discussions of morphology, habitat, pollination, genetics, distribution, and evolutionary relationships of our 2 species of *Gelsemium*. [= RAB, GW, K, S, Z]

Gelsemium sempervirens St. Hilaire, Carolina Jessamine. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA): in a wide range of habitats, from swamp forests to dry uplands and thickets, also commonly planted as an ornamental; common. March-early May; September-November. VA, se. TN, and AR south to c. peninsular FL and e. TX; disjunct in Guatemala and Mexico (Chiapas, Oaxaca, Puebla, and Veracruz). Jessamine climbs to the tops of trees. [= RAB, F, G, GW, K, S, W, Z]

GENTIANACEAE A.L. de Jussieu 1789 (Gentian Family)

A family of about 87 genera and over 1600 species, herbs, shrubs, and trees, cosmopolitan (Struwe & Albert 2002). References: Wood & Weaver (1982); Struwe & Albert (2002). [also see *MENYANTHACEAE*]

1 Leaves all scale-like, 1-3 (-5) mm long, appressed to the stem; [tribe *Gentianeae*, subtribe *Swertiinae*] ..... ***Bartonia***
1 Leaves larger, spreading or ascending.
  2 Stem leaves whorled; plants robust, 1-3 m tall; [tribe *Gentianeae*, subtribe *Swertiinae*] ..... ***Frasera***
  2 Stem leaves opposite; plants generally < 1 m tall.
    3 Calyx lobes 2; stem leaves obovate, widest near the rounded tip), 0.5-1.5 cm long, crowded near the tip of the stem, basal rosette never present; [of nutrient-rich, mesic forests]; [tribe *Gentianeae*, subtribe *Swertiinae*] ..... ***Obolaria***
    3 Calyx lobes 4-5; stem leaves lanceolate, ovate, elliptic or narrowly elliptic (widest near the middle or toward the base, the tip acute or acuminate), mostly > 1.5 cm long, distributed fairly evenly along the stem, basal rosettes sometimes present; [of various more-or-less open habitats (except some species of *Gentiana*, which can occur in nutrient-rich, mesic forests)].
      4 Corolla lobes 5-14, much longer than the corolla tube, pink or white; [tribe *Chironieae*, subtribe *Chironiinae*] ..... ***Sabatia***
      4 Corolla lobes 4-5, shorter than the corolla tube, blue, lavender, pink or white.
        5 Corolla tube < 2 mm wide; [tribe *Chironieae*, subtribe *Chironiinae*] ..... ***Centaurium***
        5 Corolla tube > 3 mm wide.
          6 Corolla lobes alternating with corolla appendages (appearing as plaits or lobes, these often toothed, notched, or lacerate, sometimes as long as or longer than the true corolla lobes); main stem leaves cuneate at the base; perennial; [tribe *Gentianeae*, subtribe *Gentianinae*] ..... ***Gentiana***
          6 Corolla lobes not alternating with corolla appendages; main stem leaves rounded to cordate at the base; biennial or annual; [tribe *Gentianeae*, subtribe *Swertiinae*].
            7 Corolla lobes 4, finely fringed; main stem leaves rounded at base, with lateral veins obscure; biennial ..... ***Gentianopsis***
            7 Corolla lobes 5, entire, not fringed; main stem leaves cordate (the cordate bases often overlapping the opposite leaf), with 2-3 well-developed lateral veins (prominently visible on the lower surface); annual ..... ***Gentianella***

Bartonia Muhlenberg ex Willdenow (Bartonia)

A genus of 3 species, herbs, of e. North America. The genus has coralloid mycorrhizae and lacks root hairs, and is thus presumably partially mycotrophic. References: Gillett (1959)=Z.

1 Corolla lobes white, 5-10 mm long, spreading, spatulate to obovate, rounded at the apex; flowering in early spring (rarely to early summer) ..... ***B. verna***
1 Corolla lobes green to creamy white, 2-3 (-5) mm long, ascending or erect, oblong to ovate or lance-ovate, acuminate or rounded-mucronate at the apex; flowering in summer or fall.
  2 Mid-cauline scale leaves alternate; corolla lobes acuminate at the apex, their margins entire; anthers 0.3-0.5 mm long ..... ***B. paniculata ssp. paniculata***
  2 Mid-cauline scale leaves opposite; corolla lobes rounded at the apex, abruptly narrowed to a mucro, their margins erose (uncommonly entire); anthers 0.5-1.1 mm long ..... ***B. virginica***

Bartonia paniculata (Michaux) Muhlenberg *ssp.* ***paniculata***, Screwstem Bartonia. Cp (FL, GA, NC, SC), Mt (GA, VA), Pd (SC, VA): swamps, bogs, pocosins, pocosin ecotones, sphagnous seepages, sinkhole ponds; uncommon (rare in NC and VA). August-October. Ssp. *paniculata* ranges from MA south to c. peninsular FL and west to e. TX, chiefly on the Coastal Plain, but

with scattered occurrences inland (to c. VA, w. NC, KY, and AR). Ssp. *iodandra* (B.L. Robinson) J. Gillett is more northern, ranging from Newfoundland south to MA. These taxa have been variously treated (and ignored). Intermediates are alleged to occur in NC, MS, AL, and northward to MA (Gillett 1959, Wood & Weaver 1982). [= K, Z; < *B. paniculata* – RAB, GW, WH; = *B. paniculata* – G; = *B. paniculata* var. *paniculata* – C, F; = *B. lanceolata* Small – S]

Bartonia verna (Michaux) Rafinesque ex Barton, Spring Bartonia, White Bartonia. Cp (FL, GA, NC, SC, VA): wet pine savannas, shores of Coastal Plain depression ponds, other moist sands; common (uncommon in NC, rare in VA). February-April (-June). VA (one site known from City of Virginia Beach) (Belden et al. 2004) and se. NC (Carteret County) south to s. FL, west to se. TX. Wood & Weaver's (1982) contention that B. verna is an outlier relative to the other species appears not to be true, with the true division being between *B. verna* + *B. virginica* on one hand and *B. paniculata* and its infrataxa on the other (K. Mathews 2008, pers. comm.). [= RAB, GW, K, S, WH, Z]

Bartonia virginica (Linnaeus) Britton, Sterns, & Poggenburg, Virginia Bartonia. Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC, VA), Pd (NC, SC, VA): bogs, swamps, savannas, pocosin ecotones, pocosins; uncommon (rare in Mountains). July-October. Nova Scotia and Québec west to WI, south to n. FL and LA. [= RAB, C, F, G, GW, K, S, WH, Z]

Centaurium Hill (Centaury)

A genus of about 20 species, herbs, mainly north temperate.

1 Flowers pedicellate, the pedicels 3-5 mm long ..... ***C. pulchellum***
1 Flowers sessile or nearly so (sometimes appearing stalked but with bracteal leaves immediately below the calyx).
  2 Inflorescence a corymbiform cyme (about as broad as long, the central axis poorly developed) ..... ***C. erythraea***
  2 Inflorescence a spikelike cyme (distinctly elongate, the central axis straight) ..... ***C. spicatum***

* ***Centaurium erythraea*** Rafn, Common Centaury, Forking Centaury. Pd (NC, VA), Cp (VA), {GA}: lawns, disturbed areas; rare, native of Europe and w. Asia. July-September. [= C, K; = *C. minus* – RAB, later homonym; = *C. umbellatum* – F, G, later homonym]

* ***Centaurium pulchellum*** (Swartz) Druce, Lesser Centaury, Branching Centaury. Cp (VA), Mt (WV): disturbed areas; rare, native of Europe. June-September. [= C, F, G, K, S]

* ***Centaurium spicatum*** (Linnaeus) Fritsch, Spiked Centaury. Cp (VA): disturbed areas; rare, native of s. Europe. July-August. [= C, F, G, K]

Eustoma Salisbury ex G. Don (Prairie-gentian)

A genus of 3 species, annual to perennial herbs, of se., c., and sw. North America south to Mexico and Belize and in the West Indies. References: Shinners (1957)=Z; Wood & Weaver (1982)=Y.

Eustoma exaltatum (Linnaeus) Salisbury ex G. Don, Prairie-gentian. Cp (FL): alkaline prairies, saline coastal areas; rare. AL and peninsular FL west to TX, south to Mexico and Belize; West Indies. June-November. [= GW, S, WH, Y, Z; = *Eu. exaltatum* ssp. *exaltatum* – K] {not yet keyed in generic key}

Frasera Walter (Columbo)

A genus of 15 species, herbs, primarily of w. North America. References: Threadgill & Baskin (1978)=Z; Horn (1997).

Frasera caroliniensis Walter, American Columbo. Mt (GA, NC), Pd (GA, SC): rich forests over mafic rocks, upper slopes of cove forests, floodplain forests; rare (NC Rare, SC Rare). Late May-June; September-October. W. NY, nw. PA, and s. Ontario west to IL, MI, MO, and e. OK, south to w. SC, n. GA, and LA, primarily west of the Blue Ridge. Horn (1997) studied the ecology of this species in the Piedmont of SC. [= C, K, S, W, Z; = *Swertia caroliniensis* (Walter) Kuntze – RAB, F, G]

Gentiana Linnaeus 1753 (Gentian)

A genus of about 350-400 species, herbs, primarily temperate and arctic. Even following the removal of *Gentianopsis* and *Gentianella, Gentiana* is a large and apparently heterogeneous group, perhaps not monophyletic. No satisfactory comprehensive treatment is available, however. All of the species treated here as *Gentiana* are in the distinctive group often treated as section, subgenus, or genus *Pneumonanthe*. References: Pringle (1967)=Z; Halda (1996)=Y; Ho & Liu (2001)=X; Ho & Liu (1990); Yuan, Küpfer, & Doyle (1996); Pringle (1977). Key adapted from Z.

Identification Notes: In some species it may be somewhat difficult to interpret the corolla lobes and the corolla appendages. The filaments are alternate to the corolla lobes, and are therefore attached to the lower portion of the corolla appendages.

1 Flower solitary (rarely 2 or 3); corolla spotted within; leaves twisted, oblanceolate to oblinear; [subgenus *Pneumonanthe*, series *Angustifoliae*] ..... ***G. autumnalis***

GENTIANACEAE

1 Flowers clustered; corolla not spotted within; leaves planar, mostly lanceolate, elliptic, or ovate (rarely linear); subgenus *Pneumonanthe*, series *Pneumonanthe*].
2 Calyx lobes keeled, the keel decurrent on the calyx tube; corolla greenish-white or yellowish-white; leaves ovate to lanceolate, acuminate ..... ***G. alba***
2 Calyx lobes not keeled; corolla white, greenish-white, or variously blue.
3 Corolla greenish-white (sometimes somewhat purplish); seeds wingless; lower leaves spatulate to obovate..... ***G. villosa***
3 Corolla blue, purplish, pale blue, or nearly white; seeds winged; lower leaves linear, lanceolate, elliptic, or ovate.
4 Margins of leaves and calyx lobes entire to minutely denticulate; corolla appendages obliquely triangular, broader than high (sometimes with a minute deflexed segment)..... ***G. linearis***
4 Margins of leaves and calyx lobes conspicuously ciliate (as seen at 10×); corolla appendages with 2 teeth, as long as broad or longer (sometimes with a deflexed segment, if so, the deflexed segment about as long as the erect one).
5 Anthers separate at anthesis; outer surfaces of petals suffused with green; calyx lobes linear-subulate, about as long as the tube; corolla lobes 6-14 mm long, about 2× as long as the the free portions of the corolla appendages ..... ***[G. puberulenta]***
5 Anthers connate at anthesis; outer surfaces of petals not suffused with green; calyx lobes various; corolla lobes usually shorter.
6 Calyx lobes linear-subulate, broadest at the base, 4× or more as long as broad, shorter than the densely puberulent calyx tube; stems densely puberulent; corolla appendages very unevenly bifid, the narrower segment often deflexed into the corolla tube..... ***G. decora***
6 Calyx lobes lanceolate, oblanceolate, ovate, or orbicular, 1-5× as long as broad, longer or shorter than the glabrous or puberulent calyx tube; stems glabrous or puberulent; corolla appendages subequally bifid, both segments erect.
7 Corollas open to loosely closed; involucral and upper leaves obtuse to acute (rarely acuminate); calyx lobes lanceolate.
8 Leaves ovate, widest near the base, bright green; calyx lobes longer than the calyx tube; corolla lobes spreading, usually 2-4 mm longer than the appendages..... ***G. catesbaei***
8 Leaves linear to elliptic, widest near the middle, dark green; calyx lobes shorter than or about equal to the calyx tube; corolla lobes usually incurved, rarely exceeding the appendages by > 2 mm..... ***G. saponaria***
7 Corollas tightly closed; involucral and upper leaves acuminate; calyx lobes ovate-orbicular.
9 Corolla lobes reduced to a minute mucro or triangular tooth, much exceeded by the corolla appendages..... ***[G. andrewsii var. andrewsii]***
9 Corolla lobes about as long as the corolla appendages.
10 Calyx tubes densely puberulent; stems puberulent; filaments 7-12 mm long; corolla lobes often triangular, about 1/2 as wide as the corolla appendages..... ***G. austromontana***
10 Calyx tubes glabrous; stems glabrous; filaments 10-15 mm long; corolla lobes usually rounded, about as wide as the corolla appendages..... ***G. clausa***

Gentiana alba Muhlenberg ex Nuttall, Pale Gentian. Mt (NC): habitat unknown (not collected in NC in this century); rare (NC Rare). August-October. Mainly distributed in midwestern United States, from MI west to MN, south to n. AR, *G. flavida* occurs as scattered disjunctions eastward to PA, OH, WV, KY, and w. NC. *G. alba* is the older name; there is controversy, however, over whether it was validly published and applies clearly to the species at hand (see Wilbur 1988c for discussion). [= RAB, K, W, X, Y, Z; = *Gentiana flavida* A. Gray – C, F, G; = *Dasystephana flavida* (A. Gray) Britton – S; = *Pneumonanthe flavida* (A. Gray) Greene]

Gentiana austromontana Pringle & Sharp, Blue Ridge Gentian. Mt (NC, VA): high elevation forests and grassy balds; rare (NC Watch List, VA Watch List). September-October. A Southern Appalachian endemic: s. WV and sw. VA south to w. NC and ne. TN. The flowers of *G. austromontana* are usually a deeper and more intense blue-violet than the similar *G. clausa* and *G. decora*. See Pringle & Sharp (1964) for additional discussion. [= C, K, W, X, Y, Z; < *G. clausa* Rafinesque – RAB, F, G, GW; < *Dasystephana decora* (Pollard) Small – S]

Gentiana autumnalis Linnaeus, Pinebarren Gentian. Cp (NC, SC, VA): savannas, pine flatwoods, sandhills, in a variety of sites varying from moist to very xeric, nearly always associated with *Pinus palustris* and *Aristida stricta*; uncommon, rare in VA (SC Rare, VA Rare). Late September-early January (rarely at other times of the year, such as spring, in response to fire). This species is a "bimodal endemic," occurring in s. NJ and adjacent DE, and from se. VA south through e. NC to nc. SC. The related *G. pennelliana* Fernald (sometimes reduced to a subspecies of *G. autumnalis*) is endemic to the FL panhandle; other siblings occur in Mexico: *G. bicuspidata* (G. Don) Briq., *G. hooperi* Pringle, and *G. longicollis* Nesom. *G. autumnalis* is often overlooked, since it is very inconspicuous except when in flower, it usually flowers at a season when few botanists are about, and sterile plants greatly outnumber fertile ones. Vegetatively it is extremely distinctive once learned; the leaves are glossy, dark-green, opposite, oblanceolate to "oblinear," and twisted and curved in a manner reminiscent of an airplane propellor. [= RAB, C, F, GW, K, X, Z; = *Gentiana porphyrio* J.F. Gmelin – G; = *Dasystephana porphyrio* (J.F. Gmelin) Small – S; = *Gentiana autumnalis* ssp. *autumnalis* – Y; = *Pneumonanthe porphyrio* (Linnaeus) Greene]

Gentiana catesbaei Walter, Coastal Plain Gentian. Cp (FL, GA, NC, SC, VA), Pd (VA): pocosins, moist savanna edges, edges of moist hardwood forests, bluff seepages; common (rare in Piedmont). Late September-November. S. NJ south to ne. FL and e. Panhandle FL, on the Coastal Plain. [= RAB, C, G, GW, K, WH, X, Y, Z; > *G. catesbaei* var. *catesbaei* – F; > *G. catesbaei* var. *nummulariifolia* Fernald – F; > *Dasystephana latifolia* (Chapman) Small – S; > *D. parvifolia* (Chapman) Small – S; = *Pneumonanthe catesbaei* (Walter) F.W. Schmidt]

Gentiana clausa Rafinesque, Meadow Closed Gentian, Meadow Bottle Gentian. Mt, Pd (NC, VA): forests; uncommon. September-October. Mostly Appalachian: ME south to w. NC and ne. TN, extending east and west to adjacent physiographic provinces. [= C, K, W, X, Y, Z; < *G. clausa* – RAB, F, G, GW (also see *G. austromontana*); < *Dasystephana decora* (Pollard) Small – S; = *Pneumonanthe clausa* (Rafinesque) Greene]

Gentiana decora Pollard, Appalachian Gentian. Mt, Pd (GA, NC, SC, VA): forests; common (rare in Piedmont). September-October. A Southern Appalachian endemic: c. WV south through w. VA to w. NC, e. TN, nw. SC, ne. GA. [= RAB, C, F, G, K, W, X, Y, Z; < *Dasystephana decora* (Pollard) Small – S; = *Pneumonanthe decora* (Pollard) Greene]

Gentiana linearis Frölich, Narrowleaf Gentian. Mt (VA): openings in spruce-fir forest near the summit of Whitetop Mountain, VA; rare (VA Rare). September-October. Mainly occurring in ne. United States and e. Canada, west to Lake

Superior, and south (scattered) in the Appalachians to sw. VA and e. TN (Chester, Wofford, & Kral 1997). On Mount LeConte (Sevier County, TN), *G. linearis* occurs in thin soils around high elevation outcrops of Anakeesta Slate. See Pringle (1977) for extensive discussion of actual and putative southern occurrences of this species. [= C, F, G, K, W, X, Y, Z; = *Pneumonanthe linearis* (Frölich) Greene]

Gentiana saponaria Linnaeus, Soapwort Gentian. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): bogs, marshes, wet hardwood forests, other moist to wet habitats; uncommon (rare in FL). Late September-November. NY west to n. IL, south to Panhandle FL and e. TX. A peculiar form with very narrow leaves has been found at several localities in Ashe and Watauga counties, NC and in the South Mountains, NC; it may warrant taxonomic recognition after further study. [= RAB, C, GW, K, W, WH, X, Y, Z; > *G. saponaria* – F, G; > *G. cherokeensis* (W.P. Lemmon) Fernald – F, G; > *G. saponaria* var. *saponaria* – K; > *G. saponaria* var. *latidens* House – K; = *Dasystephana saponaria* (Linnaeus) Small – S; = *Pneumonanthe saponaria* (Linnaeus) F.W. Schmidt] {investigate varieties}

Gentiana villosa Linnaeus, Striped Gentian. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): upland forests, sandhill/pocosin ecotones; uncommon. Late August-November. Se. PA west to n. KY and w. TN, south to Panhandle FL and e. LA. [= RAB, C, F, G, K, W, WH, X, Y, Z; = *Dasystephana villosa* (Linnaeus) Small – S; = *Pneumonanthe villosa* (Linnaeus) F.W. Schmidt]

Gentiana andrewsii Grisebach var. *andrewsii*, a northern species, ranges south to s. MD and WV; earlier reports of it as far south as GA or NC (as by F and G) are apparently based on misidentifications. An additional variety, var. *dakotica* A. Nelson, occurs from Manitoba and Saskatchewan south in the Great Plains to MO and IL. [= C, K, X, Y, Z; < *G. andrewsii* – F, G; < *Dasystephana andrewsii* (Grisebach) Small – S; = *Pneumonanthe andrewsii* (Grisebach) W.A. Weber var. *andrewsii*]

Gentiana pennelliana Fernald, Wiregrass Gentian. Cp (FL): flatwoods; rare. Endemic to Panhandle FL. [= WH; = *Dasystephana tenuifolia* (Rafinesque) Pennell – S] {add to key; add to synonymy GW, X, Y, Z}

Gentiana puberulenta J. Pringle, Prairie Gentian, ranges from w. NY west to ND, south to WV, KY, sc. TN (Coffee County) (Chester, Wofford, & Kral 1997), LA, n. AR, and KS. [= C, K, X, Y, Z; = *G. puberula* – F, G, misapplied; = *Dasystephana puberula* (Michaux) Small – S, misapplied]

Gentianella Moench (Agueweed)

A genus of about 125 species, herbs, temperate. The separation of *Gentianella* from *Gentiana* appears to be well warranted; some characters suggest that *Gentianella* is more closely allied to *Swertia*, *Halenia*, and *Lomatogonium* than to *Gentiana* (Wood & Weaver 1982). A molecular analysis has confirmed this (Yuan & Küpfer 1995). References: Gillett (1957)=Z. Key based on Gillett (1957).

1 Calyx 8-10 mm long; calyx tube 3.0-3.5 mm long; calyx lobes 5-6 mm long, elliptic-lanceolate to oblanceolate with thickened margins, and with broadly flattened, frequently nerve-like keels; corolla ca. 20 mm long..... ***G. quinquefolia* var. *occidentalis***

1 Calyx 4-5 mm long; calyx tube 1.5-2.0 mm long; calyx lobes 2.0-2.5 mm long, narrowly triangular with hyaline margins and very prominent keels; corolla 16-18 mm long..... ***G. quinquefolia* var. *quinquefolia***

Gentianella quinquefolia (Linnaeus) Small *var.* ***occidentalis*** A. Gray, Western Agueweed. Mt (VA): calcareous barrens, dry and dry-mesic limestone woodlands; rare (VA Rare). Late August-October. Var. *occidentalis* A. Gray is more western, from OH and s. Ontario west to MN, east and south to w. VA, sc. KY, AR, and se. KS. [= C, G; < *Gentiana quinquefolia* Linnaeus – RAB, GW, W; = *Gentiana quinquefolia* var. *occidentalis* (A. Gray) Hitchcock – F; = *Gentianella quinquefolia* ssp. *occidentalis* (A. Gray) J. Gillett – K, Z; = *Gentianella occidentalis* (A. Gray) Small – S]

Gentianella quinquefolia (Linnaeus) Small *var.* ***quinquefolia***, Eastern Agueweed. Mt (GA, NC, SC, VA): forests, grassy balds; common. Late August-October. Var. *quinquefolia* is primarily Appalachian, from ME west to w. NY and s. Ontario, south to n. GA and sc. TN. [= C, G; < *Gentiana quinquefolia* Linnaeus – RAB, GW, W; = *Gentiana quinquefolia* var. *quinquefolia* – F; = *Gentianella quinquefolia* ssp. *quinquefolia* – K, Z; = *Gentianella quinquefolia* – S]

Gentianopsis Ma 1951 (Fringed-gentian)

A genus of about 20 species, herbs, of north temperate Asia and North America. The reasons for the recognition of *Gentianopsis* are enumerated by Ma (1951), Iltis (1965), and Wood & Weaver (1982). References: Gillett (1957)=Z; Iltis (1965); Ma (1951).

Gentianopsis crinita (Frölich) Ma, Eastern Fringed-gentian. Mt (GA, NC, VA): sunny or semi-shaded seepage areas over calcareous, mafic, or ultramafic rocks (such as limestone, amphibolite, or serpentinized olivine); rare (GA Threatened, NC Endangered, VA Rare). September-October. ME, s. Ontario, and ND south to NJ, IN, and IA (mostly north of the glacial maximum) and from PA south to nw. NC and ne. GA in the unglaciated Appalachians. Certainly one of the most beautiful of our native plants. [= C, K; = *Gentiana crinita* Frölich – RAB, F, G, GW, W; = *Anthopogon crinitum* (Frölich) Rafinesque – S; = *Gentianella crinita* (Frölich) G. Don ssp. *crinita* – Z]

Obolaria Linnaeus (Pennywort)

A monotypic genus, herb, of e. North America. References: Gillett (1959)=Z.

Obolaria virginica Linnaeus, Pennywort. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, VA): nutrient-rich, moist forests, mesic hammocks; common (rare in Coastal Plain south of VA). March-May; May-June. NJ west to OH, s. IN, and s. IL, south to panhandle FL and se. LA (reported from TX). The small purplish-green plants are inconspicuous, often nearly hidden under fallen leaves. *Obolaria* has well-developed mycorrhizae and may be substantially mycotrophic. [= RAB, C, F, G, K, S, W, WH, Z]

Sabatia Adanson 1763 (Sabatia, Rose-gentian, Marsh-pink, Sea-pink)
(contributed by B.A. Sorrie and A.S. Weakley)

A genus of about 20 species, of North America and the West Indies. References: Wilbur (1955)=Z.

1 Flowers with (7-) 8-12 (-14) corolla lobes.
- 2 Pedicels < 5 mm long; calyx subtended by linear bracts that usually exceed the corolla lobes; terminal flowers in capitate clusters (less commonly single).
  - 3 Basal leaves similar in shape and size to the stem leaves; cauline leaves (25-) 35-50 (-65) mm long, (7-) 10-20 (-25) mm wide, 2-4× as long as wide; corolla lobes pale rose or white; [of mountain slopes, restricted in our area to sw. NC and nw. GA] ..... ***S. capitata***
  - 3 Basal leaves much broader and shorter than the stem leaves; cauline leaves (15-) 40-80 (-100) mm long, 1-3 mm wide, 20-60× as long as wide; corolla lobes medium rose to deep rose; [of bogs and savannas, of the Coastal Plain] ..... ***S. gentianoides***
- 2 Pedicels > 10 mm long; calyx not subtended by long bracts; terminal flower single.
  - 4 Upper stem leaves about as wide as the diameter of the stem, or narrower; calyx lobes terete or semi-terete; stems 6-12 dm tall; [of *Taxodium ascendens-Nyssa biflora* depressions and wet pine flatwoods in se. SC] ..... ***S. bartramii***
  - 4 Upper stem leaves much wider than the diameter of the stem; calyx lobes flat, linear to narrowly oblanceolate; stems 3-12 dm tall; [of various habitats, primarily along the shores of blackwater rivers or ponds, or in tidal marshes].
    - 5 Primary branches opposite; terminal flower short-stalked (much shorter than the first internode of the adjacent branch); stems 5-12 dm tall; [of drawdown blackwater riverbanks and similar situations] ..... ***S. kennedyana***
    - 5 Primary branches usually alternate; terminal flower long-stalked (usually longer than the first internode of the adjacent branch); stems 3-7 dm tall; [of brackish marshes or openings along blackwater streams].
      - 6 Surficial stolons usually absent or poorly developed; internodes commonly much longer than leaves; [of tidal brackish or freshwater marshes] ..... ***S. dodecandra***
      - 6 Surficial stolons usually present and well-developed, elongate; internodes shorter than to equaling the leaves; [of openings of blackwater streams] ..... ***S. foliosa***

1 Flowers with 5-6 (-7) corolla lobes.
- 7 Upper branches of main stem alternate.
  - 8 Calyx tube strongly winged; corolla lobes pink; [very rare introduction from c. United States] ..... ***S. campestris***
  - 8 Calyx tube not winged; corolla lobes pink or white; [native, primarily of the Coastal Plain, except S. campanulata which has disjunct occurrences in the Mountains].
    - 9 Calyx lobes foliaceous, 5-8 mm wide, oblong to oblanceolate, mostly exceeding the corolla lobes ..... ***S. calycina***
    - 9 Calyx lobes linear-setaceous, 0.5-2 mm wide, if equaling the corolla lobes then very narrow and not foliaceous.
      - 10 Calyx lobes (3-) 4-7 (-8) mm long; corolla lobes white; [of the Coastal Plain from se. SC southward] ..... ***S. brevifolia***
      - 10 Calyx lobes (4-) 6-17 (-23) mm long; corolla lobes pink (rarely white in individual plants); [of the Coastal Plain of GA, NC, SC, and VA, and rarely the Mountains of NC and VA].
        - 11 Plants perennial, often with several stems from a caudex; calyx lobes > 3/4× as long as the corolla lobes, and sometimes exceeding them; [of saturated soils from Coastal Plain savannas to Mountain bogs] ..... ***S. campanulata***
        - 11 Plants annual, solitary; calyx lobes up to 3/4× as long as the corolla lobes; [of brackish marshes and interdune swales] ..... ***S. stellaris***
- 7 Upper branches of main stem opposite.
  - 12 Corolla lobes pink (rarely white); pedicels at least in part > 5 mm long.
    - 13 Lower half of stem winged; leaves ovate, clasping, < 2× as long as wide; [widespread in our area] ..... ***S. angularis***
    - 13 Lower half of stem not winged; leaves elliptic to lanceolate, more or less tapered to the base, mostly > 3× as long as wide; [of the Coastal Plain or very rarely Piedmont] ..... ***S. brachiata***
  - 12 Corolla lobes white or creamy white; pedicels (above the uppermost bracts or branches) ca. 1-2 (-5) mm long.
    - 14 Lower portion of stem quadrangular, narrowly winged; plants annual or biennial, with 1 (-several) stems arising from a taproot ..... ***S. quadrangula***
    - 14 Lower portion of stem terete, not winged (though the upper stem is quadrangular or angled in *S. difformis*); plants perennial, with several stems arising from a short rhizome; [section *Eusabatia*, subsection *Difformes*].
      - 15 Leaves and upper stem not glaucous; stem terete below, becoming quadrangular or quadrangular-angled above; corolla lobes (5-) 7-15 (-21) mm long; [widespread in our area] ..... ***S. difformis***
      - 15 Leaves and upper stem glaucous; stem terete throughout; corolla lobes (4-) 5-7 (-8) mm long; [of GA southward and westward].
        - 16 Calyx-lobes erect, (0.1-) 0.2-1.5 (-2.0) mm long, as long as or shorter than the calyx-tube; [of sw. GA and n. FL westward to e. LA] ..... ***S. macrophylla var. macrophylla***
        - 16 Calyx lobes strongly recurved, (1.0-) 1.5-3 mm long, longer than the calyx-tube; [of e. and sc. GA south to ne. FL] ..... ***S. macrophylla var. recurvans***

Sabatia angularis (Linnaeus) Pursh, Bitter-bloom, Common Marsh-pink. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): forests, woodlands, marshes, fields, calcareous hammocks (in FL); common. July-August; September-October. NY west to s. MI, IL, and e. KS, south to Panhandle FL and e. TX. [= RAB, C, F, GW, K, S, W, WH, Z]

Sabatia bartramii Wilbur, Bartram's Rose-gentian. Cp (FL, GA, SC): margins of *Taxodium ascendens-Nyssa* depressions, wet pine flatwoods; common (rare in GA and SC). June-August; August-October. Ne. SC south to s. FL, west to s. AL and se. MS. [= GW, K, WH, Z; = *S. dodecandra* var. *coriacea* (Elliott) Ahles – RAB; = *S. decandra* (Walter) R.M. Harper – S]

Sabatia brachiata Elliott, Narrowleaf Rose-pink. Cp (GA, NC, SC, VA), Pd (GA, NC), Mt (GA): sandhills, pine savannas, pine flatwoods; uncommon (VA Watch List). Late May-July; August-September. Se. VA south to s. GA, west to LA, north in the interior to c. TN and se. MO. [= RAB, C, F, GW, K, S, W, Z]

Sabatia brevifolia Rafinesque. Cp (FL, GA, SC): pine savannas; common (rare in GA and SC). September-October; October-November. E. SC south to peninsular FL, west to s. AL. [= RAB, GW, K, WH, Z; = *S. elliottii* Steudel – S]

Sabatia calycina (Lamarck) Heller, Coastal Rose-pink. Cp (FL, GA, NC, SC, VA): swamp forests, river banks; common (VA Watch List). June-October; July-October. Se. VA south to s. FL, west to se. TX; e. Cuba and Hispaniola. [= RAB, C, F, GW, K, S, WH, Z]

Sabatia campanulata (Linnaeus) Torrey, Slender Marsh-pink. Cp (FL, GA, NC, SC, VA), Mt (GA, NC, VA): pine savannas, bogs; common (rare in Mountains) (VA Rare). June-August; September-October. MA south to ne. FL, oanhandle FL, west to LA and AR; scattered inland as in w. VA, w. NC, c. TN, and KY. [= RAB, C, GW, K, S, W, WH, Z; > *S. campanulata* var. *campanulata* – F; > *S. campanulata* var. *gracilis* (Michaux) Fernald – F]

* ***Sabatia campestris*** Nuttall, Western Marsh-pink, Prairie Rose-gentian, Prairie Sabatia. Mt (NC): roadsides and woodland edges; rare (NC Watch List), native of c. United States. July-August; September-October. [= RAB, C, F, GW, K, Z]

Sabatia capitata (Rafinesque) Blake, Cumberland Rose-gentian. Mt (GA, NC): sloping woodlands and meadows, over sandstone or shale; rare (GA Rare, NC Watch List). July-August; September-October. Sw. NC and se. TN south to nw. GA and c. AL. Apparently present in NC, at least formerly, based on a specimen collected "from Cherokee", probably Cherokee County, NC, a remarkably poorly botanized area. [= K, Z; = *Lapithea capitata* (Rafinesque) Small – S]

Sabatia difformis (Linnaeus) Druce. Cp (FL, GA, NC, SC, VA), Pd (NC, SC): pine savannas, bogs, pocosins; common (rare in Piedmont) (VA Rare). May-September; September-December. S. NJ south to c. peninsular FL, west to s. AL. [= RAB, C, F, GW, K, S, WH, Z]

Sabatia dodecandra (Linnaeus) Britton, Sterns, & Poggenburg, Perennial Sea-pink, Large Marsh Rose-pink. Cp (GA, NC, SC, VA): tidal brackish and freshwater marshes; common (VA Watch List). June-August; August-October. CT south to e. SC and e. GA (Sorrie 1998b). [= F, S; < *S. dodecandra* var. *dodecandra* – RAB (also see *S. foliosa*); = *S. dodecandra* var. *dodecandra* – C, GW, K, Z]

Sabatia foliosa Fernald. Cp (FL, GA, SC): openings along blackwater rivers, cypress ponds; uncommon (rare in SC). June-August; August-October. E. SC south to ne. FL and Panhandle FL, west to se. TX. [< *S. dodecandra* var. *dodecandra* – RAB; = *S. dodecandra* (Linnaeus) Britton, Sterns, & Poggenburg var. *foliosa* (Fernald) Wilbur – GW, K, Z; > *S. foliosa* – S; > *S. harperi* Small – S; = *S. dodecandra* – WH]

Sabatia gentianoides Elliott. Cp (FL, GA, NC, SC): pine savannas, bogs; common. July-August; September-October. NC south to ne. FL and Panhandle FL, west to se. TX. [= RAB, GW, K, WH, Z; = *Lapithea gentianoides* (Elliott) Grisebach – S]

Sabatia kennedyana Fernald, Plymouth Gentian. Cp (NC, SC, VA*): seasonally exposed drawdown banks of the Waccamaw River, in adjacent ditches and disturbed flats (in se. NC and ne. SC), and very rarely on shores of beaver ponds (in e. VA, by introduction); rare (NC Threatened, SC Rare). June-August; August-October. This species has a strange, disjunct range, likely related to Pleistocene refugia on the (now) Continental shelf, present in s. Nova Scotia; e. MA and RI; se. NC and ne. SC. The record of the species in e. VA (Caroline County) reported by Fleming & Ludwig (1996) has now been determined to be a deliberate introduction. Studies underway suggest that the Carolina plants may differ varietally from those in New England (Sorrie, pers. comm.). [= C, F, GW, K, Z; = *S. dodecandra* var. *kennedyana* (Fernald) Ahles – RAB]

Sabatia macrophylla Hooker *var.* ***macrophylla***, Large-leaf Rose-gentian. Cp (FL?, GA): wet savannas; uncommon. Sw. GA west to e. LA. [= K, Z; < *S. macrophylla* – GW, WH; = *S. macrophylla* Hooker – S]

Sabatia macrophylla Hooker *var.* ***recurvans*** (Small) Wilbur, Small's Rose-gentian. Cp (FL, GA): wet savannas; common. E. and c. GA south to ne. FL; it may occur in se. SC. [= K, Z; < *S. macrophylla* – GW, WH; = *S. recurvans* Small – S]

Sabatia quadrangula Wilbur, Four-angle Sabatia. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): sandhills, moist forests, pocosin ecotones; uncommon (NC Watch List). June-September; August-November. E. VA south to n. peninsular FL, west to s. AL. [= RAB, C, GW, K, WH, Z; = *S. paniculata* Michaux – F, S, misapplied]

Sabatia stellaris Pursh, Annual Sea-pink. Cp (GA, NC, SC, VA): brackish marshes; common. July-October; August-November. S. MA south to s. FL, west to LA; Bahama Islands, Cuba, c. Mexico. [= RAB, C, F, GW, K, WH, Z]

Sabatia grandiflora (Gray) Small, Largeflower Rose-gentian. Cp (FL): wet flatwoods, marshes; common. Ne. FL, Panhandle FL, s. AL, south to s. FL. [= K, WH] {not yet keyed; add to synonymy}

GERANIACEAE A.L. de Jussieu 1789 (Geranium Family)

A family of about 5-11 genera and 700-835 species, herbs and shrubs, mostly temperate. References: Albers & Van der Walt in Kubitzki, Bayer, & Stevens (2007).

1 Leaves pinnately cleft or compound; fertile stamens 5, staminodia 5 ..... ***Erodium***
1 Leaves palmately cleft or compound; fertile stamens 10 (except in *G. pusillum*, and note that anthers are readily deciduous in all species) ..... ***Geranium***

Erodium L'Héritier in Aiton 1789 (Stork's-bill, Filaree)

A genus of about 60-80 species, herbs, mainly Old World. References: Albers & Van der Walt in Kubitzki, Bayer, & Stevens (2007).

1 Leaves simple, deeply lobed but not divided ..... ***E. texanum***
1 Leaves compound, with 3 or more leaflets.
2 Primary leaflets sessile or nearly so, sometimes connected by blade tissue; blades of the primary leaflets divided nearly or quite to the base; apical pits of mericarp lacking sessile glands ..... ***E. cicutarium***
2 Primary leaflets petiolulate; blades of the primary leaflets divided <0.75× to the base; apical pits of mericarp with sessile glands ..... ***E. moschatum* var. *moschatum***

* ***Erodium cicutarium*** (Linnaeus) L'Héritier, Heron's-bill, Common Stork's-bill, Redstem Filaree, Alfileria, Pin-clover. Mt, Pd, Cp (GA, NC, SC, VA): disturbed areas, fields, lawns; common, native of Europe. March-June; April-July. [= RAB, C, F, G, S, W; > *E. cicutarium* ssp. *cicutarium* – K]

* ***Erodium moschatum*** (Linnaeus) L'Héritier *var.* ***moschatum***, Whitestem Filaree. Cp (SC): waste area near wool-combing mill; rare, perhaps merely a waif, native of Mediterranean Europe. April-September. Naturalized south to DE and PA; also in SC Coastal Plain. [= F, K; < *E. moschatum* – C, G, S]

* ***Erodium texanum*** A. Gray, Texas Stork's-bill. Cp (SC): waste areas near wool-combing mill; rare, perhaps merely a waif, native of sc. and sw. United States. [= K]

Geranium Linnaeus 1753 (Geranium, Crane's-bill)

A genus of about 300-430 species, herbs, mainly temperate. House plants called 'geranium' are members of the genus *Pelargonium*. References: Aedo, Aldasoro, & Navarro (1998); Yeo (1984); Albers & Van der Walt in Kubitzki, Bayer, & Stevens (2007).

1 Petals 12-18 mm long; perennial, from a stout rhizome; anthers > 2 mm long; [subgenus *Geranium*, section *Geranium*] ..... ***G. maculatum***
1 Petals 2-13 mm long; annual or biennial, from a taproot; anthers < 1 mm long.
2 Leaves compound, at least the terminal segment (and often also the two lateral segments) petiolulate, not connected to the lateral segments by leaf tissue; petals 9-13 (-15) mm long; [rare in our area, restricted to Mountains of VA]; [subgenus *Robertium*, section *Robertium*] ..... ***G. robertianum***
2 Leaves dissected, but not compound, all segments interconnected by leaf tissue; petals 2-10 mm long; [collectively common and widespread in our area].
3 Sepals blunt or acute, or terminating in a minute callus tip; [subgenus *Robertium*, section *Batrachioidea*].
4 Mericarps glabrous, reticulately ridged; stem pubescence an admixture of long eglandular hairs (1.0-1.7 mm long) and short (< 0.5 mm long) gland-tipped and eglandular hairs; stamens (all 10) fertile (note that anthers may fall readily) ..... ***G. molle***
4 Mericarps appressed pubescent, not ridged; stem pubescence of short (< 0.3 mm long), gland-tipped and eglandular hairs; stamens partly sterile (the inner 5 fertile, the outer 5 lacking anthers) ..... ***G. pusillum***
3 Sepals awned or subulate, the subulate awn 0.7-3 mm long.
5 Mature pedicels < 1.5× as long as the calyx.
6 Mericarps with spreading hairs about 0.5 mm long, these often gland-tipped; [subgenus *Geranium*, section *Dissecta*] ..... ***G. dissectum***
6 Mericarps with long appressed hairs about 1 mm long, these not gland-tipped; [subgenus *Geranium*, section *Geranium*].
7 Inflorescence diffusely corymbiform (because of long upper internodes), mostly 4-12-flowered; pubescence of stem mostly < 0.5 mm long ..... ***G. carolinianum* var. *carolinianum***
7 Inflorescence a compact corymb (because of notably short upper internodes), mostly 5-25-flowered; pubescence of stem mostly >0.75 mm long ..... ***G. carolinianum* var. *confertiflorum***
5 Mature pedicels >2× as long as the calyx; [subgenus *Geranium*, section *Geranium*].
8 Pedicels spreading pubescent, the hairs not glandular; mature stylar beak ca. 1 mm long ..... ***[G. sibiricum]***
8 Pedicels either retrorse-strigose or glandular-villous; mature stylar beak 3-5 mm long.
9 Pedicels glandular-villous ..... ***[G. bicknellii]***
9 Pedicels retrorsely strigose ..... ***G. columbinum***

Geranium carolinianum Linnaeus *var.* ***carolinianum***, Southern Carolina Crane's-bill. Cp, Pd, Mt (GA, NC, SC, VA): fields, roadsides, lawns, pastures, gardens, disturbed areas; common. March-June (and sometimes later). [= C, F, G; < *G. carolinianum* – RAB, S, W; < *G. carolinianum* var. *carolinianum* – K]

Geranium carolinianum Linnaeus *var.* ***confertiflorum*** Fernald, Northern Carolina Crane's-bill. Mt (NC, VA), Pd (VA): fields, roadsides, lawns, gardens, disturbed areas; common. March-June (and sometimes later). [= C, F, G; < *G. carolinianum* – RAB, S, W; < *G. carolinianum* var. *carolinianum* – K]

* ***Geranium columbinum*** Linnaeus, Long-stalk Crane's-bill. Mt (GA, NC, VA), Pd (VA): roadsides, pastures, disturbed areas; common, native of Europe. May-July. [= RAB, C, F, G, K, S, W]

* ***Geranium dissectum*** Linnaeus, Cutleaf Crane's-bill. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (GA, NC, VA): roadsides, pastures, disturbed areas; common, native of Europe. April-June. [= RAB, C, F, G, K, S, W]

Geranium maculatum Linnaeus, Wild Geranium. Mt, Pd, Cp (GA, NC, SC, VA): cove forests, bottomland forests, other mesic, base-rich forests; common (rare in Coastal Plain). April-June. ME west to Manitoba, south to SC, GA, and ne. OK. Sometimes cultivated. [= RAB, C, F, G, K, S, W]

* ***Geranium molle*** Linnaeus, Dove's-foot Crane's-bill. Pd (GA, NC, SC, VA), Mt (NC, SC, VA), Cp (VA): roadsides, pastures, disturbed areas; common, native of Europe and w. Asia. April-July. [= RAB, C, F, G, K, S, W]

* ***Geranium pusillum*** Linnaeus, Small-flowered Crane's-bill. Mt (NC, VA), Pd (SC, VA), Cp (VA): roadsides, pastures, disturbed areas; common, native of Europe. May-June. [= RAB, C, G, K, S, W]

Geranium robertianum Linnaeus, Herb Robert. Mt (VA): rocky woodlands, especially over calcareous rocks; rare (VA Rare). June-October. Circumpolar, ranging south in North America to w. VA, nc. TN (Chester, Wofford, & Kral 1997), OH, IN, and IL. Considered by C and G to be introduced in North America, but apparently native. [= C, F, G, K, W]

Geranium bicknellii Britton. South to PA, IN, IL, c. TN. No documentation is known for the reports for VA and WV by Kartesz (1999). [= C, G, K, W; > *G. bicknellii* var. *bicknellii* – F]

* ***Geranium ibericum*** Cavanilles, Iberian Crane's-bill. Mt (NC): rare, spread from horticultural use, native of Europe. Recently been found in Great Smoky Mountains National Park, in both NC and TN (K. Langdon, pers. comm.). [= F, K; *G. nepalense* – C] {not yet keyed}

* ***Geranium sanguineum*** Linnaeus, Blood-red Crane's-bill. Mt (NC): roadbank, rare, probably persistent or spread from cultivation. [= C, F, G, K] {not yet keyed; add to synonymy}

* *Geranium sibiricum* Linnaeus, native to Asia, is naturalized south to s. PA (Rhoads & Klein 1993) and is likely to occur in at least the northern part of our area. [= C, F, K]

* ***Geranium thunbergii*** Siebold & Zuccarini ex Lindley & Paxton. Mt (NC), Pd (VA): lawn along Blue Ridge Parkway; rare, native of e. Asia. Reported for NC by Nesom (2000) on the basis of a 1936 specimen. [= K; *G. ibericum* Cavanilles – C, apparently misapplied; = *G. nepalense* Sweet var. *thunbergii* (Siebold & Zuccarini ex Lindley & Paxton) Kudo – F, G] {not yet keyed, and 'promote' to main text}

GROSSULARIACEAE A.P. de Candolle 1805 (Currant Family)
[also see *ITEACEAE*]

A family of one genus, of the northern hemisphere and montane South America (Andes). The familial distinction from the Saxifragaceae is supported by recent molecular data, though the affinities of Grossulariaceae and Saxifragaceae (sensu stricto) are closer than those of many other groups traditionally included in the Saxifragaceae, such as *Parnassia*, *Lepuropetalon*, and *Penthorum* (Morgan & Soltis 1993). References: Weigend in Kubitzki, Bayer, & Stevens (2007).

Ribes Linnaeus 1753 (Currant, Gooseberry)

A genus of 150-200 species, temperate, of the Northern Hemisphere and montane South America. The genus is separated into distinctive subgenera, these sometimes maintained as full genera (as by S). Of the species treated or mentioned here, the currants (subgenus *Ribes*) include *R. americanum*, *R. aureum* var. *villosum*, *R. glandulosum*, *R. lacustre*, *R. nigrum*, *R. rubrum*, and *R. triste*. The gooseberries (subgenus *Grossularia*) include *R. curvatum*, *R. cynosbati*, *R. echinellum*, *R. hirtellum*, *R. missouriense*, *R. rotundifolium*, and *R. uva-crispa* var. *sativum*. The dried "currants" commonly available in stores are actually raisins made from a small variety of grape, and have nothing to do with *Ribes*. A molecular study suggests that recognition of *Grossularia* as a genus distinct from *Ribes* is not warranted, though it does form a monophyletic group nested within *Ribes* s.l. (Senters & Soltis 2003; Weigend, Mohr, & Motley 2002). References: Sinnott (1985)=Z; Weigend, Mohr, & Motley (2002); Spongberg (1972); Schultheis & Donoghue (2004); Senters & Soltis (2003); Weigend in Kubitzki, Bayer, & Stevens (2007). Key adapted from C, F, and Z.

1 Flowers solitary or in corymbs of 2-4; pedicels not jointed just beneath the ovary or fruit, the fruit not disarticulating at maturirty; stems with (0-) 1-3 nodal spines and sometimes also with internodal bristles (especially on young, vigorous growth); [subgenus *Grossularia*].
  2 Ovary and fruit bristly or spiny; stamens (at full anthesis) either 9-15 mm long, exserted well beyond the calyx lobes (*R. echinellum*) or 1-3 mm long, shorter than the calyx lobes (*R. cynosbati*).
    3 Bristles of the ovary and fruit not gland-tipped; stamens (at full anthesis) 1-3 mm long, shorter than the calyx lobes; calyx lobes 2.5-4 mm long; petals 1-2 mm long; [of the Mountains] ..... ***R. cynosbati***
    3 Bristles of the ovary and fruit gland-tipped; stamens (at full anthesis) either 9-15 mm long, exserted well beyond the calyx lobes; calyx lobes 4-7 mm long; petals 2-3 mm long; [of the Piedmont or, potentially, Coastal Plain] ..... ***R. echinellum***
  2 Ovary and fruit glabrous; stamens (at full anthesis) 6-12 mm long, exserted well beyond the calyx lobes.
    4 Calyx tube white; stamens 9-12 mm long; nodal spines 1-3 per node, 7-18 mm long, stout ..... ***R. missouriense***
    4 Calyx tube purplish or purplish-green; stamens 6-8 mm long; nodal spines 0-1 (-2) per node, 3-11 mm long, slender .... ***R. rotundifolium***
1 Flowers in racemes of 4-many; pedicels jointed just beneath the ovary or fruit, the fruit disarticulating at maturity; stems lacking nodal spines and internodal bristles (except *R. lacustre*); [subgenus *Ribes*].
  5 Stems (especially young, vigorous growth) with internodal bristles and sometimes internodal spines; fruit bristly, purple or black when mature; racemes drooping ..... ***R. lacustre***
  5 Stems lacking internodal bristles and nodal spines; fruit glabrous or glandular-hispid, red or black when mature (but not both dark and bristly); racemes ascending, spreading, or drooping.
    6 Ovary and fruit bristly or spiny with glandular hairs; fruit dark red when mature; racemes ascending; leaves mostly 5-10 cm across, the 5-7 lobes more-or-less acute ..... ***R. glandulosum***
    6 Ovary and fruit glabrous; fruit red or black when mature; racemes spreading to drooping; leaves mostly 3-8 cm across, the 3-5 lobes more-or-less obtuse.
      7 Leaves with resinous glands beneath; fruits black when mature; [native] ..... ***R. americanum***
      7 Leaves not glandular beneath; fruits red when mature; [introduced, rarely naturalized] ..... ***R. rubrum***

Auxiliary Key to widely distributed *Ribes* of the Mountains

1 Leaves usually 5-10 cm long and wide, serrate or doubly serrate with sharp teeth; plants usually without nodal spines; inflorescence a raceme of 4-15 flowers; pedicel jointed below the fruit ..... ***R. glandulosum***
1 Leaves 1-5 cm long and wide, serrate with rounded teeth; plants usually with nodal spines; inflorescence a raceme of 1-4 flowers; pedicel not jointed below the fruit.

2 Ovary with glandular hairs which become stiff spines on the mature fruit; leaf bases cordate to deeply cordate (rarely truncate or cuneate), the angle of leaf tissue mostly 190-230°, moderately to sparsely silvery-pilose beneath, usually on the surface as well as on the veins and in the vein axils; stamens at full anthesis equalling the petals ..... ***R. cynosbati***

2 Ovary and fruit glabrous; leaf bases rounded or cuneate (rarely truncate or cordate), the angle of leaf tissue mostly 130-170°, glabrescent to sparsely pubescent beneath (mostly on the veins and in the vein axils); stamens at full anthesis exceeding the petals..... ***R. rotundifolium***

Ribes americanum P. Miller, American Black Currant. Mt (VA): moist forests, marl marshes; rare (VA Rare). April-June. Nova Scotia west to Alberta, south to w. VA, e. and nc. KY (Clark et al. 2005), IN, NE, and CO. [= C, F, G, K, W]

Ribes cynosbati Linnaeus, Prickly Gooseberry, Dogberry. Mt (GA, NC, VA): moist slopes, periglacial boulderfields, grassy balds, mostly at high elevations; common. May-June; July-September. Ne. United States and s. Canada south to w. NC, e. TN, n. GA, n. AL, AR, and OK. [= RAB, C, G, K, W, Z; > *R. cynosbati* var. *cynosbati* – F; > *R. cynosbati* var. *glabratum* Fernald – F; = *Grossularia cynosbati* (Linnaeus) P. Miller – S]

Ribes echinellum (Coville) Rehder, Miccosukee Gooseberry. Pd (SC): mesic, nutrient-rich forests; rare (US Endangered, SC Rare). March-April; June-September. This species has a remarkable range, known only from a small area of McCormick County, SC and the vicinity of Lake Miccosukee, Jefferson County, FL. Godfrey (1988) has a detailed description of *R. echinellum*. Catling, Dumouchel, & Brownell (1998) discuss its pollination biology. [= K, Z; = *Grossularia echinella* Coville – S]

Ribes glandulosum Grauer, Skunk Currant, Mountain Currant. Mt (NC, VA): periglacial boulderfields, high elevation seeps, spruce-fir forests; uncommon, but locally abundant (VA Watch List). May-June; June-September. Newfoundland and British Columbia, south to VT, MI, and MN, and in the mountains to w. NC and e. TN. [= RAB, C, F, G, K, S, W]

Ribes lacustre (Persoon) Poiret, Bristly Black Currant, Spiny Swamp Currant. Mt (VA): forests, acid swamps; rare (VA Rare). May-June. Labrador to AK, south to MA, PA, w. VA, TN (allegedly), n. OH, MI, MN, CO, UT, and CA. The documentation for the inclusion of *R. lacustre* in the flora of VA is a sterile specimen not definitely identifiable (Wieboldt, pers. comm.). [= C, F, G, K, W]

Ribes missouriense Nuttall, Missouri Gooseberry. Mt (VA): forests, rock outcrops; rare, in VA probably introduced from further west (VA Watch List), but native in KY and TN. April-June; May-July. W. WV, sw. OH, IN, WI, MN, and e. ND south to KY, e. TN (Roane and Grainger counties), s. IL, MO, n. AR, and KS, with scattered occurrences (perhaps escapes from cultivation) in CT, NJ, PA, MD, and VA. [= C, F, G, K, Z; = *Grossularia missouriensis* (Nuttall) Coville & Britton – S]

Ribes rotundifolium Michaux, Appalachian Gooseberry. Mt (NC, SC, VA), Pd (VA): moist slopes, balds, boulderfields, rocky forests, mostly at high elevations south of VA; common (rare in Piedmont). April-May; June-September. An Appalachian endemic: MA, CO, and NY south to w. NC and e. TN. [= RAB, C, F, G, K, W, Z; = *Grossularia rotundifolia* (Michaux) Coville & Britton – S]

* ***Ribes rubrum*** Linnaeus, Garden Red Currant. Mt (NC, VA), Pd (VA): persistent from cultivation and rarely escaped to adjacent fence-rows and disturbed areas; rare, native of Europe. [= K; > *R. sativum* Syme – C, F, G]

Ribes aureum Pursh var. *villosum* A.P. de Candolle, Buffalo Currant, of midwestern United States is cultivated in ne. United States, rarely as far south as our area; it may escape. It also is reported as occurring as a native species as far east as Montgomery County in nc. TN (Chester, Wofford, & Kral 1997). It will key to couplet 6, where trouble will be encountered. It has the hypanthium long-tubular, the flowers golden yellow, and fruits black (rarely yellow). [= K; = *R. odoratum* H. Wendland – C, F, G] {not yet keyed}

Ribes curvatum Small, Granite Gooseberry. Pd, Mt (GA): rocky upland forests; rare (GA Special Concern). Native from c. and nw. GA (Jones & Coile 1988) and e. TN, in the Cumberland Plateau (Chester, Wofford, & Kral 1997) westward. Also reported for NC by Sinnott (1985), and his report is backed up by specimens. The specimens, however, indicate that the species was cultivated in a botanist's garden; there is no evidence that *R. curvatum* is a native or naturalized component of NC's flora. It will key best to *R. missouriense*; it can be distinguished from all our species of gooseberries by its glandular-punctate leaves, and additionally from *R. missouriense* by its calyx lobes 7.5-9 mm long, sparsely hairy to villous (vs. 5-7.5 mm long, glabrous to sparsely pubescent). [= K; = *Grossularia curvata* (Small) Coville & Britton – S] {not yet keyed}

Ribes hirtellum Michaux, Northern Gooseberry, ranges south to WV (Tucker County), n. NJ, s. PA, and OH. It will key to couplet 2, where trouble will be encountered. It has glabrous ovaries and fruits, but the stamens are short and included. [= C, K; > *R. hirtellum* var. *hirtellum* – F, G] {not yet keyed}

* *Ribes nigrum* Linnaeus, Garden Black Currant or Cassis, native to Europe, is cultivated in ne. United States, rarely as far south as our area; it may escape. It will key to *R. americanum*, from which it can be distinguished by its pedicels 2-8 mm long, much longer than subtending ovate bracts (vs. pedicels 0-2 mm long, shorter than the subtending lanceolate bracts). [= C, F, G, K] {not yet keyed}

Ribes triste Pallas, Swamp Red Currant, ranges south to WV (Mineral, Pocahontas, and Randolph counties); it may occur in our area. It is very similar to *R. rubrum*, and will key there. It differs in the following ways: decumbent or straggling shrub (vs. erect), axis and pedicels of inflorescence often with stipitate glands (vs. not glandular). If found in our area, it should be in an obviously native habitat, likely in boggy forests or seepage wetlands at high elevations, and probably in VA. [= C, F, G, K] {not yet keyed}

* *Ribes uva-crispa* Linnaeus var. *sativum* A.P. de Candolle, Garden Gooseberry, native of Europe, is cultivated in ne. United States, rarely as far south as our area; it may escape. It will key best to *R. cynosbati*, but differs in the fruits being glandular-pubescent (vs. hispid), and the peduncles and pedicels being short (vs. peduncles 7-25 mm long, pedicels 5-16 mm long). [= K; > *R. uva-crispi* – C; = *R. grossularia* Linnaeus – F, G] {not yet keyed}

HALORAGACEAE R. Brown 1814 (Water-milfoil Family)

A family of 8-9 genera and about 150 species, aquatic and wetland herbs, but also shrubs and trees, cosmopolitan but centered in the Southern Hemisphere, especially Australia. The family is sometimes spelled "Haloragidaceae." References: Kubitzki in Kubitzki, Bayer, & Stevens (2007).

1 Leaves whorled or alternate; stamens 4 or 8; carpels 4; emersed leaves bract-like and much-reduced (except in *M. aquaticum*) . ***Myriophyllum***

1 Leaves alternate; stamens 3; carpels 3; emersed leaves foliaceous, little if at all reduced ..... ***Proserpinaca***

Myriophyllum Linnaeus 1753 (Water-milfoil)
(contributed by B.A. Sorrie and A.S. Weakley)

A genus of about 60 species, aquatic and wetland herbs, cosmopolitan, but centered in Australia. References: Crow & Hellquist (2000)=Z; Aiken (1981)=Y.

Identification notes: Stranded plants of *M. heterophyllum* and *M. humile* (and perhaps others) produce leaves that are reduced in size. Leaves and bracts become pectinate or pinnate, so that plants resemble *M. pinnatum*. Such plants are the source of nearly all inland records of *M. pinnatum* in the VA-NC-SC-GA area. *M. heterophyllum* usually flowers and fruits when stranded and may be distinguished from *M. pinnatum* by its much denser disposition of leaves and bracts, and by its dull red fruits obscurely tuberculate (vs. tan or pale brown fruits strongly tuberculate). From stranded *M. humile*, *M. heterophyllum* may be distinguished by leaves and bracts which are clearly whorled and much more densely disposed. *M. humile* differs from *M. pinnatum* by its wholly alternate leaves and bracts, and by its smooth fruits.

1 Leaves reduced to small scales or absent; stems short, erect from substrate ..... ***M. tenellum***
1 Leaves well-developed, pinnately divided with filiform segments; stems elongate, suspended in the water column and/or floating.
  2 Flowers/fruits absent and emersed shoots with leaves closely similar in size and shape to submersed ones; widespread alien ..... ***M. aquaticum***
  2 Flowers/fruits present; emersed shoots present or not.
    3 Flowers/fruits in axils of leaves.
      4 Leaves whorled; emersed stems present and with feathery leaves ..... ***M. aquaticum***
      4 Leaves strictly alternate; flowers/fruits on submersed stems (forma *capillaceum*) or on emersed stems with pinnatifid or pectinate leaves (forma *natans*) ..... ***M. humile***
    3 Flowers/fruits in erect spikes emersed from water, f/f subtended by bracts much smaller than the normally submersed leaves.
      5 Uppermost flowers/fruits alternate; leaves alternate or whorled or both.
        6 Bracts much shorter than floral internodes, varying from pectinate to entire; fruit surface smooth or papillose ..... ***M. laxum***
        6 Bracts usually longer than floral internode, pinnatifid to pectinate; fruit surface strongly tuberculate ..... ***M. pinnatum***
      5 Uppermost flowers/fruits opposite; leaves whorled (technically pseudo-whorled in many *M. heterophyllum*) (note that early season plants of *M. pinnatum* may have flowers opposite, but at least some leaves will be alternate).
        7 Bracts usually > 2× as long as pistillate flowers; stems drying brown, pale brown, or reddish.
          8 Bracts throughout inflorescence pectinate to pinnatifid; winter buds scattered along stem, clavate, falling by early winter; [of DE and northward] ..... ***M. verticillatum***
          8 Distal bracts subentire to serrate, proximal bracts pectinate to serrate; winter buds developed only at base of stem or on rhizomes, usually persisting; widespread ..... ***M. heterophyllum***
        7 Bracts usually < 2× as long as pistillate flowers; stems drying pale tan or whitish.
          9 Midstem leaves with 11 or fewer segments on each side of rachis; leaves rounded at apex; stem diameter more-or-less uniform; stem tips usually green; winter buds produced; [native, of DE and northward] ..... ***M. sibiricum***
          9 Midstem leaves with 12 or more segments on each side of rachis; many leaves appear truncate or clipped at apex; stem diameter below inflorescence is up to 2× diameter of lower stem; stem tips usually reddish; no winter buds; [widespread alien] ..... ***M. spicatum***

Alternate key

1 Leaves reduced to small scales or absent; stems short, erect from substrate ..... ***M. tenellum***
1 Leaves well-developed, pinnately divided with filiform segments; stems elongate, suspended in the water column and/or floating.
  2 Flowers/fruits produced in axils of submersed leaves ..... ***M. humile***
  2 Flowers/fruits produced in axils of emersed leaves or on emersed shoots with bracts (reduced bracteal leaves).
    3 Emersed shoots with feathery leaves about same size and shape as submersed leaves; flowers/fruits rarely produced; [widespread alien] ..... ***M. aquaticum***
    3 Emersed shoots with bracts subtending flowers/fruits; these bracts much different in shape than submersed leaves. [stranded plants may produce bracts and leaves of similar size and shape, but these not feathery].
      4 All flowers/fruits alternate; fruits smooth ..... ***M. humile***
      4 All flowers/fruits opposite or whorled (or the lower opposite and the upper alternate in *M. pinnatum*).
        5 Bracts usually longer than the internodes.
          6 Leaves whorled or pseudo-whorled; fruits with low bumps ..... ***M. heterophyllum***
          6 Leaves strictly alternate; fruits strongly tuberculate ..... ***M. pinnatum***
        5 Bracts usually shorter than the internodes.
          7 All bracts pectinate to pinnatifid ..... ***M. verticillatum***
          7 Bracts vary from entire to pectinate.
            8 Leaves alternate, pseudo-whorled, or both; plain green; [of se. VA and southward] ..... ***M. laxum***
            8 All leaves whorled, grayish green; [collectively widespread]
              9 Midstem leaves with 11 or fewer segments on each side of rachis; leaves rounded at apex; stem diameter more-or-less uniform; stem tips usually green; winter buds produced; [native, of DE and northward] ..... ***M. sibiricum***
              9 Midstem leaves with 12 or more segments on each side of rachis; many leaves appear truncate or clipped at apex; stem diameter below inflorescence is up to 2× the diameter of the lower stem; stem tips usually reddish; no winter buds; [widespread alien] ..... ***M. spicatum***

* ***Myriophyllum aquaticum*** (Vell. Conc.) Verdc., Parrot-feather. Cp, Pd, Mt (GA, NC, SC, VA): ditches, slow-moving rivers, pools, ponds; common (rare in Piedmont and Mountains), native of South America. April-June. An introduced species

now widespread in se. United States, north to NY, WV, and MO. [= C, GW, K, W, Y, Z; = *M. brasiliense* Cambessedes – RAB, F, G; = *M. proserpinacoides* Gillies ex Hooker & Arnott – S]

Myriophyllum heterophyllum Michaux, Southern Water-milfoil. Cp (GA, NC, SC, VA), Pd, Mt (GA): ditches, slow-moving waters of rivers and streams, pools, ponds; common. April-July. NY west to Ontario and MN, south to FL and TX. [= RAB, C, F, G, GW, K, S, Y, Z]

Myriophyllum humile (Rafinesque) Morong. Cp (VA): floating in an artificial pond; rare (VA Rare). [= C, F, G, K, Y, Z]

Myriophyllum laxum Shuttleworth ex Chapman, Loose Water-milfoil. Cp (GA, NC, SC, VA): limesink depression ponds (dolines), spring-runs, rarely also in lakes; rare (GA Threatened, NC Threatened, SC Rare). June-October. Se. VA south to n. FL, s. AL, and s. MS (Sorrie & Leonard 1999). *M. laxum* and *M. heterophyllum* both have reddish submersed stems and present difficulties in identification when in sterile condition. *M. laxum* has a total of 7-15 (-17) segments per leaf, vs. (15-) 17-31 (-37) segments in *M. heterophyllum*. Documented for VA by a 1922 specimen from Princess Anne County at GH (Sorrie, pers. comm.). [= RAB, GW, K, S, Y]

Myriophyllum pinnatum (Walter) Britton, Sterns, & Poggenburg, Alternate-leaved Water-milfoil. Cp (GA, NC, SC, VA), Mt? (GA, VA): pools, ditches; uncommon (VA Watch List). June-October. MA west to IA and SD, south to GA and TX. [= RAB, C, F, G, GW, K, S, W, Y, Z]

* ***Myriophyllum spicatum*** Linnaeus, Eurasian Water-milfoil. Cp (GA, NC, SC, VA): ponds and impoundments; uncommon? {habitat and range in our area uncertain}, native of Eurasia, confused with *M. sibiricum*, (see below). An introduced species, now widespread in e. United States. Reported for South Carolina by Hill & Horn (1997). [= C, GW, K, W, Y, Z]

Myriophyllum tenellum Bigelow, Leafless Water-milfoil. Cp (NC, VA): natural lakes (Carolina bay lakes), typically growing on the sandy bottoms in water 1-2 meters deep; rare (NC Rare, VA Rare). Newfoundland west to MN, south to PA and NJ, and disjunct south to a few occurrences in VA and NC. [= C, F, G, K, Y, Z]

Myriophyllum sibiricum Komarov. South to DE, and reported for VA. [= C, G, K, Z; > *M. exalbescens* Fernald – F, Y]

Myriophyllum verticillatum Linnaeus. A circumboreal species, south in North America to DE, MD, IN, NE, TX, and CA. [= C, G, K, Y, Z; > *M. verticillatum* var. *pectinatum* Wallroth – F]

Proserpinaca Linnaeus 1753 (Mermaid-weed)

A genus of 2-3 species, aquatic and wetland herbs, of e. North America and the West Indies. References: Catling (1998)=Z.

1 Bracteal (emersed) leaves serrate; submersed pectinate leaves with 8-14 pairs of divisions 5-30 mm long; fruits 2.3-6.0 mm wide.
  2 Fruit 2.3-4.0 mm wide, acutely angled, not winged, the sides of the capsule more-or-less planar..... ***P. palustris* var. *crebra***
  2 Fruit (3.5-) 4.0-6.0 mm wide, sharply angled (to somewhat winged), the sides of the capsule concave..... ***P. palustris* var. *palustris***
1 Bracteal (emersed) leaves pinnatifid to pectinate; submersed pectinate leaves with 4-12 pairs of divisions 2-7.5 mm long; fruits 2.0-3.6 mm wide.
  3 Leaves with a flattened rachis 1-4 mm wide, the 7-12 pairs of divisions 2.0-3.5 mm long; fruits 2.3-3.6 mm wide..... ***P. intermedia***
  3 Leaves with a filiform rachis (midrib) 0.2-1.0 mm wide, the 4-9 pairs of divisions 2.0-7.5 mm long; fruits 2.0-2.8 mm wide..... ***P. pectinata***

Proserpinaca intermedia Mackenzie, Intermediate Mermaid-weed. Cp (NC, SC, VA), Mt (VA); {GA}: wet places; rare (NC Watch List). July-September. Nova Scotia to SC on the Coastal Plain; disjunct in sc. TN. This taxon is intermediate in morphology between *P. palustris* and *P. pectinata*; whether it warrants species status is unclear. If merely a rarely produced first-generation hybrid, it should be treated as a hybrid binomial (*P.* ×*intermedia*); if it forms independent, self-reproducing populations, it should probably be treated as a species. [= RAB, C, F, G, K, Z; < *P. palustris* – GW]

Proserpinaca palustris Linnaeus *var.* ***crebra*** Fernald & Griscom, Common Mermaid-weed. Cp (GA, NC, SC, VA): wet places, swamp forests; uncommon. June-October. Throughout e. North America and south to the Caribbean and Central America. [= C, F, G, K, Z; < *P. palustris* – RAB, S, W; < *P. palustris* – GW (also including *P. intermedia)*]

Proserpinaca palustris Linnaeus *var.* ***palustris***, Coastal Mermaid-weed. Cp (GA, NC, SC, VA), Pd (NC, SC), Mt? (GA?): wet places, swamp forests; common. June-October. MA (?) to FL and west to LA, on the Coastal Plain. [= C, F, G, K, Z; < *P. palustris* – RAB, S, W; *P. palustris* – GW (also including *P. intermedia)*]

Proserpinaca pectinata Lamarck, Feathery Mermaid-weed. Cp (GA, NC, SC, VA), Pd (GA): bogs, savannas, ditches, other wet places; common. June-October. Nova Scotia south to s. FL and west to w. LA, mostly on the Coastal Plain, but scattered inland as well, as in c. TN. [= RAB, C, F, G, GW, K, S, Z]

Proserpinaca palustris Linnaeus *var.* ***amblyogona*** Fernald occurs east to KY, TN, and GA. [= C, F, G, K; < *P. palustris* – GW, S] {not yet keyed}

HAMAMELIDACEAE R. Brown 1818 (Witch Hazel Family)
[also see *ALTINGIACEAE*]

A family of ca. 27 genera and ca. 87 species, trees and shrubs, tropical to temperate, and especially e. Asian. References: Meyer in FNA (1997); Endress in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves 5-7-palmately lobed and palmately veined, glabrous..... [see ***Liquidambar*** in ***ALTINGIACEAE***]
1 Leaves unlobed, pinnately veined, stellate-pubescent beneath (at least when young).

2 Petals 0; stamens 12-32; flowers numerous in dense globose or elongate spikes; leaves with a symmetric or asymmetric (oblique) base, the lateral veins marginal for a distance of at least 2-3 mm; [tribe *Fothergilleae*] ..... ***Fothergilla***
2 Petals 4; stamens 4; flowers few in small clusters; leaves with a weakly to strongly asymmetric (oblique) base, the lateral veins included in the blade tissue or barely exposed for a distance of <1 mm; [tribe *Hamamelideae*] ..... ***Hamamelis***

Fothergilla Murray in Linnaeus 1774 (Witch-alder)

A genus of 2 species, shrubs, of temperate e. North America. References: Meyer in FNA (1997); Weaver (1969)=Z; Endress in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: *Fothergilla major* often occurs with *Hamamelis virginiana*, with which it is easily confused in vegetative condition; a reliable character is the base of the lateral veins (marginal in *Fothergilla*, included in leaf tissue in *Hamamelis*).

1 Leaves stellate-pubescent above, up to 6 cm long and 5 cm wide (the largest < 5.2 cm wide); stamens 12-24; capsules 6.5-10-5 (-13) mm long, the persistent hypanthium 3.4.5 mm long; seeds 4.8-6.3 mm long; [of wet savannas, pocosins, and pocosin margins of the Coastal Plain] ..... ***F. gardenii***
1 Leaves glabrous or sparsely stellate-pubescent above, up to 12 cm long and 10 cm wide (the largest > 5.2 cm wide); stamens (18-) 22-32; capsules 8-15.2 mm long, the persistent hypanthium 4-9.2 mm long; seeds 6.2-7.8 mm long; [of rocky habitats of the Mountains and Piedmont] ..... ***F. major***

Fothergilla gardenii Linnaeus, Coastal Witch-alder. Cp (GA, NC, SC): wet savannas, pocosins, and pocosin margins; uncommon (GA Threatened). March-May; September-October. Se. NC (and allegedly se. VA) south to panhandle FL and s. AL. An ornamental prized for its small size and attractive fall color. [= RAB, F, FNA, GW, K, Z; > *F. gardeni* – S, orthographic variant; > *F. parvifolia* Kearney – S]

Fothergilla major (Sims) Loddiges, Large Witch-alder. Mt, Pd (GA, NC, SC): dry ridgetop forests of middle elevation ridges in the mountains, especially along the Blue Ridge Escarpment, summits and upper slopes of Piedmont monadnocks, north-facing bluffs in the lower Piedmont; rare (GA Special Concern, NC Rare, SC Rare). April-May; July-October. C. NC west to ne. TN, south to nc. GA and nc. AL; disjunct in AR. [= RAB, FNA, K, S, W, Z; > *F. monticola* Ashe]

Hamamelis Linnaeus 1753 (Witch-hazel)

A genus of 5-6 species, shrubs and small trees, of e. North America and e. Asia (China and Japan). The other North American species, *H. vernalis* Sargent, is endemic to the Ozark/Ouachita region of AR, OK, and MO. References: Leonard (2006)=X; Meyer in FNA (1997); Lane (2005)=Z; Jenne (1966)=Y; Wen & Shi (1999); Endress in Kubitzki, Rohwer, & Bittrich (1993).

1 Outer surface of calyx scarlet; petals 7-14 mm long, red or reddish (often yellow-tipped), flowering late December to early February; leaves 12-24 cm long, 5-17 cm wide, densely stellate-pubescent below, usually with 11 lateral veins (6 on one side of the leaf, 5 on the other); [plants of pineland ravines in s. MS] ..... ***[H. ovalis]***
1 Outer surface of calyx yellow; petals 6-8 mm long, yellow, flowering October-January; leaves 3.7-16.7 cm long, 2.5-13 cm wide, glabrous to densely stellate-pubescent beneath, usually with 9 or 10 lateral veins; [plants widespread in our area]
  2 Stellate trichomes of the leaves moderately dense to dense, averaging 0.09 mm across, with 7-11 rays; leaves (3.6-) avg. 6.4 (-10.3) cm long, (1.8-) avg. 4.1 (-6.2) cm wide; petals 7-15 mm long, 0.5-0.8 mm wide; [e. SC south to Panhandle FL, west to se. LA in the Coastal Plain] ..... ***H. virginiana* var. *henryae***
  2 Stellate trichomes of the leaves sparse to moderately dense, averaging 0.16-0.40 mm across, with 3-6 (-8) rays; leaves (4.7-) avg. 9.9 (-14.0) cm long, (3.9-) avg. 6.6 (-9.2) cm wide; petals 15-20 mm long, 1 mm wide; [widespread in our area] .... ***H. virginiana* var. *virginiana***

Hamamelis virginiana Linnaeus *var.* ***henryae*** Jenne ex C. Lane, Small-leaved Witch-hazel. Cp (FL, GA, SC): sandhill margins, xeric hammocks, streamheads; uncommon. November-January. E. SC (Horry and Hampton counties), s. GA, and panhandle FL west to se. LA. Though cited in Lane (2005) as var. *henryi*, the honoree is collector Mary G. Henry; thus the honorific epithet should be corrected to the feminine form. Additional study is needed of these small-leaved Coastal Plain populations. [< *H. virginiana* – FNA, GW, K, S, WH; = *H. virginiana* var. *henryi* Jenne ex C. Lane – Y, Z, orthographic error; = *H. virginiana* var. *henryae*]

Hamamelis virginiana Linnaeus *var.* ***virginiana***, Witch-hazel. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): forests; common (rare in FL). October-December; October-November (of the following year). Québec and Nova Scotia west to n. MI and MN, south to FL and TX. The bark is still gathered in large quantities in the Southern Appalachians, as the source for witch hazel liniment. The name "witch-hazel" alludes to its superficial resemblance to *Corylus*, the true hazel, and to its "perverse" habit of flowering in the fall, as it drops its leaves. [= Y, Z; < *H. virginiana* – RAB, C, FNA, G, GW, K, S, W, WH; > *H. virginiana* var. *parvifolia* Nuttall – F; > *H. virginiana* var. *virginiana* – F]

Hamamelis ovalis S.W. Leonard. Cp (MS): dry-mesic pineland ravines; rare. Late December-early February. Apparently endemic to sc. MS (Perry County) (Leonard 2006). [= X]

HELIOTROPACEAE Schrader 1819 (Heliotrope Family)

A family of 5 genera and ca. 400 species, trees, shrubs, and herbs, semicosmopolitan.

Heliotropium Linnaeus (Heliotrope, Turnsole)

A genus of ca. 250 species, widespread in tropical and temperate regions. Probably better placed in the family Heliotropiaceae, as it is apparently more closely related to Hydrophyllaceae than to Boraginaceae. Currently under study and additional taxonomic changes may be forthcoming (Hilger & Diane 2003). References: Al-Shehbaz (1991)=Z; Hilger & Diane 2003).

1 Flowers solitary at the ends of short branches; [of limestone habitats from nw. GA westward]; [section *Orthostachys*, subsection *Bracteata*]... ***H. tenellum***
1 Flowers in secund, helicoid cymes.
2 Leaves glabrous, succulent, < 7 mm wide; [of saline coastal situations]; [section *Halmyrophila*] ..... ***H. curassavicum var. curassavicum***
2 Leaves pubescent, not succulent, > 10 mm wide; [of a variety of mostly disturbed, inland situations].
3 Mericarps separating at maturity; fruit 4-lobed prior to maturation; leaves petiolate, ca. 2× as long as wide; [section *Heliotropium*]..... ***H. europaeum***
3 Mericarps cohering in pairs at maturity; fruit 2-lobed prior to maturation; leaves petiolate or sessile to subsessile, ca. 2-5× as long as wide.
4 Fruit tuberculate, 4-seeded; leaves sessile to subsessile, ca. 4-5× as long as wide; corolla throat and tube densely villous within; [section *Heliophytum*]..... ***H. amplexicaule***
4 Fruit longitudinally ribbed, 2-seeded; leaves petiolate, ca. 2× as long as wide; corolla throat and tube glabrous within; [section *Tiaridium*] ..... ***H. indicum***

* ***Heliotropium amplexicaule*** M. Vahl, Wild Heliotrope. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): disturbed areas, roadsides, fields; uncommon (rare north of SC), native of South America. April-September. [= RAB, C, F, G, K, Z]

Heliotropium curassavicum Linnaeus *var.* ***curassavicum***, Seaside Heliotrope. Cp (FL, GA, NC, SC, VA): edges of brackish and salt marshes, estuarine shores; rare (NC Rare). June-September. Var. *curassavicum* ranges from DE (and farther north as an introduction) south to the New World tropics. Considered by some authors to be introduced and naturalized in our area. Other varieties occur inland in the mw. and w. United States. [= C, K, Z; < *H. curassavicum* – RAB, GW; = *H. curassavicum* – F, G; = *Heliotropium curassavicum* ssp. *curassavicum*]

* ***Heliotropium europaeum*** Linnaeus, European Heliotrope. Cp (FL, GA, NC, SC, VA), Pd (NC, VA): roadsides, disturbed areas; rare, native of s. Europe. June-September. [= RAB, C, F, G, K, Z]

* ***Heliotropium indicum*** Linnaeus, Turnsole. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): roadsides, woodland borders, swamps, ditches; uncommon, native of South America. July-November. [= RAB, C, F, G, GW, K, Z; = *Tiaridium indicum* (Linnaeus) Lehm. – S]

Heliotropium tenellum (Nuttall) Torrey, Delicate Heliotrope. Mt (GA): limestone glades and barrens; rare (GA Special Concern). WV, KY, IN, IL, IA, and KS south to nw. GA, AL, MS, LA, and TX. [= C, F, G, K, Z; = *Lithococca tenella* (Nuttall) Small – S]

Heliotropium polyphyllum Lehmann, Pineland Heliotrope. Cp (FL): pine flatwoods, pond margins; common. FL. [= K] {add synonymy; not yet keyed}

HYDRANGEACEAE Dumortier 1829 (Hydrangea Family)

A family of about 17 genera and 190-220 species, trees, shrubs, vines, and herbs, primarily north temperate. As here interpreted, the family Hydrangeaceae includes two well-marked groups, the Hydrangeae (including *Decumaria* and *Hydrangea*) and the Philadelpheae (including *Deutzia* and *Philadelphus*). This group has been shown by molecular research to be unrelated to the Saxifragaceae, and to have its closest affinities to the Loasaceae, Cornaceae, and Nyssaceae (Xiang et al. 2002; Soltis, Xiang, & Hufford 1995; Morgan & Soltis 1993). References: Spongberg (1972); Soltis, Xiang, & Hufford (1995); Morgan & Soltis (1994); Xiang et al. (2002); Hufford in Kubitzki (2004).

1 Woody vine, climbing by aerial rootlets; petals 7-10; [tribe *Hydrangeae*]..... ***Decumaria***
1 Shrub; petals 5 (rarely 10 in the cultivars of the alien *Deutzia*).
2 Pubescence of leaves and twigs stellate; stamens 10; [a cultivated alien, rarely escaped]; [tribe *Philadelpheae*]..... ***Deutzia***
2 Pubescence of leaves and twigs simple; stamens 8-10 (*Hydrangea*) or 25-90 (*Philadelphus*); [natives and aliens].
3 Leaf blades 10-30 cm long; inflorescences of 25-many flowers; stamens 8-10; [tribe *Hydrangeae*]..... ***Hydrangea***
3 Leaf blades 3-8 cm long; inflorescences of 1-7 flowers; stamens 25-90; [tribe *Philadelpheae*]..... ***Philadelphus***

Decumaria Linnaeus (Climbing Hydrangea, Woodvamp)

A genus of 2 species, vines, of e. North America and e. Asia (China). References: Hufford in Kubitzki (2004).

Identification notes: *Decumaria* is readily distinguished from the other opposite-leaved, woody vines in our flora (*Gelsemium, Trachelospermum, Lonicera, Bignonia, Campsis*, and *Clematis*) by its leaves (simple, ovate, and usually serrate) and climbing structures (adventitious roots).

HYDRANGEACEAE

Decumaria barbara Linnaeus, Climbing Hydrangea, Woodvamp. Cp (GA, NC, SC, VA), Pd (GA, SC), Mt (GA, NC): swamp forests and bottomlands in the Coastal Plain (and Piedmont of SC), moist forests in the mountains of n. GA, nw. SC, sw. NC; common (rare in Mountains). May-June; July-October. Se. VA south to FL and west to LA and e. TX (Singhurst, Keith, & Holmes 2005), inland to nw. SC, se. TN, and w. TN. This handsome vine climbs to the tops of trees via adventitious roots. The opposite leaves are somewhat fleshy in texture. [= RAB, C, F, G, GW, K, S, W]

Deutzia Thunberg (Deutzia)

A genus of about 60 species, shrubs, mainly Asian. References: Hufford in Kubitzki (2004).

* ***Deutzia scabra*** Thunberg, Deutzia, Pride-of-Rochester. Mt, Pd (NC, VA), Cp (VA): fairly commonly cultivated, persistent around old homesites and escaping to adjacent woodlands; rare, native of Japan and China. First reported for NC (Jackson Co., NC) by Pittillo & Brown (1988); now known from scattered sites. *D. crenata* Siebold & Zuccarini, Chinese Deutzia, is reported as introduced in GA by Kartesz (1999); this may not be taxonomically distinct from *D. scabra*. [= C, F; > *D. scabra* – K; > *D. crenata* Siebold & Zuccarini – K; > *D. scabra* var. *candisissima* (Froebel) Rehder]

Hydrangea Linnaeus (Hydrangea, Sevenbark)

A genus of about 25 species, shrubs, of e. North America and e. Asia. Recent molecular analyses suggest that *Hydrangea* as usually interpreted is polyphyletic (Soltis, Xiang, & Hufford 1995); future taxonomic changes are to be expected. See Dirr (2004) and van Gelderen & van Gelderen (2004) for information on cultivated hydrangeas. References: Pilatowski (1982)=Z; McClintock (1957)=Y.

1 Leaves pinnately lobed, the lobes toothed; inflorescence a panicle; large sterile flowers many (> 20 per inflorescence), borne throughout the inflorescence ..... ***H. quercifolia***
1 Leaves unlobed, merely toothed; inflorescence a corymb (except *H. paniculata*); large sterile flowers absent to relatively few (0-15 per inflorescence), borne around the periphery of the corymb (except *H. paniculata*).
  2 Inflorescence a panicle; large sterile flowers many (> 20 per inflorescence), borne throughout the inflorescence; [large shrub to small tree (to 8 m tall)]; [alien, cultivated and sometimes persistent] ..... ***H. paniculata***
  2 Inflorescence a corymb; large sterile flowers absent to relatively few (0-15 per inflorescence), borne around the periphery of the corymb; [small to medium shrub, to 3 m tall]; [native].
    3 Lower leaf surface glabrous or inconspicuously puberulent, appearing green; trichomes of the lower leaf surface restricted to the midrib and major veins; sterile flowers absent, or, if present, usually < 1 cm in diameter ..... ***H. arborescens***
    3 Lower leaf surface variously pubescent, appearing white or gray; trichomes of the lower leaf surface on veins and interveinal areas; sterile flowers usually present, large and showy, usually greater than 1 cm in diameter.
      4 Lower leaf surface velutinous, pilose, or tomentose, appearing gray; trichomes usually not dense enough to entirely mask the green leaf surface; trichomes with prominent tubercles (as seen at 40× magnification); sterile flowers generally very few (0-3 per inflorescence) ..... ***H. cinerea***
      4 Lower leaf surface densely floccose-velutinous, felt-like, appearing bright white or silver; trichomes dense enough to entirely mask the green leaf surface; trichomes without tubercles, or with small and inconspicuous tubercles (as seen at 40× magnification); sterile flowers generally fairly many (2-15 per inflorescence) ..... ***H. radiata***

Hydrangea arborescens Linnaeus, Smooth Hydrangea. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): forests, especially around rock outcrops and along streambanks; common (rare in Coastal Plain). May-July. NJ, s. NY, OH, IN, IL, MO, and se. KS south to e. NC, c. SC, c. GA, panhandle FL, s. AL, LA, and OK. [= K, S, W, Z; = *H. arborescens* ssp. *arborescens* – RAB, Y; = *H. arborescens* var. *arborescens* – C, G; > *H. arborescens* var. *arborescens* – F; > *H. arborescens* var. *oblonga* Torrey & A. Gray – F]

Hydrangea cinerea Small, Ashy Hydrangea. Mt, Pd (GA, NC, SC): rocky forests and rock outcrops, roadbanks, perhaps strictly or mostly associated with mafic or calcareous rocks; uncommon. May-July. Sw. NC, c. IN, c. IL, and c. MO south to n. SC, sc. AL, and c. AR. [= K, S, W, Z; = *H. arborescens* ssp. *discolor* (Seringe) McClintock – RAB, Y; = *H. arborescens* var. *discolor* Seringe – C, G; = *H. arborescens* var. *deamii* E. St. John – F]

* ***Hydrangea paniculata*** Siebold, Panicle Hydrangea. Mt (NC, VA): persistent after cultivation at old home-sites, sometimes appearing naturalized; rare, native of e. Asia. July-August. [= C, F, G, K]

Hydrangea quercifolia Bartram, Oakleaf Hydrangea. Pd, Mt, Cp (GA, *NC, SC): native in rich foothill forests (very rare), also in disturbed areas, thickets, or forests adjacent to urban or suburban areas; rare, native of further south. May-July. C. and sw. TN and nw. SC, south through w. GA, AL, and MS to panhandle FL and e. LA; scattered elsewhere as a remnant or escpae from cultivation. Boufford & Wood (1977) describe an apparently native occurrence in nw. SC. This southeastern native is a spectacular garden plant, frequently planted, rarely escaping or persisting. [= C, F, G, K, S]

Hydrangea radiata Walter, Snowy Hydrangea, Silverleaf. Mt (GA, NC, SC), Pd (NC, SC): rocky forests and rock outcrops, often common and conspicuous on roadbanks; common. May-July. A Southern Appalachian endemic: sw. NC (in the valley of the French Broad River and to its southwest), nw. SC, ne. GA, and se. TN, with outliers (perhaps escaped from cultivation?) in Stokes County, NC and Calhoun County, SC. This attractive species is especially typical of the escarpment gorge region near the tricorner of NC, SC, and GA, in the vicinity of the towns of Highlands, Cashiers, and Rosman, NC, where it is conspicuous along roadbanks. [= K, S, W, Z; = *H. arborescens* ssp. *radiata* (Walter) McClintock – RAB, Y]

Philadelphus Linnaeus (Mock-orange)

A genus of 65 (or fewer) species, shrubs, of north temperate areas. The most recent monographer of the genus, Hu (1954-1955) recognizes many species and varieties on the basis of minor differences in pubescence. Many of the recognized taxa are based only on cultivated material. The native distributions of the varieties have little phytogeographic coherence, and several varieties are often reported from the same site, suggesting that they reflect merely variation within a population (if genetically based at all). For instance, Hu recognizes three varieties in *Ph. hirsutus* and five in *Ph. inodorus*, but these seem to be no more than forms. As Hu writes, "the formerly recognized species, *Ph. grandiflorus* Willd., and *Ph. laxus* Schrad., are merely different forms of a species with heterogeneous leaf shape, size, and margins. Fostered by growers, propagated and distributed through cuttings, these forms have maintained their distinction in gardens since their discoveries. But when they are projected on the spectrum of variations exhibited by a large number of specimens collected from the homeland of *Ph. inodorus* Linn. they appear to be nothing but a few transitional forms. In this paper, these forms are treated as varieties." Hu's "varieties" should be treated as forms or cultivars, if recognized at all. I have taken a conservative approach, though variation in several of our native species could use additional study. References: Hu (1954-1956)=Z; A.E. Weakley (2002).

1 Axillary buds exposed above the petiole base (best observed in mature long-shoot leaves, not always visible in axils of young leaves or on short-shoot leaves); twigs of the current year villous-hirsute; seeds not caudate; [subgenus *Deutzioides*, section *Deutzioides*] .....***Ph. hirsutus***
1 Axillary buds contained within a distinct pouch directly below the petiole (best observed in mature, long-shoot leaves); twigs of the current year glabrous; seeds with caudate tails about as long as the embryo; [subgenus *Philadelphus*].
  2 Flowers 1-3 (-9) in a cymule; stamens 60-90; [subgenus *Philadelphus*, section *Pauciflorus*] .....***Ph. inodorus***
  2 Flowers 5-9 in a determinate raceme; stamens 20-50; [subgenus *Philadelphus*, section *Philadelphus*].
    3 Bark of the current year brown, exfoliating in its second year; flowers fragrant..... ***Ph. coronarius***
    3 Bark of the current year gray, not exfoliating later; flowers not fragrant or only slightly so..... ***Ph. pubescens***

* ***Philadelphus coronarius*** Linnaeus, European Mock-orange. Pd (NC), {GA, SC, VA}: cultivated (though moreso in the past than now), and sometimes escaped or persisting around old homesites; rare, native of Europe. May-July. *Ph. coronarius* is the most commonly cultivated *Philadelphus* in our area, though it is currently considered rather old-fashioned. [= C]

Philadelphus hirsutus Nuttall, Hairy Mock-orange, Cumberland Mock-orange. Mt (GA, NC, SC, VA), Pd (SC): bluffs, rock outcrops, rocky woodlands, often with seepage, over mafic or calcareous rocks; rare (NC Watch List, SC Rare, VA Watch List). April-May; June-August. A Southern Appalachian species: sw. VA and KY south and west to w. NC, TN, n. GA, and n. AL. *Ph. sharpianus* Hu, known from e. TN and nc. AR, is similar to *Ph. hirsutus*, allegedly differing in the hypanthium glabrous (vs. more or less pubescent), the leaves strigose-pilose above, glabrous or sparsely strigose or with the nerves only villous beneath (vs. scabrous-hirsute above, uniformly villous beneath); it is probably best considered only a form of *Ph. hirsutus*. *Ph. hirsutus* is cultivated and it may escape outside of the range stated. [= RAB, C, F, G, S, W; > *Ph. hirsutus* – K, Z; > *Ph. sharpianus* Hu – K, Z; > *Ph. hirsutus* var. *intermedius* Hu – Z; > *Ph. hirsutus* var. *nanus* Hu – Z; > *Ph. sharpianus* Hu var. *parviflorus* Hu – Z]

Philadelphus inodorus Linnaeus, Appalachian Mock-orange. Mt, Pd, Cp (GA, NC, SC, VA): rich forests and woodlands, rocky bluffs over mafic or calcareous rocks, and also cultivated and persistent; uncommon (rare in Coastal Plain). April-May; June-August. VA and TN south to panhandle FL, GA, and s. AL (and according to C, also in e. PA). *Ph. floridus* Beadle, known from nw. GA, is similar to *Ph. inodorus*, allegedly differing in the pedicels and hypanthium pubescent (vs. glabrous); it is probably only a form of *Ph. inodorus*. [= RAB, C, G, W; > *Ph. inodorus* var. *inodorus* – F, S, Z; > *Ph. inodorus* var. *carolinus* Hu – Z; > *Ph. inodorus* var. *grandiflorus* (Willdenow) A. Gray – F, Z; > *Ph. inodorus* var. *laxus* (Schrader) Hu – Z; > *Ph. inodorus* var. *strigosus* Beadle – S, Z; > *Ph. grandiflorus* Willdenow – S; > *Ph. gloriosus* Beadle – S; > *Ph. inodorus* – K; > *Ph. floridus* Beadle – K, S, Z]

Philadelphus pubescens Loiseleur, Ozark Mock-orange, Hairy Mock-orange. Mt (GA), Pd* (VA*): limestone bluffs; rare (GA Special Concern). E. TN, KY, nw. GA (Jones & Coile 1988), AL, MO, OK, and AR, west of the Blue Ridge. It has been documented from TN counties adjacent to both VA and NC, and is likely to be found in VA, at least. [> *Ph. intectus* Beadle – S; > *Ph. latifolius* Schrader ex A.P. de Candolle – S; > *Ph. intectus* var. *intectus* – Z; > *Ph. intectus* var. *pubigerus* Hu – Z; > *Ph. pubescens* var. *verrucosus* (Schrader) Hu – Z; > *Ph. pubescens* var. *pubescens* – K, Z; > *Ph. pubescens* var. *intectus* (Beadle) A.H. Moore – K]

HYDRASTIDACEAE Martinov 1820 (Golden-seal Family)

A family of 2 genera and 2 species, perennial herbs, of temperate e. North America and Japan. In chemistry, morphology, and anatomy, *Hydrastis* shows some relationship to *Podophyllum* and *Diphylleia* of the Podophyllaceae (often included in the Berberidaceae). Though usually placed in the Ranunculaceae, Tobe & Keating (1985) present evidence from morphology, anatomy, embryology, palynology, chemistry, and cytology that suggests that *Hydrastis* is best recognized as a monotypic family. They contend that "*Hydrastis* represents a relictual primitive group which very early diverged from a common ancestral stock of the Ranunculaceae, Berberidaceae and probably of Circaeasteraceae, and that *Hydrastis* has evolved in its own evolutionary line parallel with other lines leading to the modern representatives of these families." In recent papers on classification of the flowering plants, Thorne (1992) and Reveal (1993) have also accepted Hydrastidaceae as a distinct family. Tobe in Kubitzki & Bayer places *Hydrastis* with *Glaucidium* Siebold & Zuccarini in a bigeneric Hydrastidaceae. References: Tamura in Kubitzki, Rohwer, & Bittrich (1993); Tobe in Kubitzki & Bayer (2002).

Hydrastis Linnaeus 1759 (Golden-seal)

A monotypic genus, an herb, endemic to e. North America. References: Ford in FNA (1997); Tamura in Kubitzki, Rohwer, & Bittrich (1993).

Hydrastis canadensis Linnaeus, Golden-seal. Mt (GA, NC, SC, VA), Pd (GA, NC, VA): mesic, very nutrient-rich forests, with circumneutral soils, over calcareous or mafic rocks such as limestone, amphibolite, and dolostone, sometimes forming large colonies after canopy disturbance such as logging; rare (GA Endangered, NC Endangered, VA Watch List). April; May-June. VT and MN south to w. and c. NC, n. GA, TN, and AR. Exploited for the herbal trade (and still often used as a home remedy in more remote parts of the mountains), though too rare in our area to support economically significant wild collection. The root is bitter in taste and contains several alkaloids. Reported for SC (P. McMillan, pers.comm. 2002). [= RAB, C, F, FNA, G, K, S, W]

HYDROLEACEAE Berchtold & J. Presl 1820 (Hydrolea Family)

The Hydroleaceae is not closely related to Hydrophyllaceae; recent molecular data confirm the prevailing view through most of the 19th century that *Hydrolea* was in its own family. References: Ferguson (1998); Hilger & Diane (2003); Angiosperm Phylogeny Group (1998, 2003).

Hydrolea Linnaeus 1762

A genus of about 11 species, aquatic and wetland herbs, of tropical and subtropical regions.

1 Flowers in axillary cymes; leaves 3-14 cm long, 1.5-4 cm wide; axillary spines present in the axils of some leaves; corolla 7-8 mm long.
  2 Calyx and stem sparsely pubescent with spreading hairs 2-3 mm long ..... ***H. quadrivalvis***
  2 Calyx and stem glabrous, or minutely puberulent or with sessile glands ..... ***[H. uniflora]***
1 Flowers in terminal cymes or corymbs; leaves 2-6 cm long, 0.6-2.5 cm wide; axillary spines present or absent; corolla 10-15 mm long.
  3 Leaves elliptic to lanceolate, 2-3 cm long, 0.6-1.0 cm wide; axillary spines absent or rudimentary ..... ***H. corymbosa***
  3 Leaves ovate to ovate-lanceolate, 3-6 cm long, 1.5-2.5 cm wide; axillary spines preset, well-developed, to 1.5 cm long ..... ***H. ovata***

Hydrolea corymbosa J. Macbride ex Elliott, Skyflower. Cp (GA, SC): pond cypress savannas, depression meadows; rare. Ne. SC south to sw. GA and FL. See Nelson (1993). The author is sometimes stated as J.F. Macbride, but this is an error. [= RAB, GW, K; = *Nama corymbosum* (Macbride ex Elliott) Kuntze – S]

Hydrolea ovata Nuttall ex Choisy, Ovate False-fiddleleaf. Cp (GA): swamps, ponds, ditches; rare. June-August. C. GA west to TX, north in the interior to sc. TN and MO. [= C, F, G, GW, K; = *Nama ovatum* (Nuttall ex Choisy) Britton – S]

Hydrolea quadrivalvis Walter, Waterpod. Cp (GA, NC, SC, VA), Pd (NC, VA): swamp forests, backwater sloughs, marshes, ditches; common (VA Watch List). June-September. Se. VA south to FL, west to LA. [= RAB, C, F, G, GW, K; = *Nama quadrivalve* (Walter) Kuntze – S]

Hydrolea uniflora Rafinesque. Swamp forests, sloughs, marshes. June-September. Mainly in the Mississippi River Alluvial Plain, west to e. TX and east to AL, TN, and KY. [= C, F, G, GW, K; = *Nama affine* (A. Gray) Kuntze – S; = *Hydrolea affinis* A. Gray]

HYDROPHYLLACEAE R. Brown 1817 (Waterleaf Family)

A family of about 18 genera and 270 species, herbs and shrubs, nearly cosmopolitan, concentrated in w. North America. References: Wilson (1960a); Constance (1963). [also see *HYDROLEACEAE*]

1 Leaves entire, simple; styles 2, distinct to the summit of the ovary.
  2 Flowers in axillary cymes; capsule subglobose; leaves 2-12 cm long ..... ***[see Hydrolea in HYDROLEACEAE]***
  2 Flowers solitary or paired in the leaf axils; capsule cylindrical leaves 0.8-1.5 (-3.5) cm long ..... ***Nama***
1 Leaves dissected, lobed, or toothed (sometimes the basalmost leaves simple); style fused for a portion of its length, 2-cleft toward the tip; ovary with 1 locule.
  3 Flowers solitary opposite the leaves on the upper portion of the stem (sometimes also terminal in a lax, (1-) 2-6-flowered cyme).
    4 Leaves opposite below, alternate above; petals 5-8 mm long; leaves elliptical in outline, pinnatifid into 7-13 lanceolate segments; calyx lobes to 10 mm long in fruit; capsule 4-seeded ..... ***Ellisia***
    4 Leaves all alternate; petals 2-4 mm long; leaves broadly triangular in outline, divided into 3-5 obovate segments; calyx lobes 1-3 mm long; capsule 1-2 (-3)-seeded ..... ***Nemophila***
  3 Flowers all terminal in 3-many-flowered cymes.
    5 Inflorescence repeatedly branched subdichotomously; larger leaf blades > 8 cm wide; stamens well exserted from the corolla (3 mm or more beyond the corolla); plants perennial from fibrous roots ..... ***Hydrophyllum***
    5 Inflorescence with a strong central axis (some secondary branching in *Ph. bipinnatifida*, but not as above); larger leaf blades < 5 cm wide (except *Ph. bipinnatifida*); stamens slightly exserted from the corolla (< 3 mm beyond the corolla) (except well-exserted in *Ph. bipinnatifida*, included in *Ph. covillei*); plants annual (biennial in *Ph. bipinnatifida*) from a taproot ..... ***Phacelia***

Ellisia Linnaeus (Waterpod)

Ellisia is considered to be a monotypic genus, an herb of c. and e. North America, but generic limits in the Hydrophyllaceae are badly in need of critical reassessment. References: Constance (1940)=Z.

Ellisia nyctelea (Linnaeus) Linnaeus, Waterpod, Aunt Lucy. Pd, Mt (VA): moist shaded forests, especially bottomlands; uncommon. May-June. IN and MI west to Alberta, south to AR and OK; disjunct in e. North America from s. NY and NJ south to sc. VA. Likely to occur in nc. NC. [= C, F, G, GW, K, W, Z; = *Nyctelea nyctelea* (Linnaeus) Britton – S]

Hydrophyllum Linnaeus (Waterleaf)

A genus of 8 species, herbs, of e. and w. North America. References: Constance (1942)=Z; Beckmann (1979)=Y; Alexander (1941)=X.

1 Principal cauline leaves palmately lobed, maple-like, differing from the pinnately divided basal leaves.
  2 Sepals with small reflexed appendages exserted at each sinus of the calyx; plant biennial from a taproot; stamens exserted 1-3 mm beyond the corolla; leaf lobing relatively shallow and irregular ..... ***[H. appendiculatum]***
  2 Sepals with appendages absent or rudimentary; plant perennial from fibrous roots; stamens exserted 3-6 mm beyond the corolla; leaf lobing relatively deep and regular ..... ***H. canadense***
1 Principal cauline leaves pinnately divided, similar to the basal leaves.
  3 Inflorescence and upper stem densely hirsute with spreading hairs 1-2 mm long; leaves pinnatifid with (7-) 9-13 segments, these toothed but not lobed ..... ***H. macrophyllum***
  3 Inflorescence and upper stem glabrate to strigose with appressed to ascending hairs < 0.5 mm long; leaves with 5-7 (-9) segments, some of them sometimes deeply 2-lobed.
    4 Corolla deep purple to maroon; lower stem glabrous to slightly (rarely moderately) pubescent with retrorse hairs; [of low to high elevations in the Mountains] ..... ***H. virginianum var. atranthum***
    4 Corolla white to lavender or pale purple; lower stem slightly to densely pubescent with retrorse to spreading hairs; [of low elevations of the Piedmont, Mountains, and Coastal Plain] ..... ***H. virginianum var. virginianum***

Hydrophyllum canadense Linnaeus, Mapleleaf Waterleaf, Canada Waterleaf, Broadleaf Waterleaf. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (VA): cove forests, rocky streambanks, other moist and nutrient-rich forests; common (rare in Coastal Plain and in Piedmont south of VA) (SC Rare). May-June; August. VT and s. Ontario west to MI and WI, south to n. GA, AL, AR, and MO. [= RAB, C, F, G, K, S, W, Y, Z]

Hydrophyllum macrophyllum Nuttall, Hairy Waterleaf. Mt (GA, NC, VA): cove forests and other moist rocky forests, especially over calcareous or mafic rocks; rare (GA Special Concern, NC Rare, VA Watch List). May; July. WV west to OH, and IL, south to sw. VA, w. NC, n. GA, and n. AL; reports from AR are erroneous, and are based on material of *Hydrophyllum brownei* Kral & Bates (Peck 2003). The w. North American *H. occidentale* (S. Watson) A. Gray is rather closely related. [= RAB, C, F, G, K, S, W, Y, Z]

Hydrophyllum virginianum Linnaeus *var.* ***atranthum*** (E.J. Alexander) Constance, Appalachian Waterleaf. Mt (NC, VA): cove forests and other moist rocky forests; common. May-June; July-August. N. WV south through w. and sw. VA and e. KY to w. NC and e. TN. Since its naming as a species (Alexander 1941) and subsequent reduction to a variety (Constance 1942) there has been little consensus about this taxon, some regarding it as merely a color form. Alexander lists numerous characters additional to that of flower color; they need further investigation. "*H. atranthum* differs from *H. virginianum* in the dark-violet flowers, the brown hairs on the appendages, brown filaments, corolla-lobes longer than the tube, stamens shorter [11.5 mm] and more slender, and the more numerous leaf-lobes. *H. virginianum* has flowers white to pale lavender or pinkish, white hairs on the appendages, white filaments, corolla-lobes and tube equal in length, filaments longer (13.5 mm) and stouter, and 5-7 leaf-segments." Beckmann (1979) did not accept the variety, stating that "this pigment combination appears sporadically in other sectors of the species range." Based on herbarium material I have seen darker than usual flowers are found outside of the Southern Appalachians; they do not, however, approach in darkness the flowers of Southern Appalachian material and the somewhat darker-flowered plants outside the Southern Appalachians do not share the stem pubescence character stated in the key above. The general correlation of flower color and lower stem pubescence and the tight geographical range of var. *atranthum* incline me to accept it provisionally as a variety. It is not, however, limited to high elevations, as stated or implied by some authors. The two varieties provisionally accepted here need more careful study, including either statistical studies of morphology, or electrophoretic or molecular studies. [= C, F, G, Z; < *H. virginianum* – RAB, K, W, Y; < *H. virginicum* – S, orthographic error; = *H. atranthum* E.J. Alexander – X]

Hydrophyllum virginianum Linnaeus *var.* ***virginianum***, Eastern Waterleaf, Virginia Waterleaf. Mt, Pd (NC, VA), Cp (VA): cove forests, moist rocky forests, alluvial forests; common. April-June; July-August. NH and Québec west to ND, south to e. VA, c. NC, KY, s. IN, s. IL, nc. AR, and ne. OK. As discussed by Beckmann (1979) and Constance (1941), *H. virginianum* is a closely related vicariant of *H. tenuipes* Heller of British Columbia south to CA. See *Phacelia bipinnatifida* for additional suggestions on distinguishing it from this species. [= C, F, G, Z; < *H. virginianum* – RAB, K, W, Y; < *H. virginicum* – S, orthographic error; = *H. virginianum* – X]

Hydrophyllum appendiculatum Michaux, Biennial Waterleaf. S. Ontario and MN, south to sw. PA, WV, e. TN, n. AL (Jackson Co.), MO, and e. KS. It was attributed to NC by Small (1933) on unknown grounds. [= C, F, G, K, Y, Z; = *Decemium appendiculatum* (Michaux) Small – S]

Nama Linnaeus (Fiddleleaf)

A genus of about 45 species, herbs, of sw. North America, tropical America, and Hawaii. [also see *Hydrolea* in *HYDROLEACEAE*]

* ***Nama jamaicense*** Linnaeus, Jamaica Weed. Cp (SC): lawns; rare, native of tropical America (including FL and TX). May. [= K; = *N. jamaicensis* – RAB, orthographic variant; = *Marilaunidium jamaicense* (Linnaeus) Kuntze – S]

Nemophila Nuttall (Baby Blue-eyes)

A genus of 11 species, herbs, of North America (mostly w. North America). References: Constance (1941).

Identification notes: *Nemophila* is superficially similar to *Phacelia covillei* and *Ph. ranunculacea*, with which it often co-occurs. They can be distinguished with the following key.

1 Flowers solitary, on pedicels opposite the leaves, the pedicels mostly > 12 mm long; corolla white (sometimes aging to pale lavender), 2.5-3.5 mm long; fruits ovoid, longer than thick, turning purple at maturity, exceeding the 2-4 mm long calyx lobes ..... ***Nemophila aphylla***
1 Flowers borne in 2-6-flowered terminal cymes, the pedicels mostly < 12 mm long; corolla pale blue or lavender, 4-5 mm long; fruits depressed globular and weakly 4-lobed, the apex depressed, remaining green at maturity, shorter than the calyx, the lobes of which expand to 5-8 mm long.
  2 Pubescence of the lower stem consisting of appressed to ascending, stiff, pointed hairs; [of rivers in the Atlantic drainage] ..... ***Phacelia covillei***
  2 Pubescence of the lower stem spreading or even retrorse, most of the hairs weak and twisted, and many of them glandular-tipped; [of rivers in the Mississippi drainage] ..... ***[Phacelia ranunculacea]***

Nemophila aphylla (Linnaeus) Brummitt. Cp, Pd (GA, NC, SC, VA): moist, nutrient-rich floodplain forests; uncommon, though often locally abundant. March-April. MD south to panhandle FL and west to TX, north in the interior to e. TN, w. KY, and se. MO. [= GW, K; = *N. microcalyx* (Nuttall) Fischer & Meyer – RAB, F, G, S; = *N. triloba* (Rafinesque) Thieret – C]

Phacelia A.L. de Jussieu 1789 (Phacelia)

A genus of about 150 species, of North America and South America, concentrated in w. North America. References: Constance (1949)=Z; Levy (1991)=Y; Murdy (1966); Gillett (1968, 1964).

Identification notes: 1. *Phacelia bipinnatifida* and *Hydrophyllum virginianum* are sometimes confused. *Ph. bipinnatifida* has the larger and more basal leaves distinctly bipinnatifid, the lower pinnae often stalked (vs. pinnatifid, the basal or terminal pinnae sometimes 2-lobed, all the pinnae more-or-less sessile), pubescence of the upper stem and inflorescence in part glandular (pubescence nonglandular), and seeds 4 per capsule, black (vs. 2 per capsule, light brown). 2. *Phacelia covillei* and *Ph. ranunculacea* are superficially similar to and sometimes confused with *Nemophylla aphylla*, which see for discussion.

1 Corolla lobes fimbriate; seeds 4 per capsule.
  2 Corolla white (rarely slightly lavender); pubescence of the stem spreading; lobes of cauline leaves mostly obtuse; seeds 3.0-3.5 mm long ..... ***Ph. fimbriata***
  2 Corolla lavender to blue; pubescence of the stem appressed; lobes of cauline leaves mostly acute; seeds 1.5-3.0 mm long ..... ***Ph. purshii***
1 Corolla lobes entire; seeds 4-15 per capsule.
  3 Stamens 1.5-2 mm long; style 1.5-2 mm long; corolla tubular; seeds globose-ovoid, nearly spherical, 4 per capsule.
    4 Pubescence of the lower stem consisting of appressed to ascending, stiff, pointed hairs; [of rivers in the Atlantic drainage] .... ***Ph. covillei***
    4 Pubescence of the stem spreading or even retrorse, most of the hairs weak and twisted, and many of them glandular-tipped; [of rivers in the Mississippi drainage] ..... ***[Ph. ranunculacea]***
  3 Stamens 3-10 mm long; style 3-15 mm long; corolla rotate to broadly campanulate; seeds ovoid-angled, 4-15 per capsule.
    5 Corolla 10-15 mm across, blue; plant 10-60 cm tall; seeds 2.5-4 mm long, black; ultimate segments of the leaf 15-45 mm long, 10-25 mm wide; pedicels recurved in fruit; [of moist forests of the Mountains and (very rarely) Piedmont] ..... ***Ph. bipinnatifida***
    5 Corolla 5-11 mm across, white to blue; plant 5-40 cm tall; seeds 1.5-2.2 mm long, brown; ultimate segments of the leaf 5-15 mm long, 5-9 mm wide; pedicels ascending to spreading in fruit; [of alluvial forests, granitic flatrocks, and other habitats, of the Piedmont, Coastal Plain, and Mountains].
      6 Sepals 4-8 mm long, linear or oblanceolate; marginal bristles of sepals spreading, 1.0-1.5 mm long; plants mostly erect ..... ***Ph. maculata***
      6 Sepals 2-4 mm long, narrowly ovate; marginal bristles of sepals appressed, 0.3-1.0 mm long; plants mostly decumbent, branched from the base.
        7 Sepals 2.6-4.0 mm long; petals 4-6 mm long; marginal bristles of sepals 0.6-0.9 mm long; basal leaves with 1-3 pairs of lateral leaflets. the terminal leaflet larger and usually 3-lobed; cauline leaves with 1-3 pairs of rather broad lobes; [of various habitats (including granitic flatrocks and domes) in SC, NC, and VA] ..... ***Ph. dubia var. dubia***
        7 Sepals 2.0-3.0 mm long; petals 3.5-5 mm long; marginal bristles of sepals 0.4-0.7 mm long; basal leaves with 4-5 pairs of lateral leaflets, the terminal leaflet about the same size and unlobed; cauline leaves with 2-4 pairs of narrow lobes; [of granitic flatrocks and domes of the Piedmont of SC and southwestward] ..... ***Ph. dubia var. georgiana***

HYDROPHYLLACEAE

Phacelia bipinnatifida Michaux, Fernleaf Phacelia, Forest Phacelia. Mt (GA, NC, SC, VA): cove forests, especially where rocky; common (SC Rare, VA Watch List). April-May; June. W. VA west to s. OH, n. IN, n. IL, and c. MO, south to w. NC, nw. SC, n. GA, c. AL, and n. AR. *Ph. bipinnatifida* var. *plummeri* (= *Ph. brevistyla*) is "based on a variation with sparser pubescence, larger and less divided leaf segments, smaller flowers, and sub-included stamens and style. These variations are not concomitant, and the distribution of forms showing a complete or partial combination of them is sporadic" (Constance 1949). The matter deserves additional study. [= RAB, C, G, K, W, Z; > *Ph. bipinnatifida* var. *bipinnatifida* – F; > *Ph. bipinnatifida* var. *plummeri* Wood – F; > *Ph. brevistyla* Buckley – S; > *Ph. bipinnatifida* – S]

Phacelia covillei S. Watson ex A. Gray, Eastern Buttercup Phacelia. Pd (NC, VA): rich soils of floodplains, and contiguous terraces and slopes; rare (NC Rare, VA Rare). April; May. Ranging in two disjunct areas – c. NC and sc. VA (in the drainages of the Cape Fear, Tar, and Roanoke rivers) and DC, n. VA, and sc. MD (in the drainage of the Potomac River). Most recent authors have included this taxon within the closely similar *Ph. ranunculacea*; as thus broadly defined, *Ph. ranunculacea* was considered to occur in 3 peculiarly disjunct areas; one centered around St. Louis, MO (w. KY, w. TN, e. MO, ne. AR, se. MO, s. IL, and s. IN), one near Washington, DC (DC, n. VA, and sc. MD), and a third in c. NC and sc. VA. Chuang & Constance (1977) reported that the western population center has a chromosome number of n=6, and that the two eastern population centers have n=14. The disparate cytotypes of eastern and western *Ph. ranunculacea* sensu lato led Chuang & Constance to seek morphological differences that would warrant the recognition of separate taxa, but they reported that "no consistent morphological distinction has been found between the two cytotypes." Stem pubescence does, however, show consistent, though subtle, differences between eastern and western populations of this complex. Eastern material has the stem pubescence relatively sparse, consisting of appressed to ascending, stiff, pointed hairs. Western populations have stem pubescence relatively dense, much of it spreading or even retrorse, most of the hairs weak and twisted, and many of them glandular-tipped. Given the disparate cytotypes, correlated with allopatric distribution and slight but consistent morphological differences, it seems best to provisionally recognize two taxa; further study, using chemical and molecular techniques would be valuable. Recognition at the species level is nomenclaturally the more conservative (and here followed) because of the pre-existence of Watson's binomial; varietal status might be the more appropriate. *Ph. covillei* and *Ph. ranunculacea* (sensu stricto) have numerous characteristics that render their inclusion in *Phacelia* uncomfortable (see discussion in Chuang & Constance 1977, Constance 1949, Gillett 1968). See *Nemophila aphylla* for suggestions on distinguishing these two superficially similar species. [= K; < *Ph. ranunculacea* (Nuttall) Constance – RAB, C, F, G, Z]

Phacelia dubia (Linnaeus) Trelease *var. **dubia***, Appalachian Phacelia. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): floodplain forests, rocky forests, fields, roadsides, granitic flatrocks; common. April-May; June. Var. *dubia* ranges from NY and PA west to WV, south to nc. SC, sw. NC, and se. TN. The *Phacelia dubia* complex has been under detailed biosystematic study by Foster Levy and associates (Levy 1991a, 199b, 1997; Levy et al. 1996; Levy & Malone 2001; Levy & Neal 2001; Taylor & Levy 2002; del Castillo 1994, 1998). Male sterile cytotypic variants are common in some populations but formal taxonomic recognition ius not warranted (Levy 1991a, 1991b; del Castillo 1994, 1998). Additionally, an incipient variety, informally termed "imitator", occurs in c. SC (Levy 1991a; Levy & Malone 2001). These populations are morphologically variable, some more similar to var. *georgiana*, others more similar to var. *dubia*; see Levy (1991a) for further discussion. They may warrant taxonomic recognition, as they are allopatric from each of the 3 named varieties, and show degrees of sterility when bred with each of the three, but morphologic differences have not evolved (Levy & Malone 2001). [= K, Y; < *Ph. dubia* – RAB, C, F, S, W; > *Ph. dubia* var. *dubia* – G; > *Ph. dubia* var. *fallax* (Fernald) Gleason – G; > *Ph. dubia* var. *dubia* – Z (also including var. *interior*)]

Phacelia dubia (Linnaeus) Trelease *var. **georgiana*** McVaugh, Georgia Phacelia. Pd (GA): granitic flatrocks; rare. April-May; June. Var. *georgiana* ranges from GA west to ec. AL, in the Piedmont. It has sometimes been attributed to SC, and Levy found plants in SC which morphologically resemble var. *georgiana*, but he concluded that this "imitator" genotype was largely sterile when bred with var. *georgiana*. See var. *dubia* for additional discussion. [= K, Y, Z; < *Ph. dubia* – RAB, C, F, S, W; ? *Ph. dubia* var. *dubia* – G]

Phacelia fimbriata Michaux, Fringed Phacelia, Blue Ridge Phacelia. Mt (GA, NC, VA): moist forests on slopes and floodplains, at low to high elevations, perhaps mainly over circumneutral soils; uncommon, but locally abundant (GA Special Concern, VA Rare). April-May. Sw. VA south to w. NC, e. TN, and n. GA (Jones & Coile 1988), a Southern Appalachian endemic. [= RAB, C, F, G, K, S, W, Z]

Phacelia maculata Wood, Flatrock Phacelia. Pd (GA, NC, SC): bottomlands, granitic flatrocks; uncommon (NC Rare List). April; May. Sc. NC south to GA and west to ec. AL. [= RAB, K, W, Y, Z; ? *Ph. hirsuta* – S, misapplied]

Phacelia purshii Buckley, Miami-mist. Mt (GA, NC, SC, VA): moist forests on floodplains and slopes; rare (GA Special Concern, VA Watch List). May-June. S. PA west to s. Ontario, OH and MO, south to nw. SC, nw. GA, and c. AL. Plants "with smaller flowers, shorter pedicels, and smaller capsules and seeds" are the basis of *Ph. boykinii* and *Ph. bicknellii* (Constance 1949). A study of the matter was initiated and specimens annotated as "*Ph. purshii* ssp. *boykinii*," but the research was not completed and the name was never published; further study is warranted. [= RAB, C, F, G, K, W, Z; > *Ph. purshii* – S; > *Ph. boykinii* (A. Gray) Small – S; > *Ph. bicknellii* Small – S]

Phacelia dubia (Linnaeus) Trelease var. *interior* Fernald, endemic in c. TN. [= K; < *Ph. dubia* – C, F, G, S; < *Ph. dubia* var. *dubia* – Z] {not yet keyed}

Phacelia ranunculacea (Nuttall) Constance, Western Buttercup Phacelia. In the Mississippi and Ohio river drainages, centered around St. Louis, MO (w. KY, w. TN, e. MO, ne. AR, se. MO, s. IL, and s. IN). [= K; < *Ph. ranunculacea* – RAB, C, F, G, Z]

Phacelia strictiflora (Engelmann & Gray) Gray var. *robbinsii* Constance. East to AL. [= K, Z] {not yet keyed}

HYPERICACEAE A.L. de Jussieu 1789 (St. John's-wort Family)

HYPERICACEAE

It appears from molecular analysis that recognition of the Hypericaceae may (after all) be warranted. *Hypericum* is in a clade with *Podostemum* and *Bonnetia*, sister to a clade including Clusiaceae s.s. (Savolainen et al. 2000), and unless the morphologically very different Podostemaceae is to be included in a broad Clusiaceae, Hypericaceae and Podostemaceae must be recognized. References: Adams (1973)=Z; Godfrey (1988)=Y; Wood & Adams (1976); Stevens in Kubitzki, Bayer, & Stevens (2007). [separate from *CLUSIACEAE*]

1 Petals yellow; stamens fascicled or not, if fascicled then not into 3 fascicles of 3 stamens each; staminodia (hypogynous glands) lacking; perianth 4-5-merous ..... ***Hypericum***
1 Petals pale pink; stamens fascicled, in 3 fascicles of 3 stamens each; staminodia (hypogynous glands) present, alternating with the fascicles of stamens; perianth 5-merous ..... ***Triadenum***

Hypericum Linnaeus 1753 (St. John's-wort)

A genus of 370-420 species, trees, shrubs, and herbs, primarily temperate. *Hypericum* in our area is a large, complex, and interesting genus, with a number of unresolved questions remaining. The species treated in Key B have often been treated in the segregate genus *Ascyrum*. Evidence from a variety of disciplines now suggests that they should be included in *Hypericum* (Adams & Robson 1961; Calie, Schilling, & Webb 1983; Robson 1996). {The curious bimodal distribution of *H. prolificum* (more than one taxon?). Basis of Small's *H. lobocarpum* in Blue Ridge of NC. And more....} References: Adams (1973)=Z; Godfrey (1988)=Y; Robson (1977, 1981, 1990, 1996, 2001, 2002, 2006)=X; Adams (1962)=V; Adams (1957); Webb (1980); Robson & Adams (1968); Adams & Robson (1961); Calie, Schilling, & Webb (1983); Culwell (1970); Stevens in Kubitzki, Bayer, & Stevens (2007). Key based in part on Adams (1973), Godfrey (1988), C, and GW.

1 Leaves with an articulation at the very base, this appearing as a narrow line, groove, or abrupt change of color and texture which extends across the petiole; shrub; [section *Myriandra*].
  2 Leaves needle-like, 0.5-1.5 (-2) mm wide, the margins essentially parallel (*H. galioides* keyed here and below); [subsection *Centrosperma*] ..... **Key A1 or A2**
  2 Leaves, at least the largest on the plant, not needle-like, wider than 2 mm, the margins not parallel, the widest point often beyond the middle.
    3 Petals 4; sepals 4 (rarely 2); plant 5-100 cm tall; leaves 2-40 mm long; [subsection *Ascyrum*] ..... **Key B**
    3 Petals 5; sepals 5; plant 50-250 cm tall; leaves (10-) 20-70 mm long; [subsections *Centrosperma* and *Brathydium*] ..... **Key C**
1 Leaves without an articulation at the very base, the petiole merging gradually into the stem with no break, groove, or abrupt change in color or texture; decumbent shrub (*H. buckleyi*) or an annual or perennial herb (suffruticose at the base in *H. cistifolium, H. dolabriforme, H. nudiflorum, H. apocynifolium, H. sphaerocarpum*).
  5 Leaves ascending or appressed, 1-nerved, < 1 mm wide; inflorescence a compound raceme; [section *Brathys*] ..... **Key D**
  5 Leaves spreading or ascending, generally multi-nerved, > 1 mm wide; inflorescence a dichasial cyme.
    6 Capsule 3 (-4) locular; stamens connate at the base into 3 or 5 fascicles; leaves with black glandular dots as well as translucent glandular dots when backlit (except in *H. perforatum*); sepals and/or petals marked with black glandular dots or lines; [section *Hypericum*] ..... **Key E**
    6 Capsule 1-locular; stamens separate or connate at the base, but not grouped into fascicles; leaves with translucent glandular dots, without black glandular dots (when backlit); sepals and petals with translucent glandular lines or dots only, not marked with black glandular dots or lines.
      7 Decumbent shrub or suffruticose herb; [section *Myriandra*, subsections *Pseudobrathydium* and *Suturosperma*] ..... **Key F**
      7 Herb; [section *Trigynobrathys*, and section *Myriandra* subsection *Suturosperma*] ..... **Key G**

Key A1 – shrubby St. John's-worts with needle-like leaves and flowers with 5 petals and 5 sepals [section *Myriandra*, subsection *Centrosperma*]

1 Longest leaves 5-16 mm.
  2 Capsules 3-6 mm long; seeds reddish-amber or brown, the alveoli not in distinct longtudinal rows, the seed lacking longitudinal ridges except for the two marginal sutures; primary branches with two ridged or winged angles running the length of the internodes, extending from the leaf midribs (but not the margins) at the base of the paired leaves; leaf surface glossy; [of alfisols and ultisols of wet pine savannas, seepage bogs] ..... ***H. brachyphyllum***
  2 Capsules 6-9 mm long; seeds dark red to black, the alveoli in distinct longitudinal rows, with raised ridges often evident between the rows; primary branches with six ridged or winged angles running the length of the internodes, extending from the midribs and margins at the base of the paired leaves; leaf surface dull; [of seasonally dry spodosol pine flatwoods] ..... ***H. tenuifolium***
1 Longest leaves 13-30 mm.
  3 Plant a low shrub <5 dm tall, more-or-less decumbent, forming dense clumps; inflorescence elongate (flowers at up to 5 nodes); flowers 10-12 mm diameter; [of dry to mesic soils of lower piedmont and inner coastal plain of sc. VA-NC-SC-GA-AL; disjunct to rock outcrops of s GA] ..... ***H. lloydii***
  3 Plant an erect shrub 0.5-4 m tall, with single main stem branched above; inflorescence elongate (3-7 nodes) or short (1-3 nodes in *H. fasciculatum* and *H. chapmanii*); flowers 13-26 mm diameter; [of wet soils of the Coastal Plain].
    4 Undersurface of most leaves easily seen on both sides of midrib, veins obvious on undersurface, leaves narrowly oblanceolate to oblinear, 1.5-5 (-7) mm wide; inflorescence elongate (3-7 nodes) ..... ***H. galioides***
    4 Undersurface usually not seen except for midrib (leaf margins nearly touch midrib its whole length), if undersurface visible then no veins visible, leaves linear, needle-like, 0.5-1.5 mm wide; inflorescence elongate or short.
      5 Plant short, <1 m tall; stem <1 cm wide at base; plant unbranched or few-branched, wand-like with narrow crown; [endemic to FL panhandle] ..... ***[H. exile]***
      5 Plant tall, normally >0.8 m; stem 1-several cm wide at base; crown broader with many ascending to spreading branches.

6 Young branches, leaves, and sepals strongly glaucous; bark of upper stem and branches silvery gray and smooth; mature plant 2-4 m tall with ascending branches imparting tree-like or vase-like aspect; [restricted to shores of sinkhole ponds in Bay and Washington Counties, FL] ..... ***[H. lissophloeus]***

6 Young branches, leaves, and sepals not glaucous; bark of upper stem and branches not silvery gray and smooth (except some *H. chapmanii*); mature plants variously shaped.

7 Inflorescence elongate (3-7 nodes); stem bark tight, thin, not exfoliating or exfoliating in narrow strips, not revealing buff or pale cinnamon color; if leaf undersurface is exposed it is distinctly paler than upper surface; [usually associated with flowing water (blackwater streams and impoundments)] ..... ***H. nitidum***

7 Inflorescence short (1-3 nodes); stem bark corky-thickened to spongy, exfoliating in broad strips or sheets revealing buff or pale cinnamon color; if leaf undersurface is exposed it is about the same color as upper surface; [usually associated with static water (Carolina bays, impoundments, beaver ponds, borrow pits, flatwoods depressions, cypress-gum ponds)].

8 Mature plant 2-3 (-4) m tall; branches ascending and imparting a tree-like or vase-like aspect (younger plants may be bushy); youngest internodes terete; [of flatwoods depressions and cypress-gum ponds and stringers of FL panhandle only] ..... ***[H. chapmanii]***

8 Mature plant 0.8-1.5 (-2) m tall; branches spreading and imparting a bushy or gumdrop aspect; youngest internodes with distinct winged ridge on either side; [of Carolina bays, impoundments, beaver ponds, borrow pits, widespread] ..... ***H. fasciculatum***

Key A2 – shrubby St. John's-worts with needle-like leaves and flowers with 5 petals and 5 sepals [section *Myriandra*, subsection *Centrosperma*]

1 Plants < 0.6 m tall, erect, decumbent, or matted and with ascending/erect branches.

2 Longest leaves 5-13 mm; flowers 13-15 mm diameter.

3 Capsules 3-6 mm long; seeds reddish-amber or brown, the alveoli not in distinct longtudinal rows, the seed lacking longitudinal ridges except for the two marginal sutures; primary branches with two ridged or winged angles running the length of the internodes, extending from the leaf midribs (but not the margins) at the base of the paired leaves; leaf surface glossy; [of alfisols and ultisols of wet pine savannas, seepage bogs] ..... ***H. brachyphyllum***

3 Capsules 6-9 mm long; seeds dark red to black, the alveoli in distinct longitudinal rows, with raised ridges often evident between the rows; primary branches with six ridged or winged angles running the length of the internodes, extending from the midribs and margins at the base of the paired leaves; leaf surface dull; [of seasonally dry spodosol pine flatwoods] ..... ***H. tenuifolium***

2 Longest leaves 11-25 mm; flowers 9-17 mm diameter.

4 Plant unbranched or few-branched, wand-like with narrow crown; [restricted to FL panhandle flatwoods] ..... ***[H. exile]***

4 Plant densely branched, bushy with broad crown; [plants of dry to mesic soils of lower piedmont and inner coastal plain of se VA-NC-SC-GA-AL, disjunct to rock outcrops of s GA] ..... ***H. lloydii***

1 Plants > 0.6 m tall, plants erect.

5 Longest leaves 6-13 mm, linear, needle-like, permanently tightly revolute with usually only the midrib showing on underside; flowers 13-15 mm diameter; [s GA-s FL-w LA] ..... ***H. brachyphyllum***

5 Longest leaves (12-)15-30 mm, linear and needle-like or narrowly oblanceolate to oblinear (*H. galioides*), permanently tightly revolute with usually only the midrib showing on underside OR margins revolute during drying but leaving considerable exposed undersurface (*H. galioides*); flowers 13-26 mm diameter.

6 Leaves narrowly oblanceolate to oblinear, 1.5-5 (-7) mm wide, margins revolute during drying but leaving considerable exposed undersurface, veins obvious on undersurface; flowers 13-15 mm diameter in elongate inflorescences of 3-7 nodes ..... ***H. galioides***

6 Leaves linear, needle-like, 0.5-1.5 mm wide, permanently tightly revolute with usually only the midrib showing on underside, if undersurface visible there are no veins; flowers 14-26 mm diameter, inflorescences elongate or short.

7 Plant short, < 1 m tall; stem < 1 cm wide at base; plant unbranched or few-branched, wand-like with narrow crown; [restricted to FL panhandle] ..... ***[H. exile]***

7 Plant tall, normally > 0.8 m; stem 1-several cm wide at base; crown broader with many ascending to spreading branches.

8 Plant to 1.5 m tall, with broad bushy or gumdrop aspect; plants widespread.

9 Inflorescence short (1-3 nodes); bark corky-thickened, exfoliating in sheets and wide strips exposing buff or pale cinnamon color; if leaf undersurface is exposed it is about the same color as upper surface; [usually associated with static water of Carolina bays, impoundments, beaver ponds, borrow pits] ..... ***H. fasciculatum***

9 Inflorescence elongate (3-7 nodes); bark tight, thin (not corky thickened), not exfoliating in sheets or wide strips; if leaf undersurface is exposed it is distinctly paler than upper surface; [associated with moving water of blackwater streams and impoundments] ..... ***H. nitidum***

8 Plant 2-4 m tall, with tree-like or vase-like aspect; restricted to FL panhandle.

10 Young branches, leaves, and sepals not glaucous; bark of upper stem and branches normally not silvery gray, variously roughened; inflorescence short (1-3 nodes); [flatwoods depressions and cypress-gum ponds of FL panhandle] ..... ***[H. chapmanii]***

10 Young branches, leaves, and sepals strongly glaucous; bark of upper stem and branches silvery gray and smooth; inflorescence elongate (3-7 nodes); [restricted to shores of sinkhole ponds in Bay and Washington Counties, FL] ..... ***[H. lissophloeus]***

Key B – shrubby St. John's-worts with 4 petals and 4 (rarely 2) sepals [section *Myriandra*, subsection *Ascyrum*]

1 Styles and carpels 3 (rarely 4); leaves (5-) 7-20 mm wide, rounded, subcordate, or cordate-clasping at the base; plant an erect shrub.

2 Leaves rounded or subcordate at the base; [widespread in our area] ..... ***H. crux-andreae***

2 Leaves cordate-clasping at the base; [of e. GA southward] ..... ***H. tetrapetalum***

1 Styles and carpels 2 (3 in *H. microsepalum*); leaves 1-7 mm wide, mostly cuneate (or if rounded the leaves < 8 mm long and 3 mm wide); erect or decumbent shrub.

3 Sepals nearly equal in size; styles 3; [s. GA south to n. FL] ..... ***H. microsepalum***

3 Sepals markedly unequal, one opposite pair large and enclosing the capsule; styles 2; [collectively widespread].

4 Pedicels 6-13 mm long, soon reflexed; subtending bractlets located near the last pair of leaves; decumbent shrub, to 2 dm tall .....

.....***H. suffruticosum***

4 Pedicels 1-5 mm long, erect; subtending bractlets located midway between the base of the flower and the last pair of leaves; erect or decumbent shrub, mostly 1-15 dm tall.

5 Erect shrub, usually with a single stem, freely branched well above ground level (or from ground level if injured, as by fire, but then the multiple branches still erect rather than decumbent), to 1 m or more tall; leaves usually variable in size and shape, widest near the middle .....***H. hypericoides***

5 Decumbent, matted shrub, with several prostrate stems arising from a primary rootstock near ground level, each with numerous erect branchlets, rarely over 3 dm tall; leaves usually relatively uniform in size and shape, widest above the middle.....***H. stragulum***

Key C – shrubby St. John's-worts with broader leaves (mostly lanceolate or oblanceolate) and flowers with 5 petals and 5 sepals

1 Leaves cordate-clasping at the base, ovate; [of s. SC southward]; [section *Myriandra*, subsection *Brathydium*].....***H. myrtifolium***

1 Leaves cuneate at the base, oblanceolate, oblong, elliptic, or narrowly elliptic; [collectively widespread]; [section *Myriandra*, subsection *Centrosperma*].

2 Leaves mostly narrowly oblanceolate, the larger 2-3 cm long, 2-5 (-7) mm wide, mostly 5-10× as long as wide; seeds 0.4-0.8 mm long, dark brown .....***H. galioides***

2 Leaves mostly oblong, elliptic, narrowly elliptic, or broadly oblanceolate, the larger (2-) 3-7 cm long, 5-15 mm wide, mostly 2.5-5× as long as wide; seeds 0.8-1.3 mm long, amber to medium brown.

3 Flowers solitary, terminal (or in 3-flowered terminal cymes); petals 10-20 mm long; sepals 7-15 mm long; shrubs to 1 m tall .....***H. frondosum***

3 Flowers (1-) 3-many in terminal cymes; petals 5-10 mm long; sepals 1.5-8 mm long; shrubs to 3 m tall.

4 Flowers (1-) 3-7 per inflorescence; capsules (6-) 7-14 mm long; larger leaves (4-) 7-14 mm wide .....***H. prolificum***

4 Flowers 7-many per inflorescence; capsules (3-) 4.5-6 mm long; larger leaves 1-7 (-11) mm wide.

5 Leaves (1.8-) 2.8-8.3 (-11) mm wide, the widest on a plant always over 4 mm wide; [plants widespread].....***H. densiflorum***

5 Leaves 1.0-3.7 (-4.1) mm wide; [plants of the Ridge and Valley of nw. GA, c. and nw. AL, and e. TN].....***H. interior***

Key D – herbaceous St. John's-worts with leaves ascending or appressed, 1-nerved, < 1 mm wide and with a diffuse, racemose inflorescence

1 Leaves linear-subulate, (5-) 8-20 mm long; capsules 1-1.75× as long as the sepals; seeds coarsely rugose-areolate .....***H. drummondii***

1 Leaves scale-like, 1-5 mm long; capsules ca. 2-3× as long as the sepals; seeds minutely and inconspicuously reticulate .....***H. gentianoides***

Key E – herbaceous St. John's-worts with broad leaves, 3 (-4) locular capsules, stamens connate at base into 3 or 5 fascicles, leaves with black dots as well as translucent glands (except in *H. perforatum*), and sepals and/or petals marked with black dots or lines

1 Smaller stems strongly wing-angled; seeds 1.0-1.3 mm long; leaves of the main stem (8-) 11-20 (-26) mm long, those of the lateral branches typically much smaller; leaves punctate primarily with translucent glands; [alien, usually in disturbed habitats]; [section *Hypericum*] .....***H. perforatum***

1 Smaller stems not wing-angled; seeds 0.6-1.1 mm long; leaves of the main stem (11-) 21-48 (-64) mm long, those of the lateral branches nearly to quite as large; leaves punctate with black glands; [native, in a variety of habitats]; [section *Graveolentia*].

2 Petals (3.0-) 4.3-12.2 (-14.0) mm long; sepals 1.5-6 mm long, conspicuously punctate with black glands (sometimes also black-lined); capsules (2.5-) 3.0-5.4 (-6.0) mm long; [collectively widespread, occurring in the Coastal Plain, Piedmont, and Mountains of NC, SC, and VA].

3 Sepals 3-6 mm long; styles (2.5-) 5.4-7.4 (-9.0) mm long; petals (6.0-) 9.2-12.2 (-14.0) mm long; leaf apices acute.....***H. pseudomaculatum***

3 Sepals 1.5-4.0 mm long; styles (1.0-) 1.4-2.4 (-3.0) mm long; petals (3.0-) 4.3-5.9 (-9.0) mm long; leaf apices obtuse to slightly retuse.....***H. punctatum***

2 Petals 6-18 mm long; sepals 4-10 mm long, with or without black lines (sometimes also black-punctate); capsules (3.0-) 4.0-7.7 (-10.0) mm long; [endemic to moderate to high elevations of w. NC, sw. VA, and e. TN].

4 Styles (3.0-) 5.6-10.0 (-12.0) mm long; sepals without black lines; petals (5.0-) 11.5-16.1 (-18.0) mm long, without black lines and with round black glands only along the petal margin; longest stamens (8.0-) 10.7-16.3 (-22.0) mm long; cymes relatively few-flowered, (2-) 5-14 (-22) flowers per plant .....***H. graveolens***

4 Styles (1.5-) 1.9-2.9 (-5.0) mm long; sepals with black lines; petals (6.0-) 7.0-9.2 (-11.0) mm long, with black lines and round black glands scattered over the surface of the petal; longest stamens (4.0-) 6.1-8.5 (-10.0) mm long; cymes relatively many-flowered, (5-) 13-61 (124) flowers per plant.....***H. mitchellianum***

Key F – shrubby and subshrubby St. John's-worts

1 Plant a matted, decumbent shrub, 0.5-3 (rarely to 5) dm tall; leaves 1.5-2.5× as long as wide, without axillary fascicles of leaves; flowers solitary or in small simple cymes; [endemic to rock outcrops at moderate to high elevations in the Mountains of sw. NC, nw. SC, and ne. GA]; [section *Myriandra*, subsection *Pseudobrathydium*] ..... ***H. buckleyi***

1 Plant an erect suffrutescent herb, 1.5-10 dm tall; leaves 1.5-5× as long as wide, with or without axillary fascicles of leaves; flowers in compound cymes; [mostly of the Coastal Plain and Piedmont, very rarely in the Mountains and then at low elevations]; [section *Myriandra*, subsection *Suturosperma]*.

2 Larger leaves 4-10 mm wide, 3-5× as long as wide; axillary leaf fascicles present in main leaf axils; seeds pale brown, faintly reticulate, 0.4-0.5 mm long ..... ***H. cistifolium***

2 Larger leaves 10-30 mm wide, 1.5-3× as long as wide; axillary leaf fascicles absent; seeds dark brown, strongly reticulate, 1.5-2 mm long.

3 Flowers in simple 3-flowered cymes or in compound cymes with up to 8 flowers; sepals 3 mm long, oblong, obtuse apically; capsules ovoid, 8-10 mm long (excluding the styles) and 5-7 mm broad; seeds 1.8-2.0 mm long, cylindric, sometimes slightly falcate, dull brown when mature ..... ***H. apocynifolium***

3 Flowers usually in many-flowered cymes terminating branches; sepals 1.5-2.0 mm long, usually triangular-acute; capsules ovoid to subglobose, 4-5 mm long (excluding the styles) and 4-5 mm broad; seeds 1.5-1.8 mm long, usually falcate-cylindric, dark purplish-brown and lustrous when mature ..... ***H. nudiflorum***

Key G – herbaceous St. John's-worts with broad leaves, 1-locular capsules, stamens separate or connate at base, but not grouped into fascicles, leaves with translucent dots, without black dots, sepals and petals with translucent lines or dots only, not marked with black dots or lines

1 Stems and leaves pubescent; [section *Trigynobrathys*] ..... ***H. setosum***

1 Stems and leaves glabrous.

2 Styles united, persistent as a single straight beak on the capsule; [section *Myriandra*, subsection *Suturosperma*].

3 Leaves 3-6 cm long, 4-6× as long as wide, the margins revolute; [plants (in our area) of low elevations in the Coastal Plain] ..... ***H. adpressum***

3 Leaves 1-3 (-4) cm long, 2-3× as long as wide, the margins not revolute; [plants (in our area) of high elevations in the Mountains] ..... ***H. ellipticum***

2 Styles separate, more or less divergent, not persistent as a beak on the capsule; [section *Trigynobrathys*].

4 Styles 2-4 mm long; stamens 50-80.

5 Punctate glands absent on the stem (rarely very few on the internodes of the inflorescence); punctate glands of the leaves small, round, distributed on the lower leaf surface, becoming sparse toward the base of the leaf and toward the midrib; midstem leaves mostly broadest at or beyond the middle ..... ***H. virgatum***

5 Punctate glands frequent on the stem; punctate glands of the leaves and stem large, oval, distributed evenly and densely on the lower leaf surface, also dense on the upper leaf surface in *H. denticulatum* and *H. harperi* (absent on upper leaf surface in *H. species 1*); midstem leaves usually broadest at or below the middle.

6 Upper surface of the leaf with no punctate glands; inflorescence branches typically with 3-12 pairs of bracteal leaves about 1/2 as large as the foliage leaves; [of shallow soil mats on granitic domes in the Piedmont of NC] ..... ***H. species 1***

6 Upper surface of the leaf with abundant punctate glands; inflorescence branches with at most a few pairs of very small bracts; [of Coastal Plain wetlands, very rarely disjunct inland and then in wetlands].

7 Leaves 5-20 (-24) mm long, 5-15 mm wide, 1.5-3× as long as wide, ovate to obovate to narrowly elliptic, mostly appressed to the stem, mostly shorter than the internodes; sepals 4.0-8.0 mm long, 2.0-4.0 mm wide, acute; lower stem not spongy-thickened with aerenchymatous tissue; [of moist pinelands of the Coastal Plain, very rarely disjunct inland to bog habitats in the Piedmont and Mountains] ..... ***H. denticulatum***

7 Leaves 10-35 (-40) mm long, 3-8 (-12) mm wide, 3-10× as long as wide, lanceolate to linear-lanceolate, mostly ascending to spreading, often equalling the internodes; sepals 3.0-5.0 mm long, 0.8-2.5 mm wide, acute to acuminate; lanceolate to linear-lanceolate; upper portion of stem with numerous axillary branches; lower stem usually spongy-thickened with aerenchymatous tissue; [of upland depression ponds of the Coastal Plain, growing where seasonally inundated] ..... ***H. harperi***

4 Styles 0.5-1.5 mm long; stamens 5-22.

8 Leaves lanceolate to linear, 6-30 mm long, 0.5-3 mm wide, the leaf base attenuate to cuneate ..... ***H. canadense***

8 Leaves ovate to elliptic, 3-35 mm long, 2-15 mm wide, the leaf base rounded to cordate-clasping.

9 Sepals broadest near the base; inflorescence with few or no normally sized leaves, these only low in the inflorescence, giving the inflorescence a naked appearance; [of Coastal Plain pinelands] ..... ***H. gymnanthum***

9 Sepals broadest near the middle; inflorescence with many normally sized leaves and leaflike bracts, giving the inflorescence a leafy appearance; [collectively widespread].

10 Ultimate bracts of the inflorescence elliptic, much like the leaves; leaves not paler beneath; sepals obtuse, much shorter than the capsule; capsule 3-5 mm long ..... ***H. boreale***

10 Ultimate bracts of the inflorescence linear, differing conspicuously from the leaves; leaves paler beneath; sepals acute, about equalling the capsule; capsule 2-3.5 mm long.

11 Inflorescence branches from the upper 1-6 nodes of the stem, the further branching repeatedly monochasial; stem with apical internode well developed, usually longer than the internode below; sepals broader above the middle, more-or-less imbricate; [of the Coastal Plain] ..... ***H. mutilum** var. **latisepalum***

11 Inflorescence branches from the upper 2-10 nodes of the stem, the further branching mostly dichasial; stem with apical internode shorter than the the internode below or even essentially absent; sepals broader below the middle, not imbricate (rarely broader above the middle and imbricate); [widespread] ..... ***H. mutilum** var. **mutilum***

Hypericum adpressum Rafinesque ex Barton, Bog St.-John's-wort, Creeping St.-John's-wort. Cp (GA, NC, SC, VA): boggy depressions; rare (US Species of Concern, GA Special Concern, NC Rare, SC Rare, VA Rare). July-August. E. MA south to sw. GA in the Coastal Plain; disjunct inland in WV, IN, IL, and sc. TN. See discussion on its habitats and rarity in Sorrie (1998b). [= RAB, C, F, G, GW, K, S, V, X, Z]

Hypericum apocynifolium Small. Cp (GA): mesic bluffs and ravines, ridges and natural levees in floodplains; rare. C. and s. GA west to se. AR and e. TX. [= S, V, X, Y; < *H. nudiflorum* – GW, K, Z]

Hypericum boreale (Britton) Bicknell, Dwarf St.-John's-wort, Northern St.-John's-wort. Cp (VA), Mt (NC?, VA): sinkhole ponds in the Mountains, interdune ponds in the outer Coastal Plain, boggy places; rare (NC Watch List, VA Watch List). Newfoundland and Québec west to w. Ontario, south to VA, NC (?), OH, IN, and n. IL. Hybrids with *H. canadense* have been called *H.* ×*dissimulatum* Bicknell (pro sp.). [= C, F, G, K; = *H. mutilum* Linnaeus ssp. *boreale* (Britton) J.M. Gillett – X]

Hypericum brachyphyllum (Spach) Steudel. Cp (GA, SC?): ponds and wet pinelands; common. E. GA (near SC) south to s. FL, west to s. MS. Also reported from SC (Kartesz 1999); needs confirmation. [= GW, K, V, X, Y, Z; < *H. aspalathoides* – S]

Hypericum buckleyi M.A. Curtis, Granite Dome St.-John's-wort. Mt (GA, NC, SC): thin soil in seasonal seepage around rock outcrops, particularly granitic exfoliation domes; rare (GA Special Concern, NC Watch List, SC Rare). June-August. Sw. NC south to nw. SC and ne. GA, a Southern Appalachian endemic. Wilbur (1995) showed that Curtis's spelling of the epithet, "*buckleii*", should be maintained; however, changes in the International Code of Botanical Nomenclature have reversed this (Robson 1996). [= RAB, GW, S, W, V, X, Z; = *H. buckleii* – K, orthographic variant]

Hypericum canadense Linnaeus, Canada St. John's-wort Cp (GA, NC, SC, VA), Mt (NC, SC, VA), Pd (NC, VA); bogs, pine savannas, ditches; common (rare in Piedmont and VA Mountains). July-September. Newfoundland and Québec west to MN, south to s. GA, n. FL, and MS; also in Holland and Ireland, where considered by some to be native. Hybrids with *H. mutilum* and/or *H. boreale* have been called *H.* ×*dissimulatum* Bicknell (pro sp.). [= RAB, C, G, GW, K, S, W, X, Z; > *H. canadense* var. *canadense* – F; > *H. canadense* var. *galiiforme* Fernald – F]

Hypericum cistifolium Lamarck. Cp (GA, NC, SC): pine savannas, wet pine flatwoods; common. June-August. E. NC south to s. FL, west to e. TX. [= RAB, GW, K, V, X, Y, Z; > *H. cistifolium* – S, in a narrower sense; > *H. opacum* Torrey & A. Gray – S]

Hypericum crux-andreae (Linnaeus) Crantz, St. Andrew's Cross, St. Peter's-wort. Cp, Pd (GA, NC, SC, VA), Mt (GA, NC, SC): dry forests and woodlands, pine flatwoods; common (rare in Piedmont and Mountains). June-October. NY (Long Island) and NJ south to s. FL, west to e. TX, primarily on the Coastal Plain, but scattered inland to w. NC and n. GA, also north in the interior to c. TN, s. KY, c. AR, and se. OK. [= GW, K, W, X, Y; = *H. stans* (Michaux ex Willdenow) P. Adams & Robson – RAB, C, V, Z; = *Ascyrum stans* Michaux ex Willdenow – F, G; > *Ascyrum stans* – S; > *Ascyrum cuneifolium* Chapman – S]

Hypericum densiflorum Pursh, Mountain Bushy St. John's-wort. Mt (GA, NC, VA), Pd (NC, VA), Cp (GA, NC, SC): bogs, streambanks, dry to moist forests, rock outcrops, moist forests, pine savannas; common (rare in the VA Piedmont). June-August. Sw. PA south to n. GA and c. AL in and near the Mountains; NJ south to SC in the Coastal Plain; s. GA west to TX in the Coastal Plain. The related *H. lobocarpum* Gattinger is more western, extending east to TN; the basis for attribution of *H. lobocarpum* to "Blue Ridge, N.C." by Small (1933) is unknown. [< *H. densiflorum* – RAB, C, GW, K, W, X, Z (also see *H. interior*); < *H. densiflorum* var. *densiflorum* – F, G (also see *H. interior*); > *H. densiflorum* Small – S; > *H. glomeratum* Small – S]

Hypericum denticulatum Walter, Coppery St.-John's-wort. Cp (GA, NC, SC, VA), Pd, Mt (NC): savannas, wet pine flatwoods, adjacent ditches, borrow scrapes, blackwater stream shores; common (GA Special Concern, VA Watch List). July-September. S. NJ south to e. GA (McIntosh County) (Sorrie 1998b) on the Coastal Plain; disjunct inland in c. and w. NC, sc. TN, and in s. AL. See discussion under *H. virgatum*. [= K, S; = *H. denticulatum* var. *denticulatum* – RAB, C, F, G, Z; < *H. denticulatum* – GW (also see *H. virgatum*); = *H. denticulatum* ssp. *denticulatum* – X]

Hypericum drummondii (Greville & Hooker) Torrey & A. Gray, Nits-and-lice, Drummond's St.-John's-wort. Pd, Cp (GA, NC, SC, VA), Mt (NC, SC, VA): dry woodlands, woodland borders, fields; uncommon. July-September. MD west to OH, IL, and se. KS, south to panhandle FL and c. TX. [= RAB, C, F, G, GW, K, W, X, Z; = *Sarothra drummondii* Greville & Hooker – S]

Hypericum ellipticum Hooker, Pale St.-John's-wort. Mt (NC?): wet places; rare (NC Watch List). Newfoundland and Nova Scotia west to w. Ontario, south to CT, NY, MI, and MN, and in the mountains to WV, NC (?), and ne. TN (Johnson County) (Chester, Wofford, & Kral 1997), and NC (?). The documentation for C's attribution of *H. ellipticum* to NC is unknown. [= C, F, G, K, V, X]

Hypericum fasciculatum Lamarck, Peelbark St.-John's-wort. Cp (GA, NC, SC): wet pine savannas, beaver ponds, upland depression ponds; uncommon (NC Watch List). May-September. E. NC south to s. FL, west to s. MS. [= RAB, GW, K, V, X, Y, Z; < *H. fasciculatum* – S (also see *H. nitidum* and *H. chapmanii*)]

Hypericum frondosum Michaux. Mt (GA, NC*, VA*), Pd (GA), Cp (GA): rock outcrops and rocky woodlands; rare, native in GA, introduced in NC and VA from further south and west. Late May-July. This species is native and widespread as far east as e. TN (Chester, Wofford, & Kral 1997). [= C, F, G, K, V, W, Y, Z; > *H. aureum* Bartram – S; > *H. splendens* Small – S]

Hypericum galioides Lamarck. Cp (GA, NC, SC): wet pine savannas, wet pine flatwoods, pools, edges of bottomlands; common. June-August. E. NC south to n. FL, west to se. TX. [= RAB, GW, K, V, X, Y, Z; > *H. ambiguum* Elliott – S; > *H. galioides* – S, in a narrower sense]

Hypericum gentianoides (Linnaeus) Britton, Sterns, & Poggenburg, Pineweed, Orange-grass. Mt, Pd, Cp (GA, NC, SC, VA): fields, rock outcrops, woodland borders, eroding areas; common. July-October. ME and Ontario west to MN, south to FL and TX. [= RAB, C, F, G, K, W, X, Z; = *Sarothra gentianoides* Linnaeus – S]

Hypericum graveolens Buckley, Mountain St.-John's-wort. Mt (NC): grassy balds, grassy openings, forests, at high elevations (1200 m or more); rare (NC Watch List). July-August. Nw. NC and ne. TN south to sw. NC, a Southern Appalachian endemic. This and the related *H. mitchellianum* (another narrow endemic to the Southern Appalachians) hybridize, forming local hybrid populations with intermediate characteristics (Culwell 1970). [= RAB, GW, K, S, W, X, Z]

Hypericum gymnanthum Engelmann & A. Gray, Clasping-leaf St.-John's-wort. Cp (GA, NC, SC, VA), Pd (GA, VA), Mt (VA): pine savannas, wet pine flatwoods, sinkhole ponds (Augusta and Rockingham counties, VA), other wet to moist habitats;

common (rare in Piedmont). June-September. S. NJ south to n. FL, west to c. TX, and scattered inland in PA, WV, sc. TN, OH, IN, IL, MO, and e. KS; also disjunct in Guatemala (introduced?). [= RAB, C, F, G, GW, K, S, X, Z]

Hypericum harperi R. Keller, Harper's St.-John's-wort. Cp (GA, SC): clay-based Carolina bays, other upland depression ponds, with *Taxodium ascendens*; rare. July-September. E. and c. SC south to sw. GA and panhandle FL. *H. harperi* should be sought in sc. and se. NC, where it may well occur. This species has generally been considered a part of *H. denticulatum* or *H. virgatum*, but Webb (1980) makes a convincing argument for its recognition, including the ecological differentiation and absence of intermediates or hybrids when growing in proximity to *H. denticulatum*. See *H. virgatum* for additional discussion. [= X; < *H. denticulatum* var. *acutifolium* – RAB, Z; < *H. denticulatum* – GW; < *H. harperi* – K; < *H. acutifolium* – S]

Hypericum hypericoides (Linnaeus) Crantz, St. Andrew's Cross. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): dry forests and woodlands; common (uncommon in Mountains). May-August. NJ, w. VA, c. KY, se. MO, and c. OK, south to s. FL and e. TX; also in the West Indies, Mexico, and Central America. [= RAB, C, GW, V, W, Y, Z; > *Ascyrum hypericoides* Linnaeus var. *hypericoides* – F, G; > *Ascyrum hypericoides* Linnaeus var. *oblongifolium* (Spach) Fernald – F, G; = *H. hypericoides* ssp. *hypericoides* – K, X; > *Ascyrum hypericoides* Linnaeus – S; > *Ascyrum linifolium* Spach – S]

Hypericum interior Small, Interior Bushy St. John's-wort. Mt (GA): rocky forests, riverbanks; uncommon. E. and c. TN, nw. GA south to c. AL. Perhaps best treated as a variety of *H. densiflorum*. [= S; < *H. densiflorum* – K, V, X, Z; ? *H. revolutum* R. Keller]

Hypericum lloydii (Svenson) P. Adams, Lloyd's St.-John's-wort. Pd (GA, NC, SC, VA), Cp (GA, NC, SC): dry woodlands, sandhills, edges of granitic flatrocks, edges of Altamaha Grit outcrops, roadbanks; uncommon. June-September. Sc. VA south to c. AL. [= RAB, K, V, X, Z; = *Hypericum galioides* Lamarck var. *lloydii* Svenson]

Hypericum microsepalum (Torrey & A. Gray) A. Gray ex S. Watson. Cp (GA): moist to wet pine flatwoods; rare. S. GA south to n. FL. [= GW, K, V, X, Y, Z; = *Crookea microsepala* (Torrey & A. Gray) Small – S]

Hypericum mitchellianum Rydberg, Blue Ridge St.-John's-wort. Mt (NC, VA): grassy balds, grassy openings, forests, seepages, at moderate to high elevations (1000-1900 m or more); rare (NC Watch List, VA Rare). July-August. W. VA, e. WV, and e. TN south to sw. NC, a Southern Appalachian endemic. Robson (2006) interprets this as a hybrid of *H. graveolens* and *H. punctatum* but offers no evidence other than its general morphological intermediacy. [= RAB, C, F, G, GW, K, S, W, Z; = *H.* ×*mitchellianum* Rydberg pro sp. – X]

Hypericum mutilum Linnaeus *var.* ***mutilum***, Common Dwarf St.-John's-wort Mt, Pd, Cp (GA, NC, SC, VA): bogs, marshes, other wet habitats; common. June-October. Newfoundland and Québec west to Manitoba, south to s. FL and c. TX; scattered (probably as an adventive) farther west in North America, in Central and South America, and Europe. Hybrids with *H. canadense* have been called *H.* ×*dissimulatum* Bicknell (pro sp.). [= F; < *H. mutilum* – RAB, C, G, GW, K, S, W, Z; = *H. mutilum* ssp. *mutilum* – X]

Hypericum mutilum Linnaeus *var.* ***latisepalum*** Fernald, Southern Dwarf St.-John's-wort. Cp (GA, SC): marshes and other wet habitats; rare. June-October. Se. SC south to peninsular FL, west to TX (and, according to F, north to s. NJ). Hybrids with *H. canadense* have been called *H.* ×*dissimulatum* Bicknell (pro sp.). [= F; < *H. mutilum* – RAB, G, GW, K, S, W, Z; = *H. mutilum* ssp. *latisepalum* (Fernald) N. Robson – X]

Hypericum myrtifolium Lamarck, Myrtle-leaf St.-John's-wort. Cp (GA, SC): ponds; common (rare north of GA). Small (1933) reports this species from SC; this distribution is now documented by a specimen from Jasper Co., SC (P. McMillan, pers. comm.). Se. SC south to sc. FL, west to se. MS, a Southeastern Coastal Plain endemic. [= GW, K, S, V, X, Y, Z]

Hypericum nitidum Lamarck. Cp (GA, SC): pine savannas; rare (NC Rare, SC Rare). June-August. C. SC south to panhandle FL, west to sw. AL. [= RAB, GW, K, V, Y, Z; *H. nitidum* ssp. *nitidum* – X]

Hypericum nudiflorum Michaux ex Willdenow. Pd, Cp (GA, NC, SC, VA), Mt (GA, NC): streambanks, moist forests; common (uncommon in VA Piedmont). June-July. Se. VA south to panhandle FL, west to e. TX, s. AR, and se. OK; disjunct in Cumberland Plateau of TN. [= RAB, C, F, G, S, W, V, X, Y; < *H. nudiflorum* – GW, K, Z (also see *H. apocynifolium* of the deep South)]

* ***Hypericum perforatum*** Linnaeus, European St. John's-wort. Pd (GA, NC, SC, VA), Mt, Cp (NC, SC, VA): fields, pastures, roadsides, woodland borders; common, native of Europe. June-September. See Duncan (1985) for documentation for GA. [= RAB, C, F, G, K, S, W, Z; = *H. perforatum* ssp. *perforatum* – X]

Hypericum prolificum Linnaeus, Shrubby St-John's-wort. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): bogs, seepages, rocky forests, rock outcrops; common (rare in Coastal Plain). June-October. NY west to s. MI and MN, south to GA and LA. [= RAB, C, G, K, W, S, V, X, Z; = *H. spathulatum* (Spach) Steudel – F]

Hypericum pseudomaculatum Bush. Cp, Pd (GA, SC), Mt (GA): wet, moist, or dry forests; rare. June-September. SC south to panhandle FL, west to TX, north in the interior to e. TN, c. IL, s. MO, and c. OK. {records east of the Ozarks need to be studied more carefully} [= RAB, C, G, K, S, X, Z; = *H. punctatum* Lamarck var. *pseudomaculatum* (Bush) Fernald – F]

Hypericum punctatum Lamarck, Spotted St.-John's-wort. Mt, Pd, Cp (GA, NC, SC, VA): fields, woodland borders; common. June-September. Québec west to MN, south to c. peninsular FL and TX. [= RAB, C, G, K, W, X, Z; = *H. punctatum* var. *punctatum* – F; > *H. punctatum* – S; > *H. subpetiolatum* Bicknell ex Small – S]

Hypericum setosum Linnaeus. Cp (GA, NC, SC, VA): pine savannas, wet pine flatwoods, boggy areas, adjacent ditches, fireplow lines, and scrapes; common (VA Rare). May-September. Se. VA south to c. peninsular FL, west to se. TX. [= RAB, C, F, G, GW, K, S, X, Z]

Hypericum species 1 Weakley, Radfords' St. John's-wort. Pd (NC): shallow circumneutral soil mats of granitic domes in the Brushy Mountains; rare (NC Watch List). Apparently endemic to the Brushy Mountains of Alexander and Wilkes counties, NC. This taxon, included in *H. denticulatum* var. *acutifolium* by Webb (1980), differs from typical *H. virgatum* in being profusely branched from the medial and upper nodes (rather than being little if at all branched, and then only from the uppermost nodes), in having leaves with acuminate (rather than acute to obtuse) apices, and electrophoretically (Webb 1980). Additionally, these plants have numerous bracteal leaves along the inflorescence branches (vs. few or none), the punctate glands of the foliage are large and oval, resembling those of *H. denticulatum* (vs. small and round), and the punctate glands are distributed on the

lower leaf surface and stem (vs. lower leaf surface only). It may be notable that these same outcrops are phytogeographically interesting, with other disjunct and weakly differentiated races (see *Allium cuthbertii*). Further study is planned. [< *H. denticulatum* (included in concept of *H. denticulatum* (= *H. denticulatum* var. *acutifolium*, *H. denticulatum* ssp. *acutifolium*) by most earlier authors]

Hypericum stragulum P. Adams & Robson. Mt, Pd (GA, NC, SC, VA), Cp (NC, VA): dry rocky or sandy woodlands; common (uncommon in Coastal Plain). May-August. MA (Nantucket I.), NY (Long Island), west to s. PA, s. OH, s. IN, s. IL, c. MO, se. KS, and c. OK, south to ne. NC, c. SC, c. GA, n. AL, n. MS, n. LA, and c. TX. [= C, V, W, Z; = *H. stragalum* – RAB, misspelling; = *Ascyrum hypericoides* Linnaeus var. *multicaule* (Michaux ex Willdenow) Fernald – F, G; = *H. hypericoides* (Linnaeus) Crantz ssp. *multicaule* (Michaux ex Willdenow) Robson – K, X]

Hypericum suffruticosum P. Adams & Robson, Pineland St.-John's-wort. Cp (GA, NC, SC): pine savannas and flatwoods; common (rare in NC and SC) (NC Rare). April-June. Se. NC south to c. peninsular FL, west to se. LA. [= RAB, K, V, X, Y, Z; = *Ascyrum pumilum* Michaux – S]

Hypericum tenuifolium Pursh, Sandhill St.-John's-wort. Cp (GA, NC, SC): pine flatwoods, pine savannas, sandhills; common. June-September. Se. NC south to c. peninsular FL, west to panhandle FL and se. AL. Robson (1996) indicates that the older name *H. tenuifolium* Pursh has now been adequately shown to apply to this taxon. [= X; = *H. reductum* (Svenson) P. Adams – RAB, GW, K, V, Y, Z; < *H. aspalathoides* Willdenow – S (also including *H. brachyphyllum*)]

Hypericum tetrapetalum Lamarck. Cp (GA): wet pinelands and in depressional wetlands (open or dominated by *Taxodium ascendens*); uncommon. E. GA (within a few counties of se. SC), south to s. FL, west to panhandle FL. [= GW, K, V, X, Y; = *Ascyrum tetrapetalum* (Lamarck) Vail – S]

Hypericum virgatum Lamarck. Pd, Mt (GA, NC, SC, VA), Cp (GA, SC): woodlands, rock outcrops, woodland borders; common (VA Watch List). Late June-September. MD west to s. OH, s. IN, and s. IL, south to c. NC, c. SC, sw. GA, panhandle FL, s. MS, and se. LA. Though treated by most recent authors as a variety of *H. denticulatum*, *H. virgatum* is better considered as a distinct species. Webb (1980) recognized *H. harperi* as a separate species (it had previously been considered a part of *H. virgatum*), and continued to recognize this taxon as a variety of *H. denticulatum*. However, based on the nature of the punctate glands, size of seeds, inland distribution, etc., it appears that *H. virgatum* is more distantly related to *H. denticulatum* and *H. harperi* than they are to one another; recognition at the species level is warranted for *H. virgatum*. As pointed out by Webb, *H. denticulatum* is primarily tetraploid (n = 24), while *H. virgatum* and *H. harperi* are (as far as is known) strictly diploid. Additionally, the aberrant populations from granitic outcrops in the Brushy Mountains of Alexander and Wilkes counties, NC referred by Webb (1980) to this taxon are distinct, and more closely allied to *H. denticulatum* and *H. harperi*. See *Hypericum species 1* for additional discussion. [= K; < *H. denticulatum* Walter var. *acutifolium* (Elliott) Blake – RAB, C, F, G, W, Z (also see *H. harperi*); > *H. denticulatum* var. *recognitum* Fernald & Schubert – RAB, F; < *H. denticulatum* – GW; < *H. acutifolium* Elliott – S (also see *H. harperi*); = *H. denticulatum* ssp. *acutifolium* (Elliott) N. Robson – X]

Hypericum ascyron Linnaeus ssp. *pyramidatum* (Aiton) N. Robson, American Great St.-John's-wort. The species is of e. North America and e. Asia; ssp. *pyramidatum* occurs from Québec west to MN, south to s. PA (Rhoads & Klein 1993), MD (Robson 2000), and WV (Kartesz 1999). [= X; < *H. ascyron* Linnaeus – K; = *H. pyramidatum* Aiton – C, F, G] {not yet keyed} {section *Roscyna*}

Hypericum chapmanii W.P. Adams, Apalachicola St. John's-wort, Tree St. John's-wort. Margins of pond-cypress ponds, pond-cypress stringers, often growing with *Cyrilla parviflora* and *Nyssa ursina*. Endemic to Panhandle FL (9 counties). [= GW, K, V, X, Y, Z; < *H. fasciculatum* – S; = *H. arborescens* Chapman]

Hypericum dolabriforme Ventenat, Glade St. John's-wort. Mt (GA): limestone glades and barrens; rare (GA Special Concern). In nw. GA (Jones & Coile 1988) and e. TN (Chester, Wofford, & Kral 1997); this species should be sought in sw. VA. [= C, F, G, K, S, V, X, Z] {not yet keyed}

Hypericum exile W.P. Adams. Pine flatwoods. Endemic to Panhandle FL (Bay, Franklin, Gulf, Liberty, and Washington counties). There seems nothing in particular to recommend Robson's reduction of *H. exile* to a subspecies of *H. nitidum*. [= GW, K, V, Y, Z; = *H. nitidum* Lamarck ssp. *exile* (W.P. Adams) N. Robson – X]

Hypericum lissophloeus W.P. Adams. Margins of sinkhole ponds. Endemic to Panhandle FL (Bay and Washington counties). [= GW, K, V, X, Y, Z]

Hypericum lobocarpum Gattinger. Streambanks, river bottoms, pinelands. C. TN (Chester, Wofford, & Kral 1997) and MS west to s. IL, se. OK, e. TX; credited to SC by Robson (1996), based on specimens debated and dismissed by Adams (1973). Late May-September. [= C, K, S, V, X, Z; = *H. densiflorum* var. *lobocarpum* (Gattinger) Svenson – F, G; < *H. densiflorum* – GW] {not yet keyed}

Hypericum majus (A. Gray) Britton. South to nw. PA (Rhoads & Klein 1993), NJ, DE, and OH (Kartesz 1999). [= C, F, G, K, X] {not yet keyed}

Hypericum species 3 J. Allison, Georgia St, John's-wort. Cp (GA): seepage bogs, roadside ditches; rare (GA Special Concern). Apparently endemic to the Altamaha Grit region of the GA Coastal Plain. {not yet keyed}

Hypericum sphaerocarpum Michaux, Barrens St. John's-wort. Mt (GA): limestone barrens; rare (GA Special Concern). East to GA (GAHP 2003), e. and c. TN (Chester, Wofford, & Kral 1997), sw. PA (Rhoads & Klein 1993). [= C, F, G, K, V, X, Z; > *H. turgidum* Small – S; > *H. sphaerocarpum* var. *turgidum* (Small) Svenson] {not yet keyed}

Triadenum Rafinesque 1837 (Marsh St-John's-wort)

A genus of 6-10 species, herbs, of e. North America and e. Asia. Although *Triadenum* has sometimes formerly been included in *Hypericum*, Robson (1977) and others have considerred it to be more closely related to the tropical Asian shrub *Cratoxylum* Blume. References: Adams (1973)=Z; Stevens in Kubitzki, Bayer, & Stevens (2007).

1 Leaves narrowed to the cuneate or broadly cuneate (rarely truncate) base.
  2 Lower leaves sessile; sepals acute; leaves lacking translucent or dark glands or punctae ..... ***T. tubulosum***
  2 Lower leaves petiolate; sepals obtuse; leaves with translucent glands and dark punctae ..... ***T. walteri***
1 Leaves clasping, cordate, or subcordate at the base.

3 Sepals 2.5-5 mm long at maturity, obtuse or acute; styles 0.5-1 (-1.5) mm long (best seen in fruit) ..... ***T. fraseri***
3 Sepals 5-8 mm long at maturity, acute or acuminate; styles 1.8-3 mm long (best seen in fruit) ..... ***T. virginicum***

Triadenum fraseri (Spach) Gleason, Marsh St.-John's-wort. Mt (NC, VA): bogs, peaty wetlands; rare (VA Rare). July-August. Newfoundland and Québec west to MN, south to NY, PA, w. VA, ne. TN, w. NC, OH, n. IN, and NE. Closely related to *T. virginicum* and reduced to a variety of (or included in) that species by some authors. [= C, G, K; = *Hypericum virginicum* Linnaeus var. *fraseri* (Spach) Fernald – F; < *T. virginicum* – W, Z, in part; = *Hypericum fraseri* Spach]

Triadenum tubulosum (Walter) Gleason, Marsh St.-John's-wort. Cp (GA, NC, SC, VA), Pd (VA): bogs, peaty wetlands, drawdown sloughs along rivers; uncommon (GA Rare, VA Rare). August-September. Se. VA south to n. FL, west to LA, and north in the interior to se. and c. TN, s. IL and s. OH. [= C, G, GW, K, Z; = *Hypericum tubulosum* Walter – RAB; = *Hypericum tubulosum* Walter var. *tubulosum* – F; = *T. longifolium* Small – S]

Triadenum virginicum (Linnaeus) Rafinesque, Marsh St.-John's-wort. Cp, Mt (GA, NC, SC, VA), Pd (GA, VA): bogs, peaty wetlands; common (rare in Mountains and Piedmont). July-September. Nova Scotia west to OH and s. Ontario, south to FL and MS, mostly on the Coastal Plain but scattered inland. [= C, G, GW, K, S; = *Hypericum virginicum* Linnaeus – RAB; = *Hypericum virginicum* var. *virginicum* – F; < *T. virginicum* – W, Z, in part only (also see *T. fraseri*)]

Triadenum walteri (J.G. Gmelin) Gleason, Marsh St.-John's-wort. Cp, Pd, Mt (GA, NC, SC, VA): swamp forests and marshes; common (uncommon in VA Piedmont, rare in VA Mountains). August-September. MD south to n. FL, west to e. TX, north in the interior to s. MO, s. IL, and OH. [= C, G, GW, K, W, Z; = *Hypericum walteri* J.G. Gmelin – RAB; = *Hypericum tubulosum* Walter var. *walteri* (J.G. Gmelin) Lott – F; = *T. petiolatum* (Walter) Britton – S]

ILLICIACEAE A.C. Smith 1947 (Star-anise Family)

A family of 1 genus and about 42 species, shrubs and trees, of temperate and subtropical se. Asia and se. North America (se. United States, Cuba, Haiti, and e. Mexico). The family is most closely related to the Schisandraceae and Winteraceae. References: Keng in Kubitzki, Rohwer, & Bittrich (1993).

Illicium Linnaeus 1759 (Star-anise)

A genus of about 42 species, shrubs and trees, of temperate and subtropical se. Asia and se. North America (se. United States, Cuba, Haiti, and e. Mexico). References: Morris et al. (2007) studied the evolution of the genus and revised its sectional taxonomy; New World and Old World taxa form seprate clades, treated as separate sections,our spceecies being in section Cymbostemon. Vincent in FNA (1997); Morris et al. (2007); Keng in Kubitzki, Rohwer, & Bittrich (1993); Stone & Freeman (1968).

1 Flowers 2-5-5 cm across; tepals 21-33, red-maroon (rarely white or pinkish); leaf tips acute to acuminate ..... ***I. floridanum***
1 Flowers 0.8-1.2 cm across; tepals 11-16, yellowish green; leaf tips obtuse or rounded ..... ***I. parviflorum***

Illicium floridanum Ellis, Florida Star-anise. Cp (FL, GA): acid ravines and small stream swamps; uncommon (rare in GA). Sw. GA west to e. LA. [= FNA, GW, K, S]

* ***Illicium parviflorum*** Michaux ex Ventenat, Swamp Star-anise, Yellow Anise-tree, Ocala Anise-tree. Cp (GA, SC): cultivated and persistent; rare, native of central peninsular FL. April-June. This species occurs in swampy forests, evergreen hammocks, and bayheads and is endemic to scattered localities in central FL; it is in the horticultural trade and has been introduced in various places, including sw. and se. GA and sc. SC (Aiken County) (Shealy and McCartney, pers.comm. 2008). [= FNA, K, S]

ITEACEAE J. Agardh 1858 (Sweetspire Family)

A family of 1 genus and about 27 species, shrubs, of e. and se. Asia (about 25 species), e. North America (1 species), and sub-Saharan Africa (1 species). References: Kubitzki in Kubitzki, Bayer, & Stevens (2007).

Itea Linnaeus 1753 (Virginia-willow, Sweetspire, Tassel-white)

A genus of about 27 species, shrubs and trees, all but 2 (ours and 1 in sub-Saharan Africa) are in e. and se. Asia. The closest relative of our species is *I. japonica* Oliver, of Japan. Variously treated in a very broadly-conceived Saxifragaceae (RAB, F, G, GW, W), a less comprehensive Grossulariaceae (C, K), a narrow Escalloniaceae, or a very narrow (single genus) Iteaceae (S), the relationships of *Itea* remain problematic. Recent molecular data suggest that the relationship between *Itea* and other woody "saxifragaceous" genera (including *Escallonia*) is only distant (Morgan & Soltis 1993). *Itea* is here conservatively treated in a narrow Iteaceae. References: Spongberg (1972); Morgan & Soltis (1993); Bohm et al. (1999).

Identification notes: Sometimes confused needlessly with *Clethra*, whose much more coarsely serrate, obovate leaves contrast with the serrulate, elliptic leaves of *Itea*. Also often confused with *Leucothoe racemosa* in vegetative condition.

Itea virginica Linnaeus, Virginia-willow, Sweetspire, Tassel-white. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): moist forests and thickets, especially along the banks of small streams; common (uncommon in Piedmont and Mountains). May-June. S. NJ south to s. FL and west to e. TX, north in the interior (especially in the Mississippi Embayment) to s. IL and se. MO. [= RAB, C, F, K, G, GW, S, W, WH]

JUGLANDACEAE A. Richard ex Kunth 1824 (Walnut Family)

A family of about 8 genera and 60 species, trees and shrubs, mostly temperate. References: Stone in FNA (1997); Manos & Stone (2001); Elias (1972); Stone in Kubitzki, Rohwer, & Bittrich (1993).

1 Fruit with husk dehiscent into 4 valves; pith of twigs continuous; leaves with (3-) 5-17 (-19) leaflets, the largest usually the terminal or final 2 lateral; nut with shell smooth, ridged, or irregularly wrinkled (but not deeply furrowed); terminal buds with imbricate (overlapping) or valvate scales; [tribe *Juglandeae*, subtribe *Caryinae*] ..... ***Carya***

1 Fruit with husk indehiscent; pith of twigs chambered (not always developing until autumn of the first year's growth); leaves with (7-) 11-19 (-23) leaflets, the largest usually about halfway up the leaf; nut with shell deeply furrowed in a complex corrugated pattern; terminal buds with valvate; [tribe *Juglandeae*, subtribe *Juglandinae*] ..... ***Juglans***

Carya Nuttall (Hickory)
(by A.S. Weakley & R.K. Peet)

A genus of about 18 species, trees, of e. North America (south into s. Mexico), and e. Asia. *Carya* in our area is separated into two sections, section *Apocarya* (*C. aquatica, C. cordiformis, C. illinoinensis*) and section *Carya* (*C. alba, C. carolinae-septentrionalis, C. glabra, C. laciniosa, C. myristiciformis, C. ovalis, C. ovata, C. pallida*). The southeastern United States is the center of diversity of *Carya*. Our four-state area includes 11 of 13 North American species (including the naturalized *C. illinoinensis* and lacking only a more southern species, *C. floridana* Sargent of peninsular FL, and a south-central species, *C. texana* Buckley, of sc. United States), and 11 of 18 species worldwide. Section *Rhamphocarya* includes a single Asian species. The remaining 4 species in the genus are all in section *Apocarya*: *C. palmeri* Manning of Mexico and 3 Asian species.

C. cordiformis, C. aquatica, C. illinoinensis, C. myristiciformis, C. laciniosa, C. ovata, and *C. carolinae-septentrionalis* are diploids, with n = 16. *C. pallida, C. glabra, C. ovalis*, and *C. alba* are tetraploids with n = 32 (Stone 1961). As suggested by Stone, Adrouny, & Flake (1969), it seems possible that reticulate evolution involving extant or extinct diploid species is responsible for some of the difficulties in the *C. glabra-ovalis* complex. Many hybrids have been described, but some are questionable. Additionally, Hardin & Stone (1984) state that "most of these hybrids are localized and have not led to introgressive populations, or at least none that have been recognized".

Ecologically, *Carya* is one of the more diverse and ubiquitous genera of trees in our area, surpassed in number of species, abundance, and ecological amplitude only by *Quercus* and *Pinus*. This has led to a long tradition of describing large parts of our area (in particular the Piedmont) as being characterized by "oak-hickory" or "oak-pine-hickory" forests (e.g. Küchler 1964; Greller 1988; Schafale & Weakley 1990; Skeen, Doerr, & Van Lear 1993). Ware (1992) and others have recently questioned this tradition, pointing out that *Carya* only rarely dominates or codominates, primarily in specialized circumstances (such as in soils with greater cation concentrations, derived from mafic rocks).

The association of many (but certainly not all) species of hickories with soils with high base status was noted in print as early as 1820 in an account of the landscape of North Carolina. "The sandy pine barrens, and all the lands on which pine is the exclusive growth, are unfriendly to agriculture; but where the pine is intermixed with oak and hickory, the soil is good. Some of our strongest lands have tall pine, mixed not only with hickory and oak, but also with walnut and cherry, and such trees that indicate the best soil. Where hickory prevails, the land is strong" (Guthrie 1820).

Note that the *C. glabra-C. ovalis* portion of this treatment is tentative. In our area, this group has been variously treated as consisting of between 1 and 10 (or more) taxa. For testing, we present here a plausible middle ground treatment in the key and species accounts (4 taxa). References: Stone in FNA (1997); Hardin (1992); Hardin & Stone (1984); Elias (1972); Stone, Adrouny, & Flake (1969); Stone (1961); Mohlenbrock (1986); Sargent (1918); Manning (1950); Hardin (1952); Little (1969); Harrar & Harrar (1962); Stone in Kubitzki, Rohwer, & Bittrich (1993). Key based in part on an unpublished manuscript prepared by Stone & Hardin for the Flora of the Southeastern United States.

Identification notes: Surface vestiture of leaves and bud scales is useful in distinguishing species of *Carya*. Some use of these characters can be made with a 10× or 20× hand lens; better still is a dissecting microscope. It is important to understand the different trichome types mentioned in the key (terminology follows Hardin 1990 and Hardin & Stone 1984). **Short acicular trichomes** are simple, unicellular trichomes tapered to a pointed tip, 0.10-0.35 mm long and with rough walls. **Long acicular trichomes** ("solitary" of Hardin & Stone 1984) are similar to short acicular, but are much larger, 0.45-1.6 mm long, and have smooth walls. **Fasciculate trichomes** are multicellular and have 2-8 straight or curled rays radiating from a clustered base. **Multiradiate trichomes** are similar to fasciculate, but have 8-17 rays, the inner (and usually more upright) rays attached basally above the outer (and usually more spreading) rays. **Capitate glandular trichomes** are unicellular or multicellular, and are distinguished by their bulbous or expanded tip; they are usually 0.02-0.1 mm long. **Peltate scales** are flat or dome-shaped shields or disks, slightly to strongly glandular, (sometimes regularly or irregularly lobed) and can be either sessile or stalked (they are often referred to as scales, resin dots, peltate glands, or lepidote scales). On the lower surfaces of leaflets, peltate scales are of two types: **large peltate scales** are 0.08-0.3

mm in diameter and are round, with smooth or slightly irregular margins, while **small peltate scales** are 0.025-0.12 mm in diameter and are either round, irregularly lobed or regularly 2- or 4-lobed.

1 Terminal buds with 4-6 valvate scales; leaves with 7-13 (-19) leaflets, these symmetrical to strongly falcate; fruit sutures narrowly winged.
  2 Leaves with 7-9 (-11) leaflets, these symmetrical to slightly falcate; fasciculate trichomes with 2-4 rays; terminal bud elongate, flattened, 9-19 mm long, bright orangy yellow to dull orange-tan; [common and widely distributed tree in our area, typically in floodplain and slope forests]..... ***C. cordiformis***
  2 Leaves with (7-) 9-19 leaflets, these slightly to strongly falcate; fasciculate trichomes with 2-8 rays.
    3 Leaves with (7-) 9-11 (-13) leaflets; bark shaggy; lateral petiolules 0-2 mm long; nut flattened and angled in cross-section; kernel bitter; [native, of swamp forests, primarily in the Coastal Plain] ..... ***C. aquatica***
    3 Leaves with 11-19 leaflets; bark scaly, with small exfoliating plates; lateral petiolules 0-7 mm long; nut round in cross-section; kernel sweet; [introduced, frequently cultivated, long persistent, and occasionally naturalized]..... ***C. illinoinensis***
1 Terminal buds with 6-15 imbricate scales; leaves with (3-) 5-9 (-11) leaflets, these symmetrical to slightly falcate; fruit sutures not winged (except *C. myristiciformis*).
  4 Bark shaggy (on large trees separating in segments to a meter in length); leaves with (3-) 5 (-7) leaflets; serrations of the leaflets densely (or only moderately) ciliate when young, most densely so just below the tooth apex, the hairs sloughing with age but leaving a subapical tuft of white trichomes on at least some teeth.
    5 Twigs slender, hardened first-year growth or second-year growth 1-3 mm in diameter; terminal bud 6-15 mm long, glabrous to sparsely puberulent (except for ciliate fringe on the scales), reddish-brown (usually turning black on drying); lower surface of leaflets nearly glabrous, except for tufts of trichomes in the main vein axils, and only slightly lepidote with a few, scattered scales, the large peltate scales yellow and round, the small peltate scales brown, 2- and 4-lobed; terminal leaflet 2-5 (-6) cm wide ... ***C. carolinae-septentrionalis***
    5 Twigs stout, hardened first-year growth or second-year growth (2.5-) 3-6 mm in diameter; terminal bud 9-18 mm long, tomentose, tan to brown (rarely turning black on drying); lower surface of leaflets moderately to densely hirsute with acicular and fasciculate hairs (sometimes the hairs more or less limited to the main veins), and also moderately lepidote, the large peltate scales yellow and round, the small peltate scales dark brown and mostly round; terminal leaflet (4-) 6-15 cm wide ..... ***C. ovata***
  4 Bark tight (the ridges typically forming an interlocking diamond pattern), scaly, or shaggy (when shaggy, the separated segments normally much < 1 meter long); leaves with (3-) 5-9 (-11) leaflets; serrations of the leaflets glabrous or ciliate, but lacking subapical tufts of trichomes.
    6 Twigs stout; terminal buds 8-20 mm long; leaves with (5-) 7-9 (-11) leaflets; lower surface of leaflets moderately to densely hirsute with a mixture of acicular (single), fascicled (2-8 rays), and multiradiate (8-many rays) hairs; small peltate scales of the lower surface of leaflets all round; fruit husk 4-13 mm thick; nuts slightly to strongly 4-angled toward the apex.
      7 Bark tight; petiole hirsute; leaflet apex acute; lower surface of leaflets densely hirsute with acicular (single) and abundant 2-8-rayed fascicled and multiradiate hairs; fruit husk glabrous, with pustulate bumps; fruit 3.5-5 cm long; nut 2.5-3.5 cm long; [common in our area]..... ***C. alba***
      7 Bark shaggy; petiole hirtellous; leaflet apex acuminate; lower surface of leaflets hirsute with acicular (single), 2-6-rayed fascicled, and occasional multiradiate hairs; fruit husk pubescent, lacking pustulate bumps; fruit 4-7 cm long; nut 3-6 cm long; [rare in our area]..... ***C. laciniosa***
    6 Twigs slender; terminal buds 3-15 mm long; leaves with (3-) 5-7 (-9) leaflets; lower surface of leaflets mostly glabrous, except for along the midrib and primary veins, and sometimes hirsute on the surface with acicular (single) and infrequent fascicled (2-8 rays) hairs (lacking multiradiate trichomes); small peltate scales of the lower surface of leaflets of various types, 4-lobed and/or irregular scales often more frequent than round scales; fruit husk 2-5 mm thick; nuts not 4-angled toward the apex.
      8 Terminal bud 4-10 mm long, predominantly lepidote (also pubescent); leaves with (5-) 7 (-9) leaflets; lower surface of spring leaflets densely lepidote with 4-lobed, irregular, and round peltate scales, giving the undersurface a reflective, silvery-tan, rusty-brown, or bronze sheen.
        9 Lepidote scales initially silver, soon turning bronze, and giving the buds, young twigs, and undersurface of the leaves a metallic bronze sheen; fruit 2-3 cm long; [of calcareous swamps, bottomlands and slopes of the Coastal Plain of se. NC southwards] ..... ***C. myristiciformis***
        9 Lepidote scales silvery-tan or rusty-brown, giving the buds, young twigs, and undersurface of the leaves a dull or slightly shiny tan or rusty-brown color; fruit 3-5 cm long; [usually of upland and acidic forests and woodlands, collectively widespread in our area].
          10 Undersurface of the leaflets with dense, silvery-tan large peltate scales, and fewer and less conspicuous fewer small peltate scales (thus the leaves appearing overall silvery-tan); petiole and rachis hirsute with fasciculate trichomes, and also with concentrations of hairs near the leaflet insertions; [widespread in our area, of upland and acidic forests and woodlands]..... ***C. pallida***
          10 Undersurface of the leaflets with dense, rusty-brown small peltate scales, and fewer and less conspicuous sivery-tan large peltate scales (thus the leaves appearing overall rusty-brown); petiole and rachis with few fasciculate hairs (but densely scaly), and lacking concentrations of hairs near the leaflet insertions; [of the sc. United States, east to MS, and perhaps AL, GA, and western KY and TN, of upland or lowland, acidic or calcareous forests and woodlands]..... **[*C. texana*]**
      8 Terminal bud 5-15 mm long, predominantly pubescent (also sparsely lepidote); leaves with (3-) 5-7 (-9) leaflets; lower surface of spring leaflets slightly to densely lepidote with irregular and round peltate scales (4-lobed peltate scales uncommon).
        11 Fruit husk spitting to base at maturity along 2-4 sutures; leaves with (5-) 7 leaflets, pubescent beneath; petiole reddish; fruits typically ellipsoidal; bark tight or often scaly or somewhat shaggy ..... ***C. ovalis***
        11 Fruit husk indehiscent at maturity or tardily splitting to base along 1 suture; leaves with (3-) 5 (-7) leaflets, glabrous to pubescent beneath; petiole usually green; fruits ellipsoidal, pyriform, or subglobose; bark tight.
          12 Rachis (and also often the petiole and lower surfaces of leaflets) densely pubescent ..... ***C. glabra var. hirsuta***
          12 Rachis, petiole, and lower surfaces of leaflets glabrous or glabrescent.
            13 Husk of fruit 1.5-2.5 mm thick; fruit ellipsoidal, subglobose, to obovoid, 1.5-3.5 cm long; terminal leaflet usually 8-17 cm long; [primarily of the Piedmont and Mountains]..... ***C. glabra var. glabra***
            13 Husk of fruit about 3.5 mm thick; fruit pyriform, 2.5-5 cm long; terminal leaflet usually 20-25 cm long; [primarily of the Coastal Plain] ..... ***C. glabra var. megacarpa***

Carya alba (Linnaeus) Nuttall ex Elliott, Mockernut Hickory, White Hickory. Pd, Cp, Mt (GA, NC, SC, VA): forests and woodlands; common. April-May; October. MA west to IN and IA, south to FL and TX. One of the most common forest trees of

much of our area. There has been confusion and controversy for several centuries over the specific epithet. The oldest basionym available is *Juglans alba* Linnaeus, which apparently included disparate elements, including this taxon and *C. ovata*. Following a more circumscribed typification by Crantz in 1766, the epithet "*alba*" should have been applied to this taxon, but continued to be applied in various ways. Rehder (1945) proposed that *C. alba* should be considered a *nomen ambiguum*, but agreed that it applied correctly to what has often been called *C. tomentosa*. He argued that the use of *C. alba* should be rejected "in order to avoid confusion and ambiguity." However, *C. alba* has not been officially rejected, its application appears to be nomenclaturally clear, and there is no alternative under the International Code of Botanical Nomenclature (Greuter 1988) to its use. For further discussion see Rehder (1945), Howard & Staples (1983), and Wunderlin, Hansen, & Hall (1985). [= K; = *C. tomentosa* (Lamarck ex Poiret) Nuttall – RAB, C, F, FNA, G, W; = *Hicoria alba* (Linnaeus) Britton – S]

Carya aquatica (Michaux f.) Elliott, Water Hickory, Bitter Pecan. Cp (GA, NC, SC, VA), Pd (GA, SC): swamp forests, where flooded during the winter months; uncommon. April-May; October. Se. VA south to c. peninsular FL, west to e. TX, north inland to se. MO, s. IL, and se. OK. [= RAB, C, F, FNA, G, GW, K; = *Hicoria aquatica* (Michaux f.) Britton – S]

Carya carolinae-septentrionalis (Ashe) Engler & Graebner, Carolina Shagbark Hickory, Carolina Hickory. Pd (GA, NC, SC, VA), Mt (GA): upland flats, especially those weathered from mafic rocks and with shrink-swell soils dominated by montmorillonitic clays, less typically on slopes and bottomlands; uncommon (rare in VA). April-May; October. Sc. VA (Halifax County) south to GA, AL, and MS, and inland northward to c. TN and sc. KY. First reported for VA by Wieboldt et al. (1998). The taxonomic status of *C. carolinae-septentrionalis* has been controversial, with some workers reducing it to variety of *C. ovata* or not recognizing it at all. It seems to us morphologically and ecologically distinctive and to represent an independent evolutionary lineage. Hardin & Stone (1984) found differences in trichomes, and in a study of nut oils, Stone, Adrouny, & Flake (1969) found *C. ovata* "surprisingly distant" from *C. carolinae-septentrionalis*. There are reports that the two taxa are also phenologically separated, *C. carolinae-septentrionalis* leafing out about two weeks earlier than *C. ovata*, when growing together in the c. Piedmont of NC. Though usually ecologically and/or geographically segregated, the two species sometimes occur together or in close proximity to one another; they maintain their distinctness. [= RAB, C, G, K; = *C. ovata* (P. Miller) K. Koch var. *australis* (Ashe) Little – FNA; = *Hicoria carolinae-septentrionalis* Ashe – S; = *C. ovata* var. *carolinae-septentrionalis* (Ashe) Reveal; = *C. australis* Ashe]

Carya cordiformis (Wangenheim) K. Koch, Bitternut Hickory. Mt, Pd, Cp (GA, NC, SC, VA): forests and woodlands, especially in rich, moist alluvial or slope forests; common. April; October. ME and s. Québec west to MN and NE, south to panhandle FL and e. TX. [= RAB, C, F, FNA, G, GW, K, W; = *Hicoria cordiformis* (Wangenheim) Britton – S]

Carya glabra (P. Miller) Sweet *var. **glabra***, Pignut Hickory. Mt, Pd, Cp (GA, NC, SC, VA): forests and woodlands; common. April-May; October. *C. glabra* ranges from s. NH west to s. MI, se. IA, and se. KS, south to c. peninsular FL and e. TX; the ranges of the varieties are poorly known. [= F, G; < *C. glabra* – RAB, C, FNA, GW, K; < *C. glabra* var. *glabra* – W; = *Hicoria glabra* (P. Miller) Britton var. *glabra* – S]

Carya glabra (P. Miller) Sweet *var. **hirsuta*** (Ashe) Ashe, Hairy Pignut Hickory. Mt, Pd? (GA, NC, SC, VA): forests and woodlands; common? April-May; October. Var. *hirsuta* is apparently primarily Appalachian, variously described as being endemic to the Southern Appalachians or ranging north to s. NH. It needs additional taxonomic assessment. [< *C. glabra* – RAB, C, FNA, GW, K; = *C. ovalis* (Wangenheim) Sargent var. *hirsuta* (Ashe) Sargent – F; = *Hicoria glabra* (P. Miller) Britton var. *hirsuta* Ashe – S; < *C. glabra* var. *glabra* – W]

Carya glabra (P. Miller) Sweet *var. **megacarpa*** (Sargent) Sargent, Coastal Pignut Hickory. Cp (GA, NC, SC, VA?): maritime forests and other forests of the outer Coastal Plain; uncommon? April-May; October. Var. *megacarpa* is apparently primarily a tree of the se. United States Coastal Plain, ranging from s. NY south to FL, west to TX, and north in the interior to s. IL. It needs additional taxonomic assessment. [= F, G; < *C. glabra* – RAB, C, FNA, GW, K; ? *Hicoria austrina* Small – S]

* ***Carya illinoinensis*** (Wangenheim) K. Koch, Pecan. Cp, Pd (GA, NC, SC, VA): persistent around dwellings and in pecan orchards, escaped to suburban woodlands, rural forest edges and floodplains; commonly cultivated, rarely naturalized. April-May; October. Native to the sc. United States, now more widespread in the se. United States as a result of cultivation. The spelling of the specific epithet has been a source of controversy. [= C, FNA, K; = *C. illinoensis* – RAB, F, G, GW, orthographic variant; > *Hicoria pecan* (Marshall) Britton – S; > *Hicoria texana* LeConte – S]

Carya laciniosa (Michaux f.) G. Don, Kingnut Hickory, Big Shellbark Hickory. Mt (GA), Cp, Pd (NC): moist, circumneutral, alluvial levee forests along brownwater rivers of the Coastal Plain (NC), streams of the Piedmont (NC) and Mountains (GA); rare (NC Rare). April-May; October. NY and s. Ontario west to IA, south to NC, nw. GA, MS, and OK. This species is sometimes planted, but occurs native in nw. GA, along the Roanoke River (Halifax and Northampton counties, NC) and New Hope Creek (Durham County, NC). [= RAB, C, F, FNA, G, GW, K, W; = *Hicoria laciniosa* (Michaux f.) Sargent – S]

Carya myristiciformis (Michaux f.) Elliott, Nutmeg Hickory. Cp (GA, NC, SC): nonriverine swamps over calcareous substrates, including calcareous clays and coquina limestone ("marl"), oak flatwoods; rare (GA Special Concern, NC Threatened, SC Rare). April; October. Se. NC south to GA, and from wc. AL west to e. TX and se. OK; disjunct in Mexico (Nuevo Léon and Tamaulipas). The bronze sheen of the leaflets of this species is diagnostic. First reported for NC by Leonard (1971b). [= FNA, K; = *C. myristicaeformis* – RAB, GW, orthographic variant; = *Hicoria myristicaeformis* (Michaux f.) Britton – S]

Carya ovalis (Wangenheim) Sargent, Red Hickory. Mt, Pd, Cp (GA, NC, SC, VA): forests and woodlands; common. April-May; October. MA west to WI, south to GA, MS, and MO. [= RAB, C, K; > *C. ovalis* var. *obcordata* (Muhlenberg & Willdenow) Sargent – F, G; > *C. ovalis* var. *obovalis* Sargent – F, G; > *C. ovalis* var. *odorata* (Marshall) Sargent – F, G; < *C. glabra* – FNA; = *Hicoria microcarpa* (Nuttall) Britton – S; = *C. glabra* (P. Miller) Sweet var. *odorata* (Marshall) Little – W]

Carya ovata (P. Miller) K. Koch, Common Shagbark Hickory. Mt (GA, NC, VA), Pd, Cp (NC, VA): rich moist bottomlands, slopes, occasionally on dry upland flats; uncommon. May; October. S. ME and s. Québec west to MN and NE, south to GA and TX; also disjunct in Mexico. [= RAB, C, F, G, GW, K, W; > *C. ovata* var. *ovata* – F; > *C. ovata* var. *pubescens* Sargent – F; = *C. ovata* var. *ovata* – FNA; = *Hicoria ovata* (P. Miller) Britton – S]

Carya pallida (Ashe) Engler & Graebner, Sand Hickory, Pale Hickory. Cp, Pd (GA, NC, SC, VA), Mt (GA, NC, SC): dry sandy or rocky forests and woodlands; common. April-May; October. S. NJ south to FL, west to TX, inland in the interior to w. NC, KY, s. IL, and AR. [= RAB, C, F, FNA, G, K, W; = *Hicoria pallida* Ashe – S]

Carya texana Buckley, Black Hickory. Reported to occur as far east as KY, TN, and GA (Kartesz 1999), an eastern extent not reported by FNA, which accepts it as far east as MS. Jones (2005) states that w. KY material of *C. pallida* is transitional to *C. texana*. [= FNA, K; > *C. texana* var. *arkansana* (Sargent) Little – C; > *C. texana* var. *texana* – F; > *C. buckleyi* Durand var. *arkansana* (Sargent) Sargent – G]

Juglans Linnaeus (Walnut)

A genus of about 21 species, trees and shrubs, of Mediterranean Europe to e. Asia, and North America to Andean South America. Stanford, Harden, & Parks (2000) present a molecular phylogeny and a discussion of biogeography; our two species are distantly related within the genus, with *J. nigra* most closely related to sw. North American *J. microcarpa* and *J. major*, and *J. cinerea* most closely related to several e. Asian species. References: Whittemore & Stone in FNA (1997); Stanford, Harden, & Parks (2000); Stone & Hardin in SE (in prep.); Stone in Kubitzki, Rohwer, & Bittrich (1993); Stanford (1998).

1 Lower surface of the leaflets densely hirsute with 4-8-rayed fascicled hairs; fruit ellipsoid, densely pubescent with reddish-brown glandular hairs; leaf scars with a velvety ridge along the upper margin; leaves with (7-) 11-17 leaflets; pith dark brown; terminal buds 12-18 mm long; bark of mature trees pale; [section *Trachycaryon*] ..... ***J. cinerea***
1 Lower surface of the leaflets hirsute with single and 2-rayed fascicled hairs; fruit spherical or nearly so, lepidote with peltate scales and occasional glandular hairs; leaf scars without a velvety ridge along the upper margin; leaves with (9-) 15-19 (-23) leaflets; pith light brown; terminal buds 8-10 mm long; bark of mature trees dark; [section *Rhysocaryon*] ..... ***J. nigra***

Juglans cinerea Linnaeus, Butternut, White Walnut. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): moist, nutrient-rich forests; uncommon (US Species of Concern, GA Special Concern, NC Watch List, SC Rare, VA Watch List). April-May; October. New Brunswick west to MN, south to n. GA and AR. This tree, formerly common, is afflicted with butternut canker disease, which now threatens its continued existence. [= RAB, C, F, FNA, G, K, W; = *Wallia cinerea* (Linnaeus) Alefeld – S]

Juglans nigra Linnaeus, Black Walnut. Mt, Pd, Cp (GA, NC, SC, VA); moist, nutrient-rich forests; common (uncommon in the Coastal Plain of NC and SC). April; October. MA west to MN, south to nw. FL and TX. The dark brown wood is famous for cabinetry and other uses; it is one of the most prized of North American hardwoods. The nuts, though difficult to crack, are prized for their intense flavor. The husk is used as a dye. Country people dehusk the nuts by putting them in dirt or gravel driveways where the passage of car tires removes the husk but does not crack the nut. [= RAB, C, F, FNA, G, K, W; = *Wallia nigra* (Linnaeus) Alefeld – S]

KRAMERIACEAE Dumortier 1829 (Krameria Family)

A family of a single genus and about 15-18 species, herbs, shrubs, and trees, of warm (and usually dry) parts of s. North America, Central America, South America, and the West Indies. References: Robertson (1973); Simpson et al. (2004); Simpson in Kubitzki, Bayer, & Stevens (2007).

Krameria Loefling 1758 (Ratany)

A genus of 15-18 species, herbs, shrubs, and trees, hemiparasitic by haustoria. References: Robertson (1973)=Z; Simpson in Kubitzki, Bayer, & Stevens (2007).

Krameria lanceolata Torrey, Trailing Ratany, Sandspur. Cp (GA): sandhills; uncommon. AR, TX, and s. KS west to se. CO, se. AZ, Chihuahua, and Coahuila; disjunct eastward in the Coastal Plain of FL and GA (east to Bulloch, Bryan, Evans, and Emanuel counties, GA). [= K, Z; > *K. spathulata* Small – S]

LAMIACEAE Lindley 1836 ***or LABIATAE*** A.L. de Jussieu 1789 (Mint Family)

A family of about 230-250 genera and 6700-7170 species, herbs, shrubs, vines, and trees, cosmopolitan. The placement in the Lamiaceae of several genera traditionally placed in Verbenaceae (e.g. *Clerodendrum*) is strongly supported by several lines of evidence. References: Harley et al. in Kadereit (2004).

subfamily Viticoideae: *Vitex*.
subfamily Ajugoideae: *Ajuga, Clerodendrum, Teucrium, Trichostema.*
subfamily Scutellarioideae: *Scutellaria.*
subfamily Lamioideae: *Galeopsis, Lamiastrum, Lamium, Leonurus, Macbridea, Marrubium, Physostegia, Sideritis, Stachys, Synandra.*
subfamily Nepetoideae:
tribe Elsholtzieae: *Collinsonia, Elsholtzia, Mosla, Perilla.*
tribe Mentheae:
subtribe Salviinae: *Rosmarinus, Salvia.*

subtribe Menthinae: *Blephilia, Clinopodium, Conradina, Cunila, Dicerandra, Hedeoma, Hyssopus, Lycopus, Mentha, Monarda, Origanum, Piloblephis, Prunella, Pycnanthemum, Thymus.*
subtribe Nepetinae: *Agastache, Dracocephalum, Glechoma, Meehania, Nepeta.*
incertae sedis: *Melissa.*
tribe Ocimeae:
subtribe Hyptidinae: *Hyptis.*
subtribe Ociminae: *Ocimum.*
incertae sedis: *Callicarpa.*

Acinos [see *Clinopodium*]

Agastache Clayton ex Gronovius 1762 (Giant-hyssop)

A genus of about 22 species, herbs, of c. and e. Asia, and North America to Mexico. References: Vogelmann (1985); Lint & Epling (1945); Harley et al. in Kadereit (2004).

1 Leaves densely white tomentose below; corolla blue; [cultivated as an ornamental and rarely naturalized] ..... ***[A. foeniculum]***
1 Leaves glabrous to villous beneath, appearing green; corolla yellow, greenish-yellow, or pinkish; [native].
2 Corolla yellow or greenish-yellow; calyx lobes obtuse or subacute, 1-1.5 mm long at anthesis; calyx lobes and bracts green; midstem internodes glabrous or minutely pubescent; lower surface of the leaf pubescent on the veins and surface..... ***A. nepetoides***
2 Corolla pinkish; calyx lobes acute or acuminate, 2-2.5 mm long at anthesis; calyx lobes and bracts with white or pink margins; midstem internodes at least sparsely long-pubescent; lower surface of the leaf pubescent mainly on the veins ..... ***A. scrophulariifolia***

Agastache nepetoides (Linnaeus) Kuntze, Yellow Giant-hyssop. Pd (NC, SC, VA), Cp (NC, VA), Mt (GA, NC, VA): woodlands and forests, generally over calcareous or mafic rocks; uncommon (GA Special Concern, NC Watch List). July-September; September-October. VT west to MN, south to nw. GA and OK. In our area, this species occurs mostly in the Piedmont. [= RAB, C, F, G, K, S, W]

Agastache scrophulariifolia (Willdenow) Kuntze, Purple Giant-hyssop. Mt (GA, NC, VA), Pd (NC, VA): rich woodlands and forests, bottomlands; uncommon (GA Special Concern). July-September; September-October. VT west to MN, south to NC, e. TN, n. GA, and e. KS. [= K; = *A. scrophulariaefolia* – RAB, C, G, S, W, an orthographic variant; > *A. scrophulariaefolia* var. *scrophulariaefolia* – F; > *A. scrophulariaefolia* var. *mollis* (Fernald) Heller – F]

* *Agastache foeniculum* (Pursh) Kuntze, Lavender Giant-hyssop, native of w. North America, is cultivated as an ornamental and naturalized in scattered locations in PA (Rhoads & Klein 1993), KY (Kartesz 1999), and elsewhere. [= C, F, G, K]

Ajuga Linnaeus (Bugle, Bugleweed)

A genus of about 40-50 species, herbs, of the temperate Old World. References: Harley et al. in Kadereit (2004)

1 Leaves deeply cleft into narrow segments; corolla yellow; annual..... ***A. chamaepitys***
1 Leaves entire to shallowly lobed; corolla blue (to white or pink); perennial.
2 Plants not stoloniferous; stems hairy all around..... ***[A. genevensis]***
2 Plants stoloniferous; stems hairy in lines ..... ***A. reptans***

* ***Ajuga chamaepitys*** (Linnaeus) Schreber, Yellow Bugle, Ground-pine Bugle. Cp (VA): disturbed areas; rare, introduced. May-September. [= C, F, G, K]
* ***Ajuga reptans*** Linnaeus, Carpet Bugle. Pd, Mt (NC, VA), Cp (FL, VA): lawns and roadsides; commonly cultivated, rarely naturalized, native of Europe. March-June. [= RAB, C, F, G, K]

* *Ajuga genevensis* Linnaeus, Standing Bugle. Cultivated and rarely escaped in ne. North America, reported as naturalized as far south as PA (Rhoads & Klein 1993) and MD (Kartesz 1999). [= C, F, G, K]

Blephilia Rafinesque 1819 (Woodmint, Pagoda-plant)

A genus of 3 species, herbs, of e. North America. References: Simmers & Kral (1992)=Z; Harley et al. in Kadereit (2004).

1 Stem glabrate below the middle; leaf lower surface glabrous or with a few unicellular hairs on the midvein; [of moist forests over limestone in n. AL] ..... ***[B. subnuda]***
1 Stem strongly pubescent below the middle; leaf lower surface distinctly pubescent, at least on the larger nerves; [of various moist to dry forests, woodlands, and meadows, collectively widespread in our area].
2 Lobes of the lower lip of the calyx linear, approaching the sinuses of the upper lip; outer bracteoles acute; leaves with rounded to acutish tips (rather *Prunella*-like); petioles 1-7 (-12) mm long; stem canescent, rarely with intermixed long trichomes; [primarily in the Piedmont] ..... ***B. ciliata***

2 Lobes of the lower lip of the calyx deltoid, not reaching the sinuses of the upper lip; outer bracteoles long-acuminate; leaves with acuminate to acute tips (rather *Monarda*-like); petioles 9-42 mm long; stem densely to sparsely pubescent with long, spreading trichomes; [primarily in the Mountains).....***B. hirsuta***

Blephilia ciliata (Linnaeus) Bentham. Pd, Mt (GA, NC, SC, VA), Cp (NC, SC, VA): woodlands, meadows, forests, usually in circumneutral soils (over diabase, limestone, etc.); uncommon. May-early July; August-October. MA and WI south to c. GA and AR. [= RAB, C, F, G, K, S, W, Z]

Blephilia hirsuta (Pursh) Bentham. Mt, Pd (NC, VA), {GA}: rocky or alluvial forests, montane forests up to at least 5000 feet elevation; common (rare in VA). Late June-October; August-November. Québec and MN south to NC, AL, AR, and e. TX. [= RAB, C, G, S, W, Z; > *B. hirsuta* var. *hirsuta* – F, K]

Blephilia subnuda R.W. Simmers & Kral is endemic (so far as is known) to the Cumberland Plateau of nc. AL (Jackson and Madison counties). [= K, Z]

Callicarpa Linnaeus 1753 (Beautyberry)

A genus of about 140 species, small trees, shrubs, and lianas, mainly tropical and subtropical. References: Moldenke (1980)=Z; Harley et al. in Kadereit (2004).

1 Leaves 7-23 cm long, stellate-scurfy beneath; peduncles 1-5 mm long.....***C. americana***
1 Leaves 2-6.5 (-7) cm long, glabrous or nearly so beneath (except on the midrib); peduncles 10-20 mm long.
2 Inflorescence supra-axillary, diverging from the twig 1-4 mm above the leaf axil .....***C. dichotoma***
2 Inflorescence axillary, borne directly in the axil of the leaf.....***C. japonica***

Callicarpa americana Linnaeus, Beautyberry, American Beautyberry, French-mulberry. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC): hammocks, other forests (especially with sandy or rocky soils), maritime forests (the main habitat northwards), disturbed areas; common (rare in Mountains). June-July; August-October (persisting into the winter). MD and AR south to FL, TX, Mexico; West Indies. [= RAB, C, F, G, K, S, W]

* ***Callicarpa dichotoma*** (Loureiro) K. Koch, Chinese Beautyberry. Pd (NC, VA), Cp, Mt (NC), {SC}: roadsides, powerline rights-of-way, woodland edges, suburban woodlands, bogs; uncommon, native of Asia. September-November. This species is beginning to spread more rapidly in the Southeast. [= RAB, C, K]

* ***Callicarpa japonica*** Thunberg, Japanese Beautyberry. Pd (NC): suburban woodlands; rare, native of e. Asia. Reported for Durham Co., NC by Moldenke (1980); corroborated by specimens from Orange County, NC in 2005. [= K, Z]

Chaiturus Willdenow 1787

* ***Chaiturus marrubiastrum*** (Linnaeus) Reichenbach, Horehound Motherwort. Mt, Pd (VA): disturbed areas; rare, native of Europe and n. Asia. June-September. [= K; = *Leonurus marrubiastrum* Linnaeus – C, F, G, S]

Clerodendrum Linnaeus (Glory-bower)

A genus of about 400-500 species, trees and shrubs, mostly tropical and warm temperate, e. and w. hemispheres. References: Steane et al. (1999); Hsiao & Lin (1995); Steane, de Kok, & Olmstead (2004); Harley et al. in Kadereit (2004).

1 Corolla tube > 8 cm long.....***C. indicum***
1 Corolla tube < 3 cm long.
2 Calyx 5-8 mm long .....***C. bungei***
2 Calyx > 10 mm long.
3 Corolla double.....***C. chinense***
3 Corolla single .....***C. trichotomum var. ferrugineum***

* ***Clerodendrum bungei*** Steudel, Rose Glory-bower. Pd (GA, SC), Cp (GA): roadsides and suburban woodlands; rare, native of e. Asia. August-September. First reported from South Carolina by Hill & Horn (1997); also reported for our area by W. Duncan (pers. comm.). [= K; = *Volkameria bungei*]

* ***Clerodendrum chinense*** (Osbeck) Mabberley, Stickbush. Cp (FL): disturbed areas; rare, native of Asia. Cultivated and naturalized in FL, including the Panhandle (Escambia County) (Wunderlin & Hansen 2004). [= K; ? *C. japonicum* (Thunberg) Sweet var. *pleniflorum* (Schauer) Maheshwari]

* ***Clerodendrum indicum*** (Linnaeus) Kuntze, Tubeflower, Turk's-turban. Cp (FL, GA, SC): disturbed areas, roadsides; rare, native of the Malaysian Archipelago. August-October; November-December. [= K; = *Clerodendron indicum* – RAB, orthographic variant]

* ***Clerodendrum trichotomum*** Thunberg *var.* ***ferrugineum*** Nakai, Harlequin Glory-bower. Pd, Mt (NC), Cp (FL), {GA}: roadsides, streambanks; rare, cultivated and strongly naturalized, native of e. Asia. [= K]

* *Clerodendrum japonicum* (Thunberg) Sweet is also cultivated and is reported to be naturalized in MD (Staff of the Bailey Hortorium 1976). [= K] {not yet keyed}

Clinopodium Linnaeus 1753 (Calamint)

A genus of about {??} 20 species (as here circumscribed), herbs and shrubs, of temperate and subtropical areas of the w. and e. hemispheres. References: Cantino & Wagstaff (1998)=Y; Shinners (1962a)=Z; Shinners (1962f)=X. Key adapted in part from Z.

1 Flowers 1 per leaf axil ..... ***C. brownei***
1 Flowers > 1 per leaf axil.
  2 Plant a shrubby perennial, not flowering the first year; [of sandy or rocky habitats of the Coastal Plain and Piedmont, from s. NC southward].
    3 Corolla bright scarlet, 27-50 mm long; calyx 8-18 mm long ..... ***C. coccineum***
    3 Corolla light lavender or pink with darker spots, 10-20 mm long; calyx 5.0-7.5 mm long.
      4 Leaves ovate or elliptic, sharply serrate, not revolute; leaves distinctly petioled; leaf surfaces glabrous ..... ***C. georgianum***
      4 Leaves linear to linear-elliptic, entire, strongly revolute; leaves subsessile; leaf surfaces minutely and densely pubescent ..... ***C. ashei***
  2 Plant an herbaceous to suffrutescent perennial, often flowering the first year; [of various habitats, collectively widely distributed in our area].
    5 Stem glabrous or pubescent at the nodes only; leaves of flowering stems linear to oblanceolate; [native, of limestone glades, barrens, and bluffs].
      6 Plant stoloniferous, bearing leafy stolons with ovate leaves; leaves of the flowering stems 1-2 cm long, 1-5 mm wide, entire ..... ***C. arkansanum***
      6 Plant not bearing leafy stolons; leaves of the flowering stems oblanceolate, 2.5-5 cm long, 5-17 mm wide, with several teeth on each side ..... ***C. glabellum***
    5 Stem pubescent; leaves of flowering stems elliptic to ovate; [alien or native, generally of disturbed or weedy situations].
      7 Axillary flower clusters sessile, dense.
        8 Whorls with 8 or fewer flowers; calyx 4.5-7 mm long; corolla 7-10 mm long ..... ***C. acinos***
        8 Whorls with > 8 flowers; calyx 7-10 mm long; corolla 12-22 mm long ..... ***C. vulgare***
      7 Axillary flower clusters peduncled, contracted cymes.
        9 Calyx 6.0-10.2 mm long, the hairs inside the throat barely or not exserted; blades of larger stem leaves 2-5 cm long .. ***C. ascendens***
        9 Calyx 2.8-6.0 mm long, the hairs inside the throat exserted, prominent; blades of the larger stem leaves 0.8-2.4 cm long ..... ***C. calamintha***

* ***Clinopodium acinos*** (Linnaeus) Kuntze, Mother-of-thyme, Basil-thyme. Mt (VA): cultivated, rarely escaped or persisting; rare, native of Europe. [= *Satureja acinos* (Linnaeus) Scheele – C, F, G; = *Acinos arvensis* (Lamarck) Dandy – K]

Clinopodium arkansanum (Nuttall) House, Arkansas Calamint. Mt (VA): dry limestone glades; rare (VA Rare). Ontario west to MN, south to w. NY, nw. PA, w. VA, WV, IL, c. TN, and s. WI; also in MO, OK, AR, and TX. There appears to be confusion about the identities and distributions of this taxon and *C. glabellum*. [= K, Y; = *Satureja glabella* (Michaux) Briquet var. *angustifolia* (Torrey) Svenson – C, G; = *Satureja arkansana* (Nuttall) Briquet – F; < *Calamintha arkansana* (Nuttall) Shinners – GW (also see *Clinopodium glabellum*); = *Calamintha arkansana* (Nuttall) Shinners – Z; < *Clinopodium glabellum* (Michaux) Kuntze – S]

* ***Clinopodium ascendens*** (Jord.) Samp., Common Calamint. Cp (VA): rich calcareous slope; rare, native of Europe. August. [= *Calamintha sylvatica* Bromf. ssp. *ascendens* (Jord.) P.W. Ball – K; ? *Calamintha officinalis* – Z]

Clinopodium ashei (Weatherby) Small, Ashe's Calamint, Ashe's Savory, Ohoopee Dunes Wild Basil. Cp (GA): xeric sandhills; rare (GA Threatened). Peninsular FL (south of our area); disjunct in e. GA (Candler and Tatnall counties). [= K, S, Y; = *Calamintha ashei* (Weatherby) Shinners – Z; = *Satureja ashei* Weatherby]

Clinopodium brownei (Swartz) Kuntze, Browne's Savory. Cp (GA, SC): floodplain forests, pondshores; rare (GA Special Concern). In sw. GA (Jones & Coile 1988). Reported for SC (Beaufort County, SC) (Daniel Payne, pers.comm. 2006, specimen at CLEMS). [= K; > *Micromeria pilosiuscula* (A. Gray) Small – S; > *Micromeria brownei* (Sw.) Bentham var. *pilosiuscula* A. Gray – GW, X]

* ***Clinopodium calamintha*** (Linnaeus) Stace, Lesser Calamint, Basil-thyme. Mt (NC, VA), Pd (NC, VA), Ip (KY), Cp (NC, VA), {GA}: disturbed areas; common (uncommon in NC), native of Europe. July-October. [> *Satureja calamintha* (Linnaeus) Scheele var. *nepeta* (Linnaeus) Briquet – RAB, F, G, W; = *Satureja calamintha* (Linnaeus) Scheele – C; > *Satureja calamintha* var. *calamintha* – F; > *Satureja calamintha* var. *nepetoides* (Jord.) Briquet – F, G; > *Satureja calamintha* var. *glandulosa* (Riquien) Briquet – F; > *Calamintha nepeta* (Linnaeus) Savi ssp. *nepeta* – K; > *Calamintha nepeta* ssp. *glandulosa* (Riquien) P.W. Ball – K; = *Clinopodium nepeta* (Linnaeus) Kuntze – S; > *Calamintha officinalis* Moench – Z; > *Calamintha nepeta* (Linnaeus) Savi – Z]

Clinopodium coccineum (Nuttall ex Hooker) Kuntze, Scarlet Calamint, Scarlet Wild Basil, Red Mint Shrub. Cp (FL, GA): sandhills and flatwoods; uncommon. E. GA south to c. peninsular FL, and west to s. MS. [= K, S, Y; = *Calamintha coccinea* (Nuttall ex Hooker) Bentham – Z; = *Satureja coccinea* (Nuttall ex Hooker) Bertolini]

Clinopodium georgianum R.M. Harper, Georgia Calamint. Cp (FL, GA, NC, SC), Pd (GA, NC, SC): longleaf pine sandhills, dry rocky or sandy woodlands; rare (NC Rare). July-September. S. NC south to Panhandle FL and west to LA. [= K, S, Y; = *Satureja georgiana* (R.M. Harper) Ahles – RAB; = *Calamintha georgiana* (R.M. Harper) Shinners – Z]

Clinopodium glabellum (Michaux) Kuntze. Ip (KY): dry-mesic to mesic shaley forests, limestone barrens; uncommon. C. Nc. KY, c. TN, south to c. AL; MO and AR. Reports of this for VA (Kartesz 1999) are apparently based on confusion with *Clinopodium arkansanum*. [= Y; = *Satureja glabella* (Michaux) Briquet var. *glabella* – C; = *Clinopodium glabellum* (Michaux)

Kuntze – K; < *Calamintha arkansana* (Nuttall) Shinners – GW; < *Clinopodium glabellum* (Michaux) Kuntze – S; = *Calamintha glabella* (Michaux) Bentham]

Clinopodium vulgare Linnaeus, Wild Basil. Mt (KY, NC, VA), Pd (NC, VA), Cp (NC, VA), Ip (KY): pastures, roadbanks, forests, thin soils around rock outcrops; common. July-September. Newfoundland to Manitoba, south to NC, sc. TN, and KS, scattered in the west, widespread in Europe. Plants in our area may reflect both native and introduced genotypes. [= K, S, Y, Z; = *Satureja vulgaris* (Linnaeus) Fritsch – RAB, C, F, G, W; > *Satureja vulgaris* var. *vulgaris* – F; > *Satureja vulgaris* var. *diminuta* (Simon) Fernald & Wiegand – F; > *Satureja vulgaris* var. *neogaea* Fernald – F; > *Clinopodium vulgare* var. *neogaea* (Fernald) C.F. Reed]

Clinopodium dentatum (Chapman) Kuntze, Florida Calamint, Toothed Savory. Cp (FL, GA): sandhills and xeric steepheadsl rare. Endemic to sw. GA and Panhandle FL (Walton County). [= K; = *Satureja dentata* (Chapman) Briquet; = *Calamintha dentata* Chapman] {not yet keyed; add to synonymy}

* ***Clinopodium gracile*** (Bentham) Kuntze, Slender Wild Basil. Cp (AL, FL, LA, MS): disturbed areas; rare, native of Asia. Introduced in s. AL, FL, LA (Kartesz 1999; Woods, Diamond, & Searcy 2003) and MS (S.W. Leonard, pers. comm. 2005). [= K] {not yet keyed; add to synonymy}

Collinsonia Linnaeus 1753 (Horsebalm, Richweed, Stoneroot)

A genus of about 4 species, perennial herbs, of e. North America. References: Peirson, Cantino, & Ballard (2006)=Y; Shinners (1962b)=Z; Harley et al. in Kadereit (2004). Key adapted from Y and Z.

1 Inflorescence an unbranched thyrse, the lower nodes with (3-) 6 flowers per node; floral bracts absent; pedicels flattened at base; leaves (2-) 4 (-6), the 4 upper (or only) leaves subverticillate; flowers light pink to lavender; flowering April-June; [subgenus *Micheliella*] .... ***C. verticillata***
1 Inflorescence a panicle (rarely unbranched), the flowers 2 per node; floral bracts present, minute to large; pedicels not enlarged basally; leaves 6 or more, opposite; flowers cream to yellow; flowering July-September; [subgenus *Collinsonia*].
2 Fertile stamens 4; fresh plants with anise scent; [of GA southward and westward] ..... ***C. anisata***
2 Fertile stamens 2; fresh plants with lemon scent; [collectively widespread in our area].
3 Blades of the larger stem leaves 4.0-10.5 cm long, with 5-15 teeth on each margin, glabrous or hispidulous on the main veins beneath; plant from a small, rounded tuber-like crown, to 6 cm long and 5 cm in diameter ..... ***C. tuberosa***
3 Blades of the larger stem leaves 8-25 cm long, with 11-42 teeth on each margin, glabrous or variously pubescent beneath; plant from an elongate, woody, rhizome-like crown, to 15 cm long.
4 Calyx 2-5 mm long; calyx teeth lance-subulate to narrowly lanceolate; flowers 8-13 mm long ..... ***C. canadensis***
4 Calyx 4.5-7 mm long; calyx teeth broadly lanceolate; flowers 12-17 mm long ..... ***C. punctata***

Collinsonia anisata Sims, Southern Horsebalm, Anise Horsebalm. Pd, Cp (GA): rich forests; uncommon. Late July-September; September-October. C. GA south and west to Panhandle FL and west to s. MS, on the Piedmont and Coastal Plain. This species is apparently distinct, but Shinners's concept of it included hybrids with *C. canadensis* and aberrant *C. canadensis* (Peirson, Cantino, & Ballard 2006). [= Y; < *Collinsonia serotina* Walter – K, W, Z; < *C. canadensis* var. *punctata* (Elliott) A. Gray –F, misapplied; < *C. punctata* Elliott – S; ? *Micheliella anisata* (Sims) Briquet – S]

Collinsonia canadensis Linnaeus, Richweed, Northern Horsebalm. Mt, Pd, Cp (GA, NC, SC, VA): cove forests, rich forests, especially over calcareous or mafic substrates; common. Late July-September; September-October. Québec, MI, and WI south n. FL and LA. [= RAB, C, F, G, K, S, W, Z; < *C. canadensis* – Y (also see *C. tuberosa*)]

Collinsonia punctata Elliott, Florida Horsebalm. Cp (GA, SC): rich woods; rare. Late August-mid October; September-October. S. SC (Barnwell County) to e. LA, on the Coastal Plain. [= Y; < *Collinsonia serotina* – K, Z]

Collinsonia tuberosa Michaux, Stoneroot. Pd (GA, NC, SC), Mt (GA): rich forests, over calcareous or mafic substrates; rare (NC Watch List). Late July-September; September-October. C. NC west to c. TN, south to n. GA and MS (or LA?). Peirson, Cantino, & Ballard (2006) conclude that *C. tuberosa* should be merged into *C. canadensis*, a conclusion not followed here. [= RAB, K, S, W, Z; < *C. canadensis* – Y; = *C. canadensis* Linnaeus var. *tuberosa* (Michaux) A. Wood]

Collinsonia verticillata Baldwin, Whorled Horsebalm. Pd (GA, NC, SC, VA), Mt (GA): rich forests, ranging from moist (cove) forests to rather dry oak forests over mafic or calcareous rocks; rare (NC Rare, SC Rare, VA Rare). Late April-early June; June-July. S. VA west to e. TN, south to w. NC, nw. SC, c. GA, and MS; disjunct in s. OH. The range is strangely scattered and fragmented. [= RAB, C, G, K, W, Y, Z; = *Micheliella verticillata* (Baldwin) Briquet – F, S]

Conradina A. Gray 1870

A genus of 6 species, shrubs and suffrutescent herbs, of temperate se. North America. References: Shinners (1962g)=Z; Harley et al. in Kadereit (2004).

1 Leaves densely gray-pubescent above and below ..... ***C. canescens***
1 Leaves green above, glabrous or inconspicuously short-pubecsent.
2 Plants upright to 8 dm tall; calyx tube glabrous or minutely and inconspicuously puberulent; [of the Coastal Plain of Panhandle FL and s. AL] ..... ***C. glabra***
2 Plants decumbent, rooting at the nodes; calyx tube densely short-pubescent and also pilose with longer glandular hairs; [of the Cumberland Plateau of KY and TN] ..... ***C. verticillata***

Conradina canescens A. Gray, Gray Rosemary. Cp (AL, FL, MS): sandhills, scrub, flatwoods; uncommon. January-May. Panhandle FL and s. AL west to s. MS. [= K, Z; > *C. canescens* – S; > *C. puberula* Small – S]

Conradina glabra Shinners, Apalachicola Rosemary. Cp (AL, FL): sandhills; rare. Panhandle FL and s. AL. [= K, Z]

Conradina verticillata Jennison, Cumberland Rosemary. Mt (KY, TN): flood-scoured cobble bars of large rivers; rare. Endemic to the Cumberland Plateau area of ne. TN and se. KY. It has an odor similar to rosemary, and showy purplish flowers. [= K, Z; = *C. montana* Small – S]

Cunila D. Royen ex Linnaeus 1759 (Stone-mint, American-dittany, Wild-oregano)

A genus of about 15 species, herbs, from e. North America to South America. References: Harley et al. in Kadereit (2004).

Cunila origanoides (Linnaeus) Britton, Stone-mint, American-dittany, Wild-oregano. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (NC, VA): dry rocky slopes, other dry slopes; common (rare in NC Coastal Plain). S. NY and PA west to MO, south to c. SC, n. GA, OK, and ne. TX (Singhurst & Holmes 2004). [= RAB, C, F, G, K, W; = *Mappia origanoides* (Linnaeus) House – S]

Dicerandra Bentham 1830

A genus of 9 species, herbs, endemic to se. North America. References: Huck (1987)=Z; Huck (1984)=Y; Huck & Chambers (1997); Harley et al. in Kadereit (2004).

1 Corolla tubular, straight or slightly curved; superior lobe cucullate (hoodlike); stamens and style arching under the hooded upper lobe of the corolla, included or slightly exserted beyond its apex; filaments inserted at 2 levels within the corolla; odor of fresh plant cinnamon-like, spicy; [section *Lecontea*].
  2 Corolla tube ca. 18 mm long, the orifice ca. 2 mm wide; leaves (15-) avg. 25 (-45) mm long, linear, the margins entire; [of s. SC south through much of the Coastal Plain of GA] ..... ***D. odoratissima***
  2 Corolla tube >20 mm long, the orifice ca. 4 mm wide; leaves (19-) avg. 40 (-55) mm long, narrowly oblong, the margins often dentate; [endemic to McIntosh County, GA] ..... ***D. radfordiana***
1 Corolla funnel-shaped, the tube geniculate; superior corolla lobe a lobed, flaring standard; stamens and style exserted, the stamens either widely flaring to the sides or declined along the lower lobe of the corolla; filaments inserted at the same level within the corolla; odor of fresh plant minty; [section *Dicerandra*].
  3 Cymes epedunculate; flowers nearly sessile in compact verticils; pollen white to pale yellow; anther spurs obtuse to barely acute, with domes of minute hairs ..... ***D. densiflora***
  3 Cymes on peduncles 3-6 mm long; flowers on pedicels (3-) avg. 5 (-9) mm long; pollen bright yellow; anther spurs acuminate, glabrous.
    4 Leaves linear; cymes 3-flowered; corolla white to pale purple; anthers vivid yellow; [widespread in the Coastal Plain of GA south to ne. FL and s. AL] ..... ***D. linearifolia* var. *linearifolia***
    4 Leaves narrowly rhombic; cymes 5-7-flowered; corolla purplish red to vivid purple; anthers strongly reddish brown; [of extreme s. GA south into e. Panhandle FL and ne. FL] ..... ***D. linearifolia* var. *robustior***

Dicerandra densiflora Bentham, Florida Balom. Cp (FL): longleaf pine sandhills; rare. October-early November. Reported for GA by Small (1933), but this report is apparently in error; Huck (1987) regards it as endemic to n. peninsular FL. This taxon is tetraploid. [= K, S, Y, Z]

Dicerandra linearifolia (Elliott) Bentham *var.* ***linearifolia***. Cp (AL, FL, GA): sandhills and flatwoods; uncommon. Mid September-late November. W. and ec. Coastal Plain of GA south to ne. FL and s. AL. This taxon is hexaploid. [= K, Y, Z; < *D. linearifolia* – S]

Dicerandra linearifolia (Elliott) Bentham *var.* ***robustior*** R.B. Huck. Cp (FL, GA): sandhills and flatwoods; uncommon. Late September-late November. Sc. Coastal Plain of GA (Brooks, Echols, Lowndes counties) (Huck 1987) south to e. Panhandle FL and ne. FL. This taxon is tetraploid. [= K, Y, Z; < *D. linearifolia* – S]

Dicerandra odoratissima R.M. Harper. Cp (GA, SC): sandhills; uncommon (SC Rare). Late August-early October. S. SC south to se. GA. This taxon is tetraploid. [= RAB, K, S, Y, Z]

Dicerandra radfordiana R.B. Huck, Radford's Dicerandra. Cp (GA): dry flatwoods and sandhills; rare (GA Special Concern). September-October. Endemic to e. GA (McIntosh County). This species was postulated to be a polyploid derivative of *D. odoratissima* by Huck (1984, 1987); later study has shown that this is not the case (Huck & Chambers 1997). Both taxa are tetraploid. [= K, Y, Z]

Dracocephalum Linnaeus 1753 (Dragon's-head)

A genus of about 45-70 species, herbs, of Eurasia and North America. References: Harley et al. in Kadereit (2004). [also see *Physostegia*]

* ***Dracocephalum parviflorum*** Nuttall, Dragon's-head. Pd (NC): cultivated ground; rare, native west of the Appalachians. May-July; July-September. [= C, F, G, K; = *Moldavica parviflora* (Nuttall) Britton – RAB]

Elsholtzia Willdenow 1790

A genus of about 35-40 species, herbs, of temperate e. hemisphere. References: Harley et al. in Kadereit (2004).

* ***Elsholtzia ciliata*** (Thunberg) Hylander. Mt (NC): disturbed areas; rare, native of Asia. First reported for NC by Leonard (1971b). [= C, F, G, K]

Galeopsis Linnaeus 1753 (Hemp-nettle)

A genus of about 10 species, herbs, of Eurasia. References: Stace (1997)=Z; Harley et al. in Kadereit (2004). Key adapted from Stace (1997).

1 Stem with soft, appressed hairs; stem not swollen at the nodes ..... ***[G. ladanum var. ladanum]***
1 Stem with rigid, bristly hairs; stem swollen at the nodes.
  2 Terminal lobe of lower lip of corolla clearly emarginate and also convex (the sides revolute); corolla 13-16 mm long ..... ***G. bifida***
  2 Terminal lobe of the lower lip of the corolla entire to very slightly emarginate, essentially planar, not revolute; corolla 13-20 (-25) mm long ..... ***[G. tetrahit]***

* ***Galeopsis bifida*** Boenninghausen, Bifid Hemp-nettle. Mt (NC): streamsides, pastures, roadsides; rare, native of Eurasia. July-frost. [= K, Z; < *G. tetrahit* – RAB, S; = *G. tetrahit* Linnaeus var. *bifida* (Boenninghausen) Lejeune & Courtois – C, F, G]

* *Galeopsis ladanum* Linnaeus var. *ladanum*, Red Hemp-nettle is naturalized in ne. North America, south at least to se. PA (Rhoads & Klein 1993) and may occur in our area. [= F, K; > *G. ladanum* Linnaeus var. *angustifolia* (Ehrhart ex Hoffmann) Wallroth – C, G, misappied]
* *Galeopsis tetrahit* Linnaeus, Common Hemp-nettle is naturalized in ne. North America and may occur in our area. Some of the material reported from our area may be this taxon. [= Z; = *G. tetrahit* var. *tetrahit* – C, F, G; > *G. tetrahit* var. *tetrahit* – K]

Glechoma Linnaeus 1753 (Gill-over-the-ground)

A genus of about 4-10 species, herbs, of temperate Eurasia. References: Harley et al. in Kadereit (2004).

* ***Glechoma hederacea*** Linnaeus, Gill-over-the-ground, Ground-ivy. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): lawns, gardens, disturbed areas; common (rare in FL), native of Eurasia. Late March-June; May-July. [= C, K; = *Glecoma hederacea* – RAB, S, W, misspelled; > *G. hederacea* var. *hederacea* – F; > *G. hederacea* var. *micrantha* Moricand – F; > *Glecoma hederacea* var. *parviflora* (Bentham) House – G]

Hedeoma Persoon 1807 (American Pennyroyal)

A genus of about 38-42 species, herbs, of North America, Central America, and South America. References: Irving (1980)=Z; Harley et al. in Kadereit (2004).

1 Leaves elliptic, 4-11 mm wide, slightly to strongly crenate; nutlets subspherical, 0.7-1.0 mm long, 0.6-0.9 mm wide, the surface smoothish, mottled, not glaucous; [subgenus *Hedeoma*] ..... ***H. pulegioides***
1 Leaves linear to narrowly elliptic, 1-4 mm wide, entire; nutlets narrowly ovoid, 1.0-1.3 mm long, 0.4-0.6 mm wide, the surface areolate and strongly glaucous; [subgenus *Saturejoides*].
  2 Calyx teeth convergent, closing the orifice at maturity; bracteoles subtending the individual flower pedicels 1-2 mm long, about ½ as long as the pedicel; leaves (5.0-) avg. 7.7 (-11.0) mm long, (1.2-) avg. 2.2 (-4.0) mm wide, 3-5× as long as wide ..... ***[H. drummondii]***
  2 Calyx teeth spreading (the upper) to slightly convergent (th lower), not closing the orifice at maturity; bracteoles subtending the individual flower pedicels (1.5-) 2.5-6 mm long, generally as long as or longer than the pedicel; leaves (11.0-) avg. 16.4 (-21.0) mm long, (1.0-) avg. 2.2 (-3.0) mm wide, > 5× as long as wide ..... ***H. hispida***

*? ***Hedeoma hispida*** Pursh, Rough Pennyroyal. Pd (GA, SC, VA), Mt (GA), Cp (FL, GA): disturbed areas, pastures, granitic flatrocks; rare, apparently adventive from further south and west. Irving (1980) shows *H. hispida* east to e. panhandle FL, c. AL, nc. TN, and s. OH; it may be recently arrived further east or previously overlooked. First reported for SC by Hill & Horn (1997). [= C, F, G, K, Z]

Hedeoma pulegioides (Linnaeus) Persoon, American Pennyroyal. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): dry soils of woodlands, roadbanks, woods-roads, especially common in shaly parts of the VA mountains; common (uncommon to rare in the Carolinas). Late July-October. Nova Scotia, s. Québec, s. Ontario, MI, WI, and IA south to c. SC, c. GA, and AR. The fragrant oil is apparently very similar to that of the European Pennyroyal, *Mentha pulegium* Linnaeus. The oil is a powerful insect repellant and insecticide, often used on pets to repel fleas. It is also poisonous to humans, however, at least in substantial quantities. It is sometimes used as a tea; native Americans are reputed to have used it as an abortion inducer. This plant should be used with great caution, if at all. [= RAB, C, F, G, K, S, W, Z]

Hedeoma drummondii Bentham. East to MS and AL, where it occurs in black belt prairies. [= K, Z]

Hyptis Jacquin 1786 (Cluster Bushmint)

A genus of about 280-300 species, herbs and shrubs, of warm temperate, subtropical, and tropical America. References: Harley et al. in Kadereit (2004).

1 Leaves lanceolate, narrowed to a narrowly cuneate, subpetiolar base; flowers borne in large, globose heads, 1.5-2.5 cm across, borne on peduncles 2-6 cm long.....***H. alata***
1 Leaves ovate, narrowed to a broadly cuneate to truncate base and well-developed petiole (4-6 cm long on larger leaves); flowers borne in irregular verticillate spikes, sessile to pedunculate on peduncles 1-2 mm long.....***H. mutabilis***

Hyptis alata (Rafinesque) Shinners, Musky Mint, Cluster Bushmint. Cp (FL, GA, NC, SC): wet pine savannas, margins of swamp forests, wet powerline rights-of-way, ditches; common. Late June-September. Ne. NC south to s. FL, west to se. TX; West Indies. [= RAB, GW, K; = *H. radiata* Willdenow – S]

Hyptis mutabilis (A. Richard) Briquet, Tropical Bushmint. Cp (FL, GA, SC, VA); moist disturbed areas; common (uncommon in GA, rare north of GA), native of South America. [= GW, K, S]

Hyssopus Linnaeus 1753 (Hyssop)

A genus of 2-5 species, herbs, of s. Europe to c. Asia. References: Harley et al. in Kadereit (2004).

* ***Hyssopus officinalis*** Linnaeus, Hyssop. {NC} Reported for NC (see G and S); documentation not known. Native of Eurasia. July-October. [= RAB, C, F, G, K, S]

Lamiastrum Heister ex Fabricius 1759 (Yellow Archangel)

A monotypic genus, an herb, of w. Europe to Iran, often included in *Lamium*. The generic name may be illegitimate. References: Mennema (1989)=Z; Harley et al. in Kadereit (2004).

* ***Lamiastrum galeobdolon*** (Linnaeus) Ehrendorfer & Polatschek, Yellow Archangel. Pd (VA): disturbed areas; rare, native of Europe and e. Asia. Several subspecies are recognized in Europe. [= K; = *Lamium galeobdolon* (Linnaeus) Linnaeus – Z; = *Galeobdolon luteum* Hudson]

Lamium Linnaeus 1753 (Dead-nettle, Henbit)

A genus of about 17-40 species, herbs, of n. Africa and Eurasia. References: Mennema (1989)=Z; Harley et al. in Kadereit (2004).

1 Corolla yellow; anthers glabrous; bracts present, reflexed.....*[see **Lamiastrum galeobdolon**]*
1 Corolla blue or white; anthers with tufts of hairs; bracts absent or present (if present not reflexed).
2 Perennial, with rhizomes or stolons; corolla 18-35 mm long, the tube curved; leaves all petioled; [section *Lamiotypus*].
3 Corolla white; leaves not blotched with white; lower corolla lip with 2-3 teeth on each side; pollen light yellow..... ***L. album ssp. album***
3 Corolla pinkish-purple (rarely white); leaves usually marked with white; lower corolla lip with 1 tooth on each side; pollen orange.....***L. maculatum***
2 Annual, lacking rhizomes or stolons; corolla 10-18 (-20) mm long, the tube straight; leaves all petioled **or** upper leaves sessile and clasping.
4 Leaves subtending flower clusters sessile; [section *Amplexicaule*] .....***L. amplexicaule var. amplexicaule***
4 Leaves all petiolate; [section *Lamium*].
5 Leaves subtending whorls deeply serrate, with many teeth > 2 mm long; nutlets (2.5-) 2.7-3.0 (-3.3) mm long..... ***L. dissectum***
5 Leaves subtending whorls crenate-serrate, with teeth < 2 mm long; nutlets (2.0-) 2.2-2.5 (-2.8) mm long.....***L. purpureum***

* ***Lamium album*** Linnaeus *ssp.* ***album***, White Dead-nettle, Snowflake. (VA): disturbed areas; rare, native of Eurasia. April-September. Reported from our area (VA) by many earlier manuals; not documented in Harvill et al. (1992). [= Z; < *L. album* – C, F, G, K]

* ***Lamium amplexicaule*** Linnaeus *var.* ***amplexicaule***, Henbit, Henbit Dead-nettle. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): lawns, fields, roadsides, disturbed areas, gardens, pastures; common (uncommon in FL), native of Eurasia and n. Africa. January-December. [= Z; < *L. amplexicaule* – RAB, C, F, G, K, W]

* ***Lamium dissectum*** With., Cutleaf Dead-nettle. Mt (NC), Pd (VA): lawns, fields, roadsides, disturbed areas; rare, native of Eurasia. April-May. This taxon is apparently an allopolyploid derivative (2n=36), resulting from hybridization of *L. purpureum* and another species, perhaps *L. amplexicaule*. Because of its allopolyploid status, this taxon should not be treated as a variety of *L. purpureum*. It is, however, possible that some individuals identified here may be sterile hybrids (2n=18). [= *L. hybridum* Villars – RAB, C, F, G, misapplied; = *L. purpureum* Linnaeus var. *incisum* (Willdenow) Persoon – K, Z]

* ***Lamium maculatum*** Linnaeus, Spotted Dead-nettle. Pd, Mt (NC?, VA): lawns, fields, roadsides, disturbed areas; rare, native of Eurasia. April-September. [= RAB, C, F, G, K, Z]

LAMIACEAE

* ***Lamium purpureum*** Linnaeus, Red Dead-nettle, Purple Dead-nettle. Mt, Pd (GA, NC, SC, VA), Cp (NC, VA): lawns, fields, roadsides, disturbed areas, pastures; common, native of Eurasia. March-October. Other varieties are found in the Old World. [= RAB, C, F, G, W; = *L. purpureum* var. *purpureum* – K, Z]

Leonotis (Persoon) R. Brown 1810 (Lion's-ears)

A genus of about 9 species, herbs, shrubs, and small trees, of sub-Saharan Africa. References: Iwarsson & Harvey (2003)=Z.

* ***Leonotis nepetifolia*** (Linnaeus) Aiton f. *var.* ***nepetifolia***, Lion's-ears, Lightning-rod-plant. Cp (FL, GA, NC, SC), Pd (GA, NC, SC): pastures, disturbed areas; uncommon, native of s. Africa. Late August-October. [= Z; < *L. nepetifolia* – K; < *L. nepetaefolia* – RAB, S, orthographic variant]

Leonurus Linnaeus 1753 (Motherwort)

A genus of 25 species, herbs, of temperate Eurasia. Though *L. marrubiastrum* and *L. sibiricus* are documented in our area only from VA, they are also documented from south of our area; they likely will be found to occur in all four states. [also see *Chaiturus*]

1 Calyx strongly 5-angled, the lower 2 lobes deflexed; upper corolla lip white-villous; leaves lacerately toothed and the larger shallowly lobed . ..... ***L. cardiaca***
1 Calyx slightly 5-angled, no lobes notably deflexed; upper corolla lip with densely and finely puberulent; leaves **either** entire to few-toothed (but not lobed) **or** deeply 3-parted, the 3 divisions further lacerately toothed or lobed.
  2 Leaves entire to few-toothed (but not lobed) ..... ***[see Chaiturus marrubiastrum]***
  2 Leaves deeply 3-parted, the 3 divisions further lacerately toothed or lobed ..... ***L. sibiricus***

* ***Leonurus cardiaca*** Linnaeus, Motherwort, Lion's-tail. Pd (SC, VA), Mt (GA, VA), Cp (VA), {NC}: roadsides, pastures, disturbed areas; common, native of c. Asia. May-August; July-October. Nelson (1993) reports the occurrence of this species in SC. [= RAB, C, F, G, S, W; *? L. cardiaca* ssp. *cardiaca* – K]
* ***Leonurus sibiricus*** Linnaeus, Siberian Motherwort. Cp (FL, VA): disturbed areas; rare, native of Asia. May-September. [= C, F, G, K, S; ? *L. japonicus* Houttuyn] {for FL, Wunderlin & Hansen have *L. japonicus* and state that *L. sibiricus* is misapplied – investigate}

Lycopus Linnaeus 1753 (Bugleweed, Water-horehound)

A genus of about 10-14 species, herbs, of temperate Eurasia, North America, and Australia. References: Sorrie (1997)=Z; Harley et al. in Kadereit (2004). Key adapted from Sorrie.

1 Calyx lobes acute at the apex, shorter than or equaling the nutlets.
  2 Plant without tubers; leaf base tapered to a long, winged petiole; corolla lobes 4, erect; leaf teeth (6-) avg. 8.6 (-11) per side ... ***L. virginicus***
  2 Plant usually with tubers; leaf base subsessile or tapered to a short, winged petiole; corolla lobes 4 or 5, all or some spreading; leaf teeth (2-) avg. 5.0 (-7) per side.
    3 Corolla lobes 4, one erect and three spreading; nutlet tubercles well-developed, deeply toothed; leaf teeth (2-) avg. 4.5 (-6) per side; [of the fall-line sandhills of NC and SC] ..... ***L. cokeri***
    3 Corolla lobes 5, spreading; nutlet tubercles weakly developed, undulate; leaf teeth (4-) avg. 5.4 (-7) per side; [of the Mountains, upper Piedmont, and VA Coastal Plain] ..... ***L. uniflorus***
1 Calyx lobes acuminate to subulate-tipped, much exceeding the nutlets.
  4 Nutlet tubercles not developed or only weakly so.
    5 Calyx 2.0-3.3 mm long; stems and branches glabrous to sparsely pubescent with hairs < 0.5 mm long; leaf teeth sharply acute to short-acuminate ..... ***L. americanus***
    5 Calyx 3.0-4.5 mm long; stems and branches densely to sparsely pubescent with hairs 0.5-1.6 mm long; leaf teeth blunt to acute ..... ***L. europaeus***
  4 Nutlet tubercles well developed.
    6 Leaves evidently petiolate, the petioles narrowly winged ..... ***L. rubellus***
    6 Leaves sessile or subsessile.
      7 Leaves ovate to lanceolate, usually rounded at the base, scarcely reduced upward on the stem ..... ***L. amplectens***
      7 Leaves lanceolate to linear, cuneate at the base, upper leaves conspicuously narrower (and often also shorter) than the lower leaves ... ***L. angustifolius***

Lycopus americanus Muhlenberg ex W. Barton, American Bugleweed. Cp (FL, GA, NC, SC, VA), Pd (NC, VA), Mt (GA, VA): marshes, bottomlands; common (rare in FL and GA). June-November. Newfoundland west to British Columbia, south to FL Panhandle and CA. [= RAB, C, GW, K, S, W, Z; > *L. americanus* var. *americanus* – F, G; > *L. americanus* var. *longii* Benner – F, G; > *L. americanus* var. *scabrifolius* Fernald – F]

Lycopus amplectens Rafinesque, Clasping Water-horehound. Cp (FL, GA, NC, SC), Mt? (NC?), {VA}: clay-based Carolina bays, other moist habitats; uncommon (NC Watch List). June-November. MA south to ne. FL; disjunct inland around

the Great Lakes and (allegedly) in w. NC. [= RAB, C, GW, K, W, Z; > *L. amplectens* var. *amplectens* – F, G; > *L. amplectens* var. *pubens* (Britton) Fernald – F, G; > *L. pubens* Britton – S; > *L. sessilifolius* A. Gray – S]

Lycopus angustifolius Elliott, Narrowleaf Bugleweed, Southern Bog Water-horehound. Cp (FL, GA, NC, SC, VA): bogs, marshes; uncommon (NC Watch List). June-November. Se. VA south to FL, west to e. TX, north in the interior to s. TN and s. MO. [= C, Z; = *L. rubellus* Moench var. *angustifolius* (Elliott) Ahles – RAB, GW; = *L. rubellus* Moench var. *lanceolatus* Benner – F; < *L. rubellus* – G, K, W]

Lycopus cokeri Ahles ex Sorrie, Coker's Bugleweed, Carolina Bugleweed. Cp (NC, SC): sandhill pocosins, boggy streamheads, seepage bogs; uncommon (NC Watch List). July-November. Endemic to the fall-line sandhill region of sc. NC and SC. See Sorrie (1997) for a detailed discussion of this species. [= RAB, K, Z; < *L. uniflorus* Michaux – GW]

* ***Lycopus europaeus*** Linnaeus, Gypsywort, European Bugleweed. Cp (NC, VA): marshes, ditches; uncommon, native of Europe. June-November. [= RAB, C, G, K, S, Z; > *L. europaeus* var. *europaeus* – F; > *L. europaeus* var. *mollis* (Kern.) Briq. – F]

Lycopus rubellus Moench, Stalked Bugleweed. Cp (FL, GA, NC, SC, VA), Pd (NC, SC, VA), Mt (GA, VA): marshes, swamp forests, bottomlands; common. June-November. ME west to MI, south to FL and TX. [= C, S, Z; = *L. rubellus* var. *rubellus* – RAB, GW; < *L. rubellus* – G, K, W (also see *L. angustifolius*); > *L. rubellus* – S; > *L. velutinus* Rydberg – S]

Lycopus uniflorus Michaux, Northern Bugleweed. Mt (NC, SC, VA), Pd (NC, VA): bogs, seeps, wet forests; common. July-October. Newfoundland west to AK, south to w. NC, AR, and CA. [= RAB, C, F, G, S, W, Z; < *L. uniflorus* – GW (also see *L. cokeri*); > *L. uniflorus* var. *uniflorus* – K]

Lycopus virginicus Linnaeus, Virginia Bugleweed. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): swamps, bottomlands, other wet habitats; common. July-November. MA west to PA, s. IN, MO, and OK, south to n. peninsular FL, Panhandle FL, and e. TX. [= RAB, C, F, G, GW, K, S, W, Z]

In the Great Lakes and St. Lawrence River regions, hybrid swarms involving *L. americanus* and *L. europaeus* are numerous (Webber & Ball 1980). However, to date there is no evidence that these species have hybridized within the Flora region.

Macbridea Elliott ex Nuttall 1818 (Birds-in-a-nest, Macbridea)

A genus of 2 species, herbs, of se. North America. References: Harley et al. in Kadereit (2004).

1 Corolla white (faintly marked with purple in the throat); leaf tips obtuse to rounded; [FL Panhandle] ..... ***M. alba***
1 Corolla lavender or pink; leaf tips acute; [se. NC south to s. GA] ..... ***M. caroliniana***

Macbridea alba Chapman, White Birds-in-a-nest, White Macbridea. Cp (FL): wet pine savannas, pitcherplant bogs; rare. Endemic to Panhandle FL. [= GW, K, S]

Macbridea caroliniana (Walter) Blake, Carolina Birds-in-a-nest, Carolina Macbridea. Cp (GA, NC, SC): swamp forests, especially in sphagnous seepage areas away from direct flooding, savanna edges, ditches; rare (US Species of Concern, GA Special Concern, NC Proposed Threatened). July-November. Se. NC to s. GA; reported but undocumented from n. FL, AL, and MS. Apparently rare throughout its range. [= RAB, GW, K; = *M. pulchra* Elliott – S]

Marrubium Linnaeus 1753 (Horehound)

A genus of about 30-40 species, herbs, of Mediterranean Europe and Asia. References: Harley et al. in Kadereit (2004).

* ***Marrubium vulgare*** Linnaeus, Horehound. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): fencerows, disturbed places; uncommon, native of Eurasia. Used for cough-syrups in folk medicine. [= RAB, C, F, G, K, S, W]

Meehania Britton 1894 (Meehania)

A genus of 2-6 species, herbs, ours in temperate e. North America, and the other species in e. Asia. References: Harley et al. in Kadereit (2004).

Meehania cordata (Nuttall) Britton, Meehania. Mt (NC, VA): moist, rocky, forested slopes; uncommon (NC Rare, VA Watch List). Late May-June; June-July. A Central and Southern Appalachian endemic: sw. PA and OH south to nw. NC and ne. TN. [= RAB, C, F, G, K, S, W]

Melissa Linnaeus 1753 (Balm)

A genus of 3-4 species, herbs, from Europe to Iran and c. Asia. References: Harley et al. in Kadereit (2004).

* ***Melissa officinalis*** Linnaeus, Lemon Balm, Common Balm. Mt, Pd (NC, SC, VA), Cp (VA): disturbed areas; rare, native of w. Asia. [= RAB, C, F, G, K, S, W]

Mentha Linnaeus 1753 (Mint)

A genus of about 20-25 species, herbs, of temperate Eurasia and n. North America. References: Stace (1997)=Z; Tucker & Naczi (2007)=Y; Harley et al. in Kadereit (2004). Key largely adapted from C and Stace (1997).

1 Flowers in axillary verticils subtended by ordinary foliage leaves, and separated by internodes of ordinary length.
  2 Calyx glabrous throughout, or pubescent toward the tips only; calyx 2-3.5 mm long; plants usually sterile; fresh plant usually with spearmint odor or flavor ..... ***M. ×gracilis***
  2 Calyx pubescent throughout its length; calyx 1.5-2.5 mm long; plants usually fertile; fresh plant usually with a rather unpleasant odor of flavor.
    3 Leaves subtending the inflorescence mostly broadly rounded at the base; leaves of the inflorescence relatively narrow; [alien] ..... ***[M. arvensis ssp. arvensis]***
    3 Leaves subtending the inflorescence mostly cuneate at the base; leaves of the inflorescence relatively broad; [native, though often in weedy situations] ..... ***M. canadensis***
1 Flowers in terminal spikes or heads, the subtending leaves absent or distinctly smaller than the foliage leaves.
  4 Inflorescence a terminal globose to ovoid head of 1-3 verticils.
    5 Pedicels, calyx, and leaves pubescent; plants usually fertile ..... ***M. aquatica var. aquatica***
    5 Pedicels and clayx glabrous, leaves glabrous or nearly so; plants usually sterile ..... ***M. aquatica var. citrata***
  4 Inflorescence a spike of several to many verticils.
    6 Bracteal leaves much longer than the flowers, resembling the foliage leaves, but smaller or narrower ..... ***M. ×gracilis***
    6 Bracteal leaves linear to laneolate, little surpassing the flowers.
      7 Calyx tube glabrous; leaves glabrous, or with scattered hairs on the lower surface.
        8 Petioles of the min leaves 4-15 mm long; spikes stout; plants sterile; fresh plant with peppermint odor or flavor ..... ***M. ×piperita var. piperita***
        8 Petioles of the main leaves 0-3 mm long; spikes slender; plants fertile; fresh plant with spearmint odor or flavor ..... ***M. spicata var. spicata***
      7 Calyx tube pubescent; leaves moderately to densely hairy on the lower surface.
        9 Leaves 2-3× as long as wide, broadly cuneate to rounded at the base; leaf serrations sharp; leaf surface nearly planar ..... ***M. longifolia ssp. longifolia***
        9 Leaves 1-2× as long as wide, broadly roundec to subcordate at the base; leaf serrations rounded; leaf surface strongly rugose ..... ***M. suaveolens***

[Note: The distribution, habitats, phenology, and abundance of all *Mentha* species need herbarium investigation]

* ***Mentha aquatica*** Linnaeus *var.* ***aquatica***, Water Mint, Lemon Mint. {NC, VA} native of Europe. [= Y; = *M. aquatica* – C, F, G, S, Z; < *M. aquatica* – K (also see *Mentha aquatica* var. *citrata*)]

* ***Mentha aquatica*** Linnaeus *var.* ***citrata*** (Ehrhart) Fresen., Lemon Mint, Orange Mint, Bergamot Mint. {VA} native of Europe. [= Y; = *M.* ×*piperita* Linnaeus (pro sp.) var. *citrata* (Ehrhart) Briquet (pro sp.) – Z; = *M.* ×*citrata* Ehrhart – C; = *M. citrata* – F, G, S; < *M. aquatica* – K]

Mentha canadensis Linnaeus, Canada Mint. {NC, VA} [= S, Y; = *M. arvensis* Linnaeus var. *canadensis* (Linnaeus) Kuntze – C; *?* *M. arvensis* – RAB, misapplied; *?* *M. gentilis* Linnaeus – RAB; = *M. arvensis* var. *villosa* (Bentham) S.R. Stewart – F; > *M. arvensis* var. *glabrata* (Bentham) Fernald – G; > *M. arvensis* var. *lanata* Piper – G; = *M. arvensis* Linnaeus ssp. *canadensis* (Linnaeus) H. Hara; < *M. arvensis* – K]

* ***Mentha*** ×***gracilis*** Sole (pro sp.) [*Mentha arvensis* × *spicata*], Spearmint. {NC, SC, VA}: native of Europe. [= K, Y, Z; *?* *M. cardiaca* (S.F. Gray) Gerarde ex Baker – RAB; *?* *M. gentilis* Linnaus (pro sp.) – C; > *M. cardiaca* – F, G; > *M. gentilis* Linnaeus – F]

* ***Mentha longifolia*** (Linnaeus) Linnaeus *ssp.* ***longifolia***, Horse Mint. {VA} Native of Europe. [= Y; < *M. longifolia* – RAB, C, G; > *M. longifolia* (Linnaeus) Hudson var. *longifolia* – F; > *M. longifolia* var. *undulata* (Willdenow) Fiori & Paoletti – F]

* ***Mentha*** ×***piperita*** Linnaeus (pro sp.) *var.* ***piperita*** [*Mentha aquatica* × *spicata*], Peppermint. {GA, NC, SC, VA} native of Europe. [= C, K, Y, Z; = *M. piperita* – RAB, G, S; > *M. piperita* – F; > *M. crispa* Linnaeus – F]

* ***Mentha*** ×***rotundifolia*** (Linnaeus) Hudson [*Mentha longifolia* × *suaveolens*]. {GA, NC, SC, VA} [= C, K, Y; = *M. rotundifolia* – G, S] {not yet keyed}

* ***Mentha spicata*** Linnaeus *var.* ***spicata***, Spearmint. {GA, NC, SC, VA} Native of Europe. [= Y; < *M. spicata* – RAB, C, F, G, K, S, Z]

* ***Mentha suaveolens*** Ehrhart *ssp.* ***suaveolens***, Apple Mint, Pineapple Mint, Round-leaved Mint. {NC, SC} native of Europe. [= Y; < *M. suaveolens* – C, K, Z]

* *Mentha arvensis* Linnaeus ssp. *arvensis*, Field Mint. Native of Europe. [= Y; = *M. arvensis* var. *arvensis* – C, F, G; = *M. arvensis* Linnaeus – S, Z; = *M. arvensis* ssp. *arvensis* – Y; < *M. arvensis* – K]

* *Mentha pulegium* Linnaeus var. *pulegium*, European Pennyroyal. Introduced in MD, PA, and NJ (Kartesz 1999). [= Y; < *M. pulegium* – C, G, K] {not yet keyed}

* *Mentha* ×*villosa* Hudson (pro sp.) [*Mentha spicata* × *suaveolens*]. Introduced south to PA and KY. [= C, K; > *M. alopecuroides* Hull – F; > *M.* ×*villosa* var. *villosa* – Y; > *M.* ×*villosa* var. *alopecuroides* (Hull) Briquet – Y] {not yet keyed}

Monarda Linnaeus 1753 (Bergamot)

A genus of about 12-20 species, herbs, of North America. Many of our species are cultivated, especially *M. didyma* in various selected forms. Additional studies are needed on a number of taxonomic problems in *Monarda*. Most of the varieties recognized above have been considered valid by a succession of workers; they do seem to describe morphologically distinguishable (if not entirely discrete) entities which make phytogeographic sense. References: McClintock & Epling (1942)=Z; Scora (1967)=Y; Fosberg & Artz (1953)=X; Gill (1977); Prather & Keith (2003); Harley et al. in Kadereit (2004).

1 Flowers in 2-6 glomerules, terminal and at 2-5 successive nodes down the stem; stamens included; leaves lanceolate to narrowly elliptic, usually broadest near the middle and tapered to a cuneate base, (2.5-) 3-8× as long as wide.
  2 Calyx lobes attenuated into a spinose awn 2-7 mm long; corolla white to pink; inner bracts subtending the flowers 4-9 mm wide, abruptly acuminate into a spinose bristle ..... ***M. citriodora var. citriodora***
  2 Calyx lobes narrowly to broadly triangular, acute or long-acuminate but not awned; corolla yellow, spotted with purple; inner bracts 8-14 mm wide, acuminate.
    3 Lower leaf surface moderately to densely silvery-tomentose; stem densely villous with spreading or downwardly-curved coarse hairs, lacking coarse, horizontal bristles and short downwardly-curved hairs..... ***M. punctata var. villicaulis***
    3 Lower leaf surface pubescent mainly on the midvein and other main veins, appearing green; stem pubescent with short downwardly-curved hairs, also with coarse, horizontal bristles and/or upwardly-curved hairs.
      4 Stem with many coarse horizontal bristles, also pubescent with short, downwardly-curved hairs; leaves (40-) 50-70 (-95) mm long, 10-28 mm wide (at least some over 15 mm wide), averaging ca. 3× as long as wide ..... ***M. punctata var. arkansana***
      4 Stem with few or no coarse horizontal bristles, also pubescent with a mixture of upwardly-curved and downwardly-curved hairs; leaves (25-) 35-55 (80) mm long, 5-17 mm wide (the widest very rarely over 15 mm wide), averaging ca. 4× as long as wide ..... ***M. punctata var. punctata***
1 Flowers in 1 (-2) glomerule, terminal (rarely also 1 at the next node down the stem); stamens exserted; leaves ovate to ovate-lanceolate, broadest near the rounded, truncate, or subcordate base, 1.5-3 (-4)× as long as wide.
  5 Corolla 30-45 mm long, scarlet-red, (3-) 4-8 mm broad at the expanded portion of the throat; [primarily of mountain seepages, streambanks, and boggy places] ..... ***M. didyma***
  5 Corolla 14-33 (-36) mm long, white, lavendar, or purple, 1-3 (-4) mm broad at the expanded portion of the throat; [of various habitats, usually dryish to mesic].
    6 Leaves deltoid-ovate to ovate, 2-6 cm wide, usually ca. 2× as long as wide; orifice of the calyx glabrous to slightly hirsute with a few long hairs; upper lip of the corolla 5-8 mm long and not bearded (*M. clinopodia*) or 13-16 mm long and slightly bearded (*M. media*) near its apex; outer surface of the corolla glabrous to evenly pubescent with short curled hairs.
      7 Corolla white, greenish, or pale pink, the lower lip purple-spotted; outer bracts subtending the inflorescence green or pale (rarely with a purplish midvein); upper lip of the corolla 5-8 mm long, not bearded ..... ***M. clinopodia***
      7 Corolla deep purple, the lower lip usually not spotted; outer bracts subtending the inflorescence purple to red; upper lip of the corolla 13-16 mm long and slightly bearded near its apex ..... ***M. media***
    6 Leaves narrowly-deltoid, ovate-lanceolate to lanceolate, 1-4 cm wide, usually ca. 3× as long as wide; orifice of the calyx densely hirsute with numerous erect, stiff, white hairs; upper lip of the corolla prominently bearded near its apex; outer surface of the corolla evenly pubescent with short curled hairs.
      8 Corolla deep purple; middle lobe of the lower corolla lip 4-6 mm long; outer bracts subtending the inflorescence reddish ..... ***M. fistulosa var. rubra***
      8 Corolla lavendar, rose, or nearly white; middle lobe of the lower corolla lip 2-4 mm long; outer bracts subtending the inflorescence green (rarely the midvein only reddish).
        9 Plants 10-30 cm tall; leaves subcoriaceous, glabrous, dark green, shiny; calyx 5-8 mm long, the lobes conspicuously pustulate-glandular; [of limestone glades and barrens] ..... ***M. fistulosa var. brevis***
        9 Plants 30-130 cm tall; leaves herbaceous, pubescent, light to medium green, not shiny; calyx 7-11 mm long, the lobes not pustulate-glandular; [of various habitats].
          10 Pubescence of the petioles and lower leaf surface hirsute or villous, the trichomes spreading, 1-3 mm long ..... ***M. fistulosa var. fistulosa***
          10 Pubescence of the petioles and lower leaf surface canescent, the trichomes appressed (sometimes also with an admixture of longer, spreading trichomes) ..... ***M. fistulosa var. mollis***

* ***Monarda citriodora*** Cervantes ex Lagasca y Segura *var.* ***citriodora***, Lemon Bergamot. Cp (FL, GA, SC): disturbed places: rare, native of sc. United States (centered in TX). June-July; July-August. [= Y; < *M. citriodora* – RAB, F, G; = *M. citriodora* ssp. *citriodora* var. *citriodora* – K; *? M. dispersa* – S; = *M. citriodora* ssp. *citriodora* – Z]

Monarda clinopodia Linnaeus, Basil Bergamot. Mt, Pd (NC, SC, VA): mesic, forested slopes; common. Late May-September; July-October. NJ, w. NY, and IL, south to n. GA and c. AL (some of the range perhaps accountable to cultivation). There appear to be a number of chemical races in *M. clinopodia* which may warrant taxonomic status. [= RAB, C, F, G, K, S, W, Y, Z; = *M. fistulosa* Linnaeus var. *clinopodia* (Linnaeus) Cooperrider]

Monarda didyma Linnaeus, Bee-balm, Oswego Tea. Mt (NC, SC, VA), Pd (NC, VA), Cp (NC): seepage slopes, periglacial boulderfields with abundant seepage, streambanks, boggy places, usually in strong to moderately filtered sunlight; common, rare in Piedmont, rare in Coastal Plain (where introduced only) (SC Rare). July-September; September-October. ME west to MI, south to PA and OH, and in the Appalachians south to sw. NC, se. TN, and ne. GA (part of the northern range is likely only by introduction). McClintock & Epling (1942) describe 2 forms of *M. didyma*: the "broad-leaved form," with leaves averaging 9.2 cm long and 5.2 cm wide and corollas averaging 35 mm long, ranging south to sc. PA and ne. WV, and the "narrow-leaved form," with leaves averaging 11.8 cm long and 4.4 cm wide and corollas averaging 39 mm long, occurring throughout the range of the species. Further study seems warranted. [= C, F, G, K, S, W, Y, Z; < *M. didyma* – RAB (also see *M. media*)]

Monarda fistulosa Linnaeus *var.* ***brevis*** Fosberg & Artz, Smoke Hole Bergamot, Cedar Glade Bergamot. Mt (VA): limestone outcrops, cliffs, barrens, and glades, and on limestone talus; rare (US Species of Concern). June-August; July-October. Apparently endemic to w. VA and e. WV. This variety is seemingly very distinct (Kimball et al. 2002). It had been collected only a very few times prior to the work of Bartgis (1993), who found it to be a characteristic plant of limestone barrens and woodlands in localized areas in the Ridge and Valley Province of WV. It flowers about a month earlier than *M. fistulosa* in the

vicinity (Bartgis, pers. comm.). [= X, Y; = *M. fistulosa* ssp. *brevis* (Fosberg & Artz) Scora, comb. nov. ined. – K; < *M. fistulosa* – W]

Monarda fistulosa Linnaeus *var.* ***fistulosa***, Appalachian Bergamot. Mt, Pd (NC, VA): moist wooded slopes, roadsides, woodland edges, old fields; common. June-September; August-October. CT south to sw. NC, nearly or entirely limited to the Appalachians. I have interpreted var. *fistulosa* and var. *mollis* somewhat differently than some previous workers. A more coherent geographic pattern is achieved by limiting var. *fistulosa* to plants with spreading hairs only. [= F, X, Y; < *M. fistulosa* – RAB, W; = *M. fistulosa* ssp. *fistulosa* var. *fistulosa* – K; < *M. fistulosa* var. *fistulosa* – C, G, Z (also see var. *mollis*); = *M. fistulosa* – S]

Monarda fistulosa Linnaeus *var.* ***mollis*** (Linnaeus) Bentham, Eastern Bergamot. Mt, Pd (NC, SC), {GA, VA}: moist wooded slopes; common. June-September; August-October. See comments under var. *fistulosa*. ME west to MN, south to GA, AL, and se. TX. [= F, X, Y; < *M. fistulosa* – RAB, W; < *M. fistulosa* var. *fistulosa* – C, G, Z; = *M. fistulosa* ssp. *fistulosa* var. *mollis* (Linnaeus) Bentham – K; > *M. mollis* Linnaeus – S; > *M. scabra* Beck – S]

Monarda fistulosa Linnaeus *var.* ***rubra*** A. Gray, Purple Bergamot. Mt (NC, VA), {GA}: moist slope forests; rare (NC Watch List). ME to NJ, and from nw. NC to n. GA, in the Appalachians. Perhaps native only in the Southern Appalachians. A problematic taxon; see *M. media* for comments. [= X, Y, Z; < *M. fistulosa* – RAB, W; = *M. fistulosa* ssp. *fistulosa* var. *rubra* A. Gray - K; < *M. media* – C, F, S]

Monarda media Willdenow, Purple Bee-balm. Mt (NC), {GA, VA}: grassy balds, moist slopes, mostly at high elevations; rare (NC Watch List). July-September; September-October. VT west to IN, south to w. MD; disjunct in w. NC and sw. TN, part of the range perhaps the result of cultivation. *M. media* is a problematic taxon, especially in combination with *M. fistulosa* var. *rubra*. Many have suggested that *M. media* is the result of hybridization or introgression of *M. didyma* with either *M. fistulosa* or *M. clinopodia*, or both (see Scora 1967). Scora (1967) implies that *M. media* consists of hybrids, backcrosses, and "introgressive elements" involving all three pairwise combinations, and the three-way combination, but that *M. fistulosa* var. *rubra* is not of hybrid origin. Needed are studies of *M. media*, *M. fistulosa* var. *rubra*, and their possible parents which go beyond the herbarium and determine the genetics, origin, and population structure of these taxa. It seems best for the moment to recognize (or to attempt to!) *M. media* and *M. fistulosa* var. *rubra* in order to foster additional observation and study, hopefully leading to a more definite understanding of their taxonomic status(es). [= G, K, Z; < *M. didyma* – RAB; < *M. media* – C, F, S (also see *M. fistulosa* var. *rubra*); = *M.* ×*media* Willdenow (pro sp.) – W, Y]

Monarda punctata Linnaeus *var.* ***arkansana*** (McClintock & Epling) Shinners, Arkansas Horse-mint. Mt (NC), Pd (GA): dryish forests over mafic rock; rare (NC Watch List). McClintock & Epling (1942) map and discuss this taxon as endemic to AR and immediately adjacent TX, but mention that "a specimen collected near Columbus, Polk County, North Carolina (Townsend, 1897) is scarcely different from subsp. *arkansana*." Scora (1967) treats var. *arkansana* as similarly endemic, though he cites (but does not map) a specimen from Cherokee County, GA and annotated (following the publication of his paper) a later collection from Polk County, NC as var. *arkansana*. The Polk County, NC material is manifestly var. *arkansana* and might be considered merely aberrant or a chance introduction, were it not for its repeated collection and the phytogeographic interest of the Blue Ridge Escarpment of Polk County, which harbors numerous Ozarkian and other Midwestern disjuncts, such as *Veratrum woodii*. [= Y; < *M. punctata* – RAB, S, W; = *M. punctata* ssp. *punctata* var. *arkansana* (McClintock & Epling) Shinners – K; = *M. punctata* ssp. *arkansana* McClintock & Epling – Z]

Monarda punctata Linnaeus *var.* ***punctata***, Eastern Horse-mint. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): maritime forests, dunes, roadsides, rocky or sandy woodlands; common, uncommon in Piedmont and Mountains. Late July-September; September-October. {full distribution} [= C, F, Y; < *M. punctata* – RAB, S, W; = *M. punctata* ssp. *punctata* – G, Z; = *M. punctata* ssp. *punctata* var. *punctata* – K]

Monarda punctata Linnaeus *var.* ***villicaulis*** (Pennell) Palmer & Steyermark, Hairy-stem Horse-mint. Cp (NC): disturbed areas, rare, perhaps only adventive in our area. August; October. NY west to MN, south to n. IN and s. MO. [= C, F, Y; < *M. punctata* – RAB, S, W; = *M. punctata* ssp. *villicaulis* Pennell – G, Z; = *M. punctata* ssp. *punctata* var. *villicaulis* (Pennell) Palmer & Steyermark – K]

Monarda bradburiana Beck. East to c. TN (Chester, Wofford, & Kral 1997), KY, and AL. [= G, K; < *M. russeliana* – C, F] {not yet keyed; synonymy incomplete}

Monarda russeliana Nuttall ex Sims, White Beebalm. East to AL and KY. [= G, K; < *M. russeliana* – C, F (also see *M. bradburiana*)] {not yet keyed; synonymy incomplete}

Mosla (Bentham) Buchanan-Hamilton ex Maximowicz 1875 (Mosla)

A genus of about 10-22 species, of e. Asia. References: Harley et al. in Kadereit (2004).

* ***Mosla dianthera*** (Buchanan-Hamilton ex Roxburgh) Maximowicz, Mosla. Mt (GA, NC): disturbed areas; rare, native of e. Asia. August-September. This species is becoming a noxious weed west of our area (in KY and TN); it should be expected to become more widespread in our area. [= RAB, F, G, K; = *Orthodon dianthera* (Buchanan-Hamilton) Handel-Mazzetti – C]

Nepeta Linnaeus 1753 (Catnip, Catmint)

A genus of about 250 species, herbs, of Eurasia and n. Africa. References: Harley et al. in Kadereit (2004).

* ***Nepeta cataria*** Linnaeus, Catnip, Catmint. Mt (GA, NC, VA), Pd (NC, VA), Cp (NC, SC, VA): fencerows, barnyards, disturbed areas; uncommon, native of Eurasia. [= RAB, C, F, G, K, S, W]

Ocimum Linnaeus 1753 (Basil)

A genus of about 65 species, herbs and shrubs, of warm temperate and tropical areas. References: Harley et al. in Kadereit (2004).

* ***Ocimum basilicum*** Linnaeus, Basil. Cp (FL, GA, NC, SC), Pd (GA, NC, SC): commonly cultivated in gardens, rarely persistent for short times around gardens or as a waif on trash-heaps, probably not persistent; commonly cultivated, rarely persistent, native of tropical Asia and tropical Africa. [= C, G, K, S]

Origanum Linnaeus 1753 (Oregano, Marjoram)

A genus of about 36-40 species, herbs and dwarf shrubs, of Eurasia. References: Harley et al. in Kadereit (2004).

* ***Origanum vulgare*** Linnaeus, Wild Marjoram. Mt (NC, VA): cultivated in gardens, persistent around gardens or as a waif; commonly cultivated, rarely persistent, native of Eurasia. July-September. [= RAB, C, G, K, S]

Perilla Linnaeus 1764 (Perilla, Beefsteak-plant)

A genus of about 1-6 species, herbs, of s. and e. Asia. References: Harley et al. in Kadereit (2004).

* ***Perilla frutescens*** (Linnaeus) Britton, Perilla, Beefsteak-plant. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist disturbed areas; common (rare in FL), native of India. August-October; October-December. Two varieties are sometimes recognized. Var. *crispa* (Bentham) Deane (leaves purple above and below; leaf margins laciniate-dentate and also crisped) and var. *frutescens* (leaves purple below; leaf margins dentate, not crisped). These probably represent cultivars more than taxonomically distinct entities. [= RAB, C, G, S, W; > *P. frutescens* var. *frutescens* – F, K; > *P. frutescens* (Linnaeus) Britton var. *crispa* (Bentham) Deane]

Physostegia Bentham 1829 (Obedient-plant)

A genus of about 12 species, perennial herbs, of North America. References: Cantino (1982)=Z; Harley et al. in Kadereit (2004). Key adapted from Z and GW.

1 Leaves, 1 or more of them, conspicuously or inconspicuously clasping the stem.
  2 Perennating buds borne directly on the primary rhizome or at the ends of short, vertical secondary rhizomes (horizontal secondary rhizomes lacking), the plant thus forming clumps
    3 Most or all of the larger leaves sharply serrate; larger leaves usually < 2.5 cm wide and > 5× as long as wide ..... ***Ph angustifolia***
    3 Most or all of the larger leaves bluntly serrate to entire; larger leaves usually > 3 cm wide or < 5× as long as wide..... ***Ph. purpurea***
  2 Perennating buds borne at the ends of elongate, horizontal, secondary rhizomes, the plant thus forming clonal patches.
    4 Flowers 22-35 mm long; larger stem leaves acute to attenuate at the tip; axis of raceme with at least some of the hairs 0.13-0.25 mm long; larger stem leaves mostly sharple serrate ..... ***Ph. angustifolia***
    4 Flowers smaller, **or** most of the leaves obtuse at the tip, **or** hairs of the raceme axis < 0.13 mm long; larger stem leaves bluntly toothed to entire.
      5 Flowering calyx tube (1-) 2-4 mm long; flowers < 20 mm long ..... ***[Ph. intermedia]***
      5 Flowering calyx tube 3-7 (-8) mm long; flowers usually > 20 mm long.
        6 Uppermost pair of leaves below the terminal raceme usually considerably larger than the floral bracts, the next pair of leaves down the stem (1.5-) 2.0-12.8 cm long and 0.3-2× as long as the internode above; principal stem leaves usually widest at or below the middle of the blade ..... ***Ph. leptophylla***
        6 Uppermost pair of leaves below the terminal raceme often no larger than the floral bracts, the next pair of leaves down the stem 0.4-3.2 cm long, generally 0.1-0.3× as long as the internode above; principal stem leaves usually widest at or above the middle of the blade ..... ***Ph. purpurea***
1 Leaves petiolate or sessile, none of them clasping the stem.
  7 All or most of the largest leaves sharply serrate; apex of the leaves acute to attenuate.
    8 Axis of raceme with at least some of the hairs 0.13-0.25 mm long; nutlets 2-3 mm long; flowering April to early July (or later if burned) ..... ***Ph. angustifolia***
    8 Axis of raceme with hairs < 0.1 mm long; nutlets usually 3-4 mm long; flowering July-October.
      9 Perennating buds usually borne directly on the primary rhizome or at the ends of short, vertical secondary rhizomes (horizontal secondary rhizomes usually lacking), the plant thus forming clumps; nonglandular trichomes of the raceme axis < 0.1 (-0.13) mm long; sterile floral bracts usually present below lowest flowers; flowers (16-) 18-37 mm long..... ***Ph. virginiana ssp. praemorsa***
      9 Perennating buds usually borne at the ends of elongate, horizontal, secondary rhizomes, the plant thus forming clonal patches; nonglandular trichomes of the raceme axis frequently 0.15 (0.20) mm long; sterile floral bracts usually not present below lowest flowers; flowers (13-) 14-28 mm long ..... ***Ph. virginiana ssp. virginiana***
  7 Half or more of the larger leaves bluntly toothed to entire; apex of the leaves obtuse, or acute to attenuate.

10 Calyx and rachis of the inflorescence bearing stalked glands (visible at 10× magnification or greater); nutlets 1.7-2.0 mm long, usually warty over the surface ..... ***Ph. godfreyi***
10 Calyx and rachis lacking stalked glands; nutlets 2.0-3.6 mm long, smooth.
11 Uppermost pair of leaves below the terminal raceme often no larger than the floral bracts, the next pair of leaves down the stem 0.4-3.2 cm long, generally 0.1-0.3× as long as the internode above ..... ***Ph. purpurea***
11 Uppermost pair of leaves below the terminal raceme usually considerably larger than the floral bracts, the next pair of leaves down the stem (1.5-) 2.0-12.8 cm long and 0.3-2× as long as the internode above.
12 Leaves (some of them) present at or after anthesis usually petiolate, the petioles often > 2 cm long, the petiolate leaves typically the lowest and among the largest leaves present ..... ***Ph. leptophylla***
12 Leaves present at or after anthesis usually sessile (rarely a few petiolate, but these with petioles < 2 cm long and the petiolate leaves usually not among the largest leaves present) ..... ***Ph. virginiana ssp. virginiana***

Physostegia angustifolia Fernald, Narrowleaf Obedient-plant. Cp (GA): calcareous openings; rare (GA Special Concern). Sw. GA and AL west to KS and TX. [= GW, K, Z]

Physostegia godfreyi Cantino, Apalachicola Dragonhead. Cp (FL): wet savannas and flatwoods, adjacent ditches; rare. Endemic to Panhandle FL. [= GW, K, Z]

Physostegia leptophylla Small, Tidal Marsh Obedient-plant, Swamp Obedient-plant. Cp (FL, GA, NC, SC, VA): bottomland hardwood forests, swamps, tidal freshwater or slightly brackish (oligohaline) marshes, rarely wet savannas (GA); uncommon (GA Threatened, SC Rare, VA Watch List). Late May-early August; June-September. Se. VA south to sc. peninsular FL, west to sw. GA and panhandle FL. *P. leptophylla* is a tetraploid; Cantino (1982) suggests that this species may be an allotetraploid, perhaps originating from *P. purpurea* × *virginiana*. [= C, GW, K, Z; < *Dracocephalum purpureum* (Walter) McClintock ex Gleason – RAB, G; > *P. denticulata* (Aiton) Britton – F, misapplied; > *P. aboriginorum* Fernald – F; > *Dracocephalum leptophyllum* Small – S; > *Dracocephalum veroniciformis* Small – S]

Physostegia purpurea (Walter) Blake, Savanna Obedient-plant. Cp (FL, GA, NC, SC): wet savannas, savanna-swamp ecotones, ditches adjacent to former pinelands; common (uncommon north of FL). Late May-early August; June-September. Ec. NC south to s. FL, west to sw. GA and panhandle FL. Cantino (1982) discusses clinal variation within *P. purpurea*. [= GW, K, Z; < *Dracocephalum purpureum* (Walter) McClintock ex Gleason – RAB (also see *P. leptophylla*); = *P. obovata* (Elliott) Godfrey ex Weatherby – F; = *Dracocephalum denticulatum* Aiton – S]

Physostegia virginiana (Linnaeus) Bentham *ssp.* ***praemorsa*** (Shinners) Cantino, Southern Obedient-plant. Mt, Pd, Cp (NC, SC, VA), {FL, GA}: woodlands, glades, seepages, especially over calcareous or mafic rock; common. July-October. OH west to n. IL, south to c. NC, n. FL, TX, NM, and Mexico. [= K, W, Z; < *Dracocephalum virginianum* Linnaeus – RAB, G, S; = *P. virginiana* var. *arenaria* Shimek – C; >< *P. virginiana* var. *virginiana* – F; >< *P. virginiana* var. *speciosa* – F; < *P. virginiana* – GW]

Physostegia virginiana (Linnaeus) Bentham *ssp.* ***virginiana***, Northern Obedient-plant. Mt, Pd, Cp (NC, SC, VA), {FL, GA}: streambanks, seepages, marshes, grassy balds (native occurrences usually over mafic or calcareous rocks), other open or semi-open moist to wet habitats, disturbed areas, ditches; rare as a native, more common as an escape from cultivation. July-October. Native from Québec west to Manitoba, south to e. VA, nc. TN, and ne. KS; escaped elsewhere (as in most of our area). Cantino (1982) discusses ambiguous plants from a zone of intergradation between the 2 subspecies in sw. NC, n. GA, ne. AL, e. TN, and sc. KY. Moreover, garden escapes show some intermediacy between the 2 subspecies, and Cantino (1982) suggests that cultivars are likely inter-subspecific hybrids, stating "because the genetic background of modern cultivars is unknown, they cannot be reasonably placed in either subspecies and should not be identified below the species level." [= K, Z; < *Dracocephalum virginianum* Linnaeus – RAB, G, S; = *P. virginiana* var. *virginiana* – C; >< *P. virginiana* var. *virginiana* – F; >< *P. virginiana* var. *speciosa* (Sweet) A. Gray – F; > *P. virginiana* var. *granulosa* (Fassett) Fernald – F; < *P. virginiana* – GW]

Physostegia intermedia (Nuttall) Engelmann & A. Gray. IL, KY, AR, and LA west to OK and TX. Also mapped as widespread in Coastal Plain of GA (Jones & Coile 1988); {investigate}. [= GW, K, Z; = *Dracocephalum intermedium* Nuttall]

Piloblephis Rafinesque 1838

A monotypic genus, a shrub, of se. North America. References: Harley et al. in Kadereit (2004).

Piloblephis rigida (Bartram ex Bentham) Rafinesque, Florida Pennyroyal. Cp (GA): xeric oak scrub, with *Quercus myrtifolia*; rare. S. GA; c. to s. peninsular FL. [= K; = *Pycnothymus rigidus* (Bartram ex Bentham) Small – S; = *Satureja rigida* Bartram ex Bentham]

Prunella Linnaeus 1753 (Self-heal, Heal-all)

A genus of about 4-7 species, herbs, of n. temperate areas. References: Harley et al. in Kadereit (2004).

1 Upper leaves pinnatifid; flowers creamy yellow or white (rarely pale blue) ..... ***P. laciniata***
1 Upper leaves entire to obscurely toothed; flowers blue-violet (rarely pink or whitish).
2 Principal or median cauline leaves lanceolate to oblong, (2-) avg. 3 (-5)× as long as wide; leaf cuneate at the base ..... ***P. vulgaris var. lanceolata***
2 Principal or median cauline leaves ovate to ovate-oblong, (1.5-) avg. 2 (-2.5)× as long as wide; leaf broadly rounded at the base ..... ***P. vulgaris var. vulgaris***

* ***Prunella laciniata*** (Linnaeus) Linnaeus, Cutleaf Self-heal. Mt (NC?, VA), {GA}: disturbed areas; rare, native of Eurasia. [= RAB, C, G, K, S]

Prunella vulgaris Linnaeus *var.* ***lanceolata*** (W. Barton) Fernald, American Self-heal. {Mt, Pd, Cp (FL, GA, NC, SC, VA): disturbed areas, pastures, roadsides, bottomland forests; other forests and woodlands; common. April-December. Additional herbarium work is needed to determine the relative ranges, distributions, habitats, and abundances of the two varieties.} Newfoundland west to AK, south to NC, SC?, TN, MO, KS, NM, AZ, and CA. [= C, F, G; < *P. vulgaris* – RAB, S, W; = *P. vulgaris* ssp. *lanceolata* (W. Barton) Hultén – K]

* ***Prunella vulgaris*** Linnaeus *var.* ***vulgaris***, Eurasian Self-heal. {Mt, Pd, Cp (FL, GA, NC, SC, VA): disturbed areas, pastures, roadsides, bottomland forests; other forests and woodlands; common. April-December. Additional herbarium work is needed to determine the relative ranges, distributions, habitats, and abundances of the two varieties. The possible recognition of var. *hispida* also needs assessment} Native of Eurasia. Var. *hispida* Bentham, considered to have been originally e. Asian, is alleged to be widespread in se. United States. It differs from *P. vulgaris* var. *vulgaris* in having the "stems, petioles, and often the lower surfaces of leaves densely villous-hispid" (vs. "only sparingly and not conspicuously pilose" – F). [< *P. vulgaris* – RAB, S, W; > *P. vulgaris* var. *vulgaris* – C, F, G; > *P. vulgaris* var. *hispida* Bentham – C, F, G; = *P. vulgaris* ssp. *vulgaris* – K]

Pycnanthemum Michaux 1803 (Mountain-mint, Wild-basil)

A genus of 20-25 species, herbs, of temperate North America. *Pycnanthemum* remains a complicated and difficult group, with speciation apparently having proceeded by allopolyploidy, autoploidy, and aneuploidy. Numerous aberrant forms and (probably) sterile hybrids complicate identification and understanding. References: Chambers (1993); Grant & Epling (1943)=Z; Chambers & Hamer (1992)=Y; Harley et al. in Kadereit (2004).

1 Leaves 1-15 mm wide (to 30 mm wide in *P. setosum*), mostly > 3× as long as wide (except in *P. nudum*); calyx lobes not tipped with a tuft of long, jointed bristles (except *P. clinopodioides*).
  2 Longer calyx lobes 1.5-5 mm long, attenuate-aristate, stiff, whitened; [of Coastal Plain pinelands, rarely in Mountain bogs with Coastal Plain affinities].
    3 Principal stem leaves 5-15 mm wide ..... ***P. flexuosum***
    3 Principal stem leaves 10-30 mm wide ..... ***P. setosum***
  2 Longer calyx lobes 0.5-1.6 mm long, deltoid to narrowly triangular, not notably stiff (except in *P. tenuifolium*) or whitened; [widespread in our area, but mainly of the Piedmont and Mountains].
    4 Leaves 10-15 mm wide (or more often even wider, to 25 mm wide, in *P. clinopodioides*); longer calyx lobes 0.7-1.6 mm long, tipped with a few long (1-3 mm) jointed bristles (*P. clinopodioides*) or not tipped (*P. nudum*).
      5 Leaves 3-5× as long as wide, herbaceous; stems and leaves pubescent; [plants from NC northward]..... ***P. clinopodioides***
      5 Leaves 1-2.5× as long as wide, coriaceous; stems and leaves glabrous; [plants from se. SC southward]..... ***P. nudum***
    4 Leaves 1-12 (-15) mm wide; longer calyx lobes 0.5-1.5 mm long, variously pubescent but not tipped with a tuft of long jointed bristles.
      6 Leaves glabrous on the lower and upper surface, with 2-3 pairs of lateral veins; stems glabrous on the faces and angles (rarely with a few small upwardly-curled hairs on the angles).
        7 Leaves 5-15 mm wide, 1-2.5× as long as wide; calyx lobes and inner bracts of the inflorescence herbaceous ..... ***P. nudum***
        7 Leaves 1-4 (-5.5) mm wide, 8-15× as long as wide; calyx lobes and inner bracts of the inflorescence semi-spinose, their tips subulate, thickened, and stiff..... ***P. tenuifolium***
      6 Leaves pubescent at least on the lower surface along the midrib and main veins; leaves with 4-5 pairs of lateral veins; stems glabrous or pubescent on the faces, pubescent on the angles.
        8 Stems pubescent on the angles only (or distinctly less pubescent on the faces); leaves 3-10 mm wide ..... ***P. virginianum***
        8 Stems pubescent on the faces and angles, the hairs distributed more-or-less evenly; leaves 8-12 (-15) mm wide.
          9 Longer calyx teeth 1.0-1.5 mm long; bracts of the inflorescence and leaves glabrous or very sparsely pubescent on the upper surface..... ***P. torreyi***
          9 Longer calyx teeth 0.5-1.0 mm long; bracts of the inflorescence (and usually also the leaves) canescent on the upper surface ..... ***P. verticillatum var. verticillatum***

1 Leaves broad, 15-40 mm wide, mostly 1.5-3× as long as wide; calyx lobes usually tipped with a tuft of long, jointed bristles (except *P. curvipes, P. muticum, P. setosum*).
  10 Bracts of the inflorescence glabrous (or very sparsely pubescent) on the upper surface, the margins long-ciliate; calyx lobes and upper part (at least) of the tube with long spreading hairs (independent of the apical tufts) ..... ***P. montanum***
  10 Bracts of the inflorescence puberulent on the upper surface, the margins not ciliate; calyx lobes and tube variously glabrous or puberulent (independent of the apical tufts).
    11 Calyx lobes not tipped with a tuft of long, jointed bristles.
      12 Calyx lobes 1.5-3 mm long, attenuated into a subulate tip; [of the Coastal Plain]..... ***P. setosum***
      12 Calyx lobes 0.5-1.2 mm long, triangular to narrowly triangular, acute to acuminate, but not subulate; [collectively widespread in our area].
        13 Petioles 5-15 mm long; inflorescence corymbose, loose, the branches apparent; [of dry rocky woodlands, in sw. NC, w. SC, and southward]..... ***P. curvipes***
        13 Petioles 0-3 mm long; inflorescence capitate, tight, the branches within the clusters not apparent; [of moist habitats, widespread in our area]..... ***P. muticum***
    11 Calyx lobes usually tipped with a tuft of long, jointed bristles.
      14 Calyx not distinctly bilabiate, all of the calyx lobes about the same length, the sinuses about the same depth.
        15 Longer calyx lobes 1-2 mm long; [of the Mountains]..... ***P. beadlei***
        15 Longer calyx lobes 2.5-3 mm long; [of the Coastal Plain]..... ***P. monotrichum***
      14 Calyx distinctly bilabiate, the lower 2 lobes 1.5-2.5× longer than the upper 3 lobes, and separated from each other and the upper 3 lobes by deeper sinuses.
        16 Leaves lanceolate, (10-) 15-25 mm wide, > 3× as long as wide ..... ***P. clinopodioides***
        16 Leaves ovate, 13-50 mm wide, < 3× as long as wide.

17 Leaves of the lower and middle stem with lower surfaces glabrate, glandular-punctate, similar in color to the dark green upper surface; calyx 5-7 mm long ..... ***P. beadlei***
17 Leaves of the lower and middle stems with lower surface canescent, distinctly paler than the dark green upper surface; calyx 3-6.5 mm long.
18 Calyx lobes broadly triangular, their apices obtuse, acute, or somewhat acuminate; calyx tube > 2× as long as the longest (lower) calyx lobes.
19 Pubescence of the stem of dense, very small downwardly-curved hairs, usually mixed with scattered longer and spreading hairs ..... ***P. incanum var. incanum***
19 Pubescence of the stem of sparse, coarse, downwardly-curved hairs ..... ***P. incanum var. puberulum***
18 Calyx lobes narrowly triangular, their apices acuminate to attenuate; calyx tube 1-2× as long as the longest (lower) calyx lobes.
20 Mericarps 0.5-1.3 mm long, with a smooth surface, glabrous or with a few short hairs at the tip ..... ***P. loomisii***
20 Mericarps 1.2-1.5 mm long, with a rugose or pitted surface, densely pubescent at the tip.
21 Stems and lower leaf surfaces canescent, the short hairs often intermixed with longer, spreading ones ..... ***P. pycnanthemoides var. pycnanthemoides***
21 Stems and lower leaf surfaces with coarse, spreading hairs only ..... ***P. pycnanthemoides var. viridifolium***

Pycnanthemum beadlei (Small) Fernald, Beadle's Mountain-mint. Mt (NC, SC, VA), Pd (NC): forests, woodland borders; uncommon (GA Special Concern, VA Watch List). August-September. A Southern Appalachian endemic: sw. VA and ne. TN south to sw. NC, nw. SC, and n. GA. A tetraploid species (n = 38), probably an allotetraploid derived from *P. montanum* × *muticum*. [= C, K, W, Y, Z; < *P. incanum* – RAB; = *Koellia beadlei* Small – S]

Pycnanthemum clinopodioides Torrey & A. Gray. Cp, Pd (NC, VA): forests, woodland borders; rare (NC Watch List, VA Rare). July-September. MA south to NC, mostly on the Coastal Plain. A tetraploid species (n = 38). Probably an allotetraploid hybrid. [= C, F, K, Y, Z; < *P. verticillatum* – RAB; = *Koellia clinopodioides* (Torrey & Gray) Kuntze – S]

Pycnanthemum curvipes (Greene) E. Grant & Epling, Tennessee Mountain-mint, Stone Mountain Mountain-mint. Mt (GA, NC), Pd (GA): dry rocky woodlands and rock outcrops (granite or mafic); rare (GA Special Concern). June-August. Sw. NC and se. TN south nc. GA and n. AL; disjunct in nc. TN (Chester, Wofford, & Kral 1997). A diploid species (n= 20). [= K, Y, Z; = *Koellia curvipes* Greene – S]

Pycnanthemum flexuosum (Walter) Britton, Sterns, & Poggenburg, Savanna Mountain-mint. Cp (NC, SC, VA), Mt (NC): moist to wet pine savannas, pocosin margins, mountain bogs, seepage areas on low elevation granite domes; common (rare in Mountains). June-September; September-October. Se. VA south to n. FL, west to s. AL on the Coastal Plain; disjunct inland in bogs and rock outcrops of sw. NC with Coastal Plain affinities and in sc. TN. A diploid species (n = 18). Sometimes mistaken in vegetative condition for *Eupatorium leucolepis*, *P. flexuosum* can be distinguished by its square stem and aromatic odor. *Koellia hugeri* Small, alleged to differ details of the calyx, was established for the plants of bogs of the Blue Ridge; it apparently is not morphologically segregated from other variation within the species (Grant & Epling 1943). [= RAB, C, F, K, W, Y; = *P. hyssopifolium* Bentham – G, GW, Z; > *Koellia hyssopifolia* (Bentham) Britton – S; > *Koellia hugeri* Small – S]

Pycnanthemum incanum (Linnaeus) Michaux *var.* ***incanum***. Mt, Pd (NC, VA): forests and woodland borders; common (uncommon in NC). Late June-August; September-October. VT west to s. OH and s. IL, south to nc. NC, w. NC, and nc. TN. A tetraploid species (n = 38). [= F, K; < *P. incanum* – RAB (also see *P. beadlei*, *P. loomisii*, *P. pycnanthemoides*); < *P. incanum* – C, G, W, Y; > *Koellia incana* (Linnaeus) Kuntze – S; > *Koellia dubia* (Gray) Small – S; = *P. incanum* – Z; = *P. incanum* (Linnaeus) Michaux ssp. *incanum*]

Pycnanthemum incanum (Linnaeus) Michaux *var.* ***puberulum*** (E. Grant & Epling) Fernald. Mt (NC, SC), Pd (NC): forests and woodland borders; rare. Late June-August; September-October. WV and NC south to FL and AL. A tetraploid species (n = 38). [= F, K; < *P. incanum* – RAB (also see *P. beadlei*, *P. loomisii*, *P. pycnanthemoides*); < *P. incanum* – C, G, W, Y; < *Koellia incana* (Linnaeus) Kuntze – S; = *P. puberulum* E. Grant & Epling – Z]

Pycnanthemum loomisii Nuttall, Loomis's Mountain-mint. Pd, Mt (NC, SC, VA), Cp (NC, VA): forests and woodland borders; rare (VA Watch List). Late June-August; September-October. VA west to IL, south to n. FL. A diploid species (n = 19). [= C, K, Y, Z; < *P. incanum* – RAB; = *P. incanum* var. *loomisii* (Nuttall) Fernald – F; < *P. pycnanthemoides* var. *pycnanthemoides* – G]

Pycnanthemum monotrichum Fernald. Cp (VA): sandy woodlands; rare (VA Rare). Allegedly endemic to se. VA. Perhaps only a hybrid or else likely more widespread and merely overlooked. [= F, G, K]

Pycnanthemum montanum Michaux, Appalachian Mountain-mint. Mt (NC, SC, VA): balds, woodlands, forests, and forest edges; uncommon (Va Watch List). June-August; September-October. W. VA and WV south through w. NC and e. TN to nw. SC and n. GA, a Southern Appalachian endemic. A diploid species (n = 20). [= RAB, C, F, G, K, Y, Z; = *Koellia montana* (Michaux) Kuntze – S]

Pycnanthemum muticum (Michaux) Persoon. Mt, Cp, Pd (NC, SC, VA): bogs, wet meadows, moist to wet forests; common (uncommon in Piedmont). June-August; September-October. MA west to MI and MO, south to FL and LA. A diploid, tetraploid, and hexaploid (?) species (n = 20, 40, ca. 54). [= RAB, C, F, G, GW, K, Y; = *Koellia mutica* (Michaux) Kuntze – S]

Pycnanthemum nudum Nuttall, Smooth Mountain-mint. Cp (SC): wet pine flatwoods; rare. Se. SC south to n. FL and se. AL. Small (1933) attributes this species to NC; the documentation is unknown (and doubtful). This is a diploid species (n = 20). [= GW, K, Z; = *Koellia nuda* (Nuttall) Kuntze – S]

Pycnanthemum pycnanthemoides (Leavenworth) Fernald *var.* ***pycnanthemoides***. Mt, Pd (NC, SC, VA): forests and woodland borders; common. July-August. VA and IL south to w. SC and n. GA. A tetraploid species (n = 36). [= F, K; < *P. incanum* – RAB; < *P. pycnanthemoides* – C, Y; < *P. pycnanthemoides* var. *pycnanthemoides* – G (also see *P. loomisii*); < *Koellia pycnanthemoides* (Leavenworth) Kuntze – S; > *P. tullia* Bentham – Z]

Pycnanthemum pycnanthemoides (Leavenworth) Fernald *var.* ***viridifolium*** Fernald. Mt, Pd (NC, SC, VA), Cp (NC, VA): forests and woodland borders; uncommon. July-August. VA and WV south to ec. GA and AL. A tetraploid species (n = 36).

The recognition of this variety is doubtful. [= F, G, K; < *P. incanum* – RAB; < *P. pycnanthemoides* – C, Y; > *Koellia pycnanthemoides* (Leavenworth) Kuntze – S; > *Koellia dubia* (A. Gray) Small – S; = *P. viridifolium* (Fernald) E. Grant & Epling – Z]

Pycnanthemum setosum Nuttall. Cp (GA, NC, SC, VA): dry pinelands; uncommon (rare in VA) (NC Watch List, VA Rare). Mid June-August; August-October. NJ south to GA (FL?), on the Coastal Plain. See Wieboldt et al. (1998) for discussion of the taxonomy and rarity of this species. A tetraploid species (n = 38), probably an allotetraploid derived from *P. flexuosum* × *muticum*. [= RAB, C, GW, K, Y; > *P. setosum* – F, G; > *P. umbratile* Fernald – F, G; = *Koellia aristata* (Michaux) Kuntze – S; = *P. aristatum* Michaux – Z]

Pycnanthemum tenuifolium Schrader. Mt, Pd, Cp (GA, NC, SC, VA): bogs, wet meadows, moist to wet forests; common. June-August; September-October. ME west to MN, KS, and OK, south to FL and TX. A diploid and tetraploid species (n = 20 and 40). [= RAB, C, F, GW, K, W, Y; = *P. flexuosum* – G, Z, misapplied; = *Koellia flexuosa* – S, misapplied]

Pycnanthemum torreyi Bentham, Torrey's Mountain-mint. Mt (NC, SC, VA), Pd, Cp (VA), {GA?}: dry rocky woodlands, over mafic, ultramafic, or calcareous rocks, dry powerline rights-of-way; rare (NC Rare, VA Rare). NH west to IL, south to NC. A tetraploid and hexaploid species (n = 40 and ca. 60). [= C, G, Y, Z; < *P. verticillatum* – RAB; = *P. torrei* – K, orthographic variant; > *P. torrei* var. *torrei* – F; > *P. torrei* var. *leptodon* (Gray) Boomhour – F; = *Koellia leptodon* (Gray) Small – S]

Pycnanthemum verticillatum (Michaux) Persoon *var.* ***verticillatum***. Mt (NC, SC, VA), Pd (NC, VA), Cp (VA): upland rocky woodlands; common. July-September. Var. *verticillatum* ranges from VT west to MI, south to NC and KY. Var. *pilosum* (Nuttall) Cooperrider ranges from s. Ontario west to MI and IA, south to TN, AR, and OK. It differs in having the stems thickly (vs. thinly pubescent), the lower surface of the leaves evenly pubescent (vs. pubescence chiefly restricted to the midrib). It should be sought in our area. A tetraploid species (n = 38-39). [= C, K; < *P. verticillatum* – RAB (also see *P. clinopodioides*, *P. torrei*); = *P. verticillatum* – F, G, Y, Z; > *Koellia verticillata* (Michaux) Kuntze – S; > *Koellia leptodon* (A. Gray) Small – S; < *P. verticillatum* – W]

Pycnanthemum virginianum (Linnaeus) T. Durand & B.D. Jackson ex B.L. Robinson & Fernald, Virginia Mountain-mint. Mt (GA, NC, VA), Pd (NC, VA), Cp (VA?, NC?): wet meadows and marshes over calcareous or mafic rocks; uncommon (rare in VA Piedmont and VA Coastal Plain) (GA Special Concern, NC Watch List). June-September; September-October. ME west to ND, south to NC, nw. GA, n. AL, and OK. A tetraploid species (n = 40). [= RAB, C, F, G, GW, K, W, Y, Z; = *Koellia virginiana* (Linnaeus) MacMillan – S]

Pycnanthemum albescens Torrey & A. Gray, White-leaved Mountain-mint. Pd (GA): open, mesic forests; rare (GA Special Concern). Reported for NC by Small, as *Koellia albescens*. It is known from nc. GA (Jones & Coile 1988). [= C, F, G, K; = *Koellia albescens* (Torrey & A. Gray) Kuntze – S] {not yet keyed; synonymy incomplete}

Pycnanthemum floridanum E. Grant & Epling, north to e. GA. [= K] {not yet keyed; synonymy incomplete}

Pycnanthemum verticillatum (Michaux) Persoon *var.* ***pilosum*** (Nuttall) Cooperrider. {GA}. In c. TN, and reported from a single county in e. TN (Chester, Wofford, & Kral 1997), in se. PA (Rhoads & Klein 1993), and WV (K99). [= C, K; = *P. pilosum* Nuttall – F, G; = *Koellia pilosa* (Nuttall) Britton – S] {not yet keyed; synonymy incomplete}

Rosmarinus Linnaeus (Rosemary)

A genus of 2-3 species, herb/shrubs, of Mediterranean Europe. Closely related to *Salvia* (Walker et al. 2004), and probably to be combined there. References: Harley et al. in Kadereit (2004).

* ***Rosmarinus officinalis*** Linnaeus, Rosemary. Cp, Pd (NC, SC): gardens; commonly cultivated, rarely persistent or established, native of Mediterranean Europe. October-March. [= K]

Salvia Linnaeus 1753 (Sage, Clary)

A genus of about 900 species, shrubs and herbs, almost cosmopolitan. Walker et al. (2004) have determined that *Salvia* as traditionally circumscribed is polyphyletic. References: Epling (1938)=Z; Walker et al. (2004).

1 Leaves predominantly basal.
  2 Veins of the 3 upper calyx lobes parallel, the lobes themselves minute and widely-spaced (> 1 mm between the 2 lateral teeth), separated by flattish sinuses; basal leaves lobed; [native, though weedy, common throughout our area] ..... ***S. lyrata***
  2 Veins of the 3 upper calyx lobes converging, the lobes themselves minute and spaced within a distance of 1 mm; basal leaves lobed or toothed; cauline leaves toothed (rarely lobed); [alien weeds, rarely naturalized in our area].
    3 Upper corolla-lip strongly arched; leaves serrate ..... ***S. pratensis***
    3 Upper corolla-lip straight; leaves lobed ..... ***S. verbenacea***
1 Leaves predominantly cauline, not lobed.
  4 Leaves lanceolate, linear, or narrowly elliptic, the base cuneate to attenuate.
    5 Leaves canescent, gray; [introduced, rarely persistent from cultivation in gardens] ..... ***S. officinalis***
    5 Leaves puberulent, green; [native, of dry woodlands from sc. NC southward and westward].
      6 Stem usually with sparse, antrorse or somewhat spreading pubescence; calyx with antrorse hairs limited to major veins; flowers of mature inflorescences spaced out, most internodes elongate and ranging up to 25 (-34) mm; [plants of Atlantic and Gulf Coastal Plain and adjacent piedmont, from south-central NC to central FL to southeast LA] ..... ***S. azurea var. azurea***
      6 Stem usually with dense, retrorse pubescence; calyx with dense antrorse pubescence; flowers of mature inflorescences densely arranged, internodes between flowers very short, only the lowermost 1-3 internodes elongate and ranging up to 12 (-17) mm; [plants of inland and prairie sites, ranging from IL, IA, NE, and eastern CO south to nw. AL, ne. MS, LA, southeastern and central TX] .....

..... ***S. azurea* var. *grandiflora***

4 Leaves rhombic-ovate, the base cordate, truncate, or broadly cuneate.
6 Petiole not clearly differentiated from the leaf blade (leaf tissue decurrent on the petiole for most or all its length); corolla blue; [native, of woodlands] ..... ***S. urticifolia***
6 Petiole clearly differentiated from the leaf blade; corolla blue, white, or scarlet; [introduced, weedy, rare].
7 Corolla scarlet; larger leaves 3-6.5 cm long ..... ***S. coccinea***
7 Corolla blue or whitish; leaves (8-) 12-20 cm long ..... ***S. sclarea***

Salvia azurea Michaux ex Lamarck *var.* ***azurea***, Azure Sage. Cp (FL, GA, NC, SC), Pd (GA, NC, SC), Mt (GA): sandhills, hammocks, other sandy or rocky woodlands; common (NC Rare). Late August-October; October-November. S. NC south to panhandle FL, west to TX. [= K; < *S. azurea* – RAB, S]

Salvia coccinea P.J. Buchoz ex Etlinger, Scarlet Sage. Cp (FL, GA, SC*?), Pd (GA*?): hammocks, disturbed areas; rare, perhaps only introduced (at least in SC) from farther south and west. May-November. [= RAB, G, K, S]

Salvia lyrata Linnaeus, Lyreleaf Sage. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): hammocks, lawns, roadsides, woodlands; common. April-May; May-July. CT west to MO, south to FL and TX. A common and familiar native weed. [= RAB, C, F, G, K, S, W]

* ***Salvia officinalis*** Linnaeus, Garden Sage. Cp (VA): cultivated as a garden herb, rarely persistent; rare, native of Europe. [= C, F, G, K]

* ***Salvia pratensis*** Linnaeus, Meadow Sage, Meadow Clary. Cp (VA): fields and disturbed areas; rare, native of Europe. [= C, F, G, K]

* ***Salvia sclarea*** Linnaeus, Clary. Mt (NC?, VA): cultivated as a garden herb, rarely persistent; rare, native of Europe. [= C, G, K, S]

Salvia urticifolia Linnaeus, Nettle-leaf Sage. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, VA): woodlands and glades, usually over mafic or calcareous rocks; uncommon (rare in Coastal Plain). April-June; May-July. PA west to w. KY, south to SC, c. GA, Panhandle FL, and AL. Quite showy when in flower. [= RAB, C, F, G, K, S, W, Z]

* ***Salvia verbenacea*** Linnaeus, Wild Clary. Mt (VA), {GA, NC?}: fields and disturbed areas; rare, native of Europe. [= C, G, K, S]

Salvia azurea Michaux ex Lamarck *var.* ***grandiflora*** Bentham. {GA}: IL, IA, NE, and eastern CO south to nw. AL, ne. MS, LA, se. TX, and c. TX. [= F, K; = *S. pitcheri* Torrey ex Bentham – C, G; < *S. azurea* – S; = *S. azurea* ssp. *pitcheri* (Torrey ex Bentham) Epling] {not yet keyed; synonymy incomplete}

Salvia chapmanii A. Gray. AL and FL. Uncertain taxonomic status, often included in *S. urticifolia*. [= K, S] {not yet keyed; synonymy incomplete}

* *Salvia reflexa* Hornemann, Lanceleaf Sage, Mintweed. In c. TN (Chester, Wofford, & Kral 1997). The apparent ascription by C of *S. reflexa* Hornemann to "N.C." is a typographic error for "N.D." This species is, however, sometimes adventive as far east as WV. [= C, F, G, K, Z] {not yet keyed}

* *Salvia verticillata* Linnaeus, Whorled Clary, is introduced as far south as scattered locations in PA (Rhoads & Klein 1993), MD, and WV (Kartesz 1999). [= C, F, G, K] {not yet keyed}

Scutellaria Linnaeus 1753 (Skullcap)

(contributed by Bruce A. Sorrie and Alan S. Weakley)

A genus of about 350-360 species, herbs and shrubs, almost cosmopolitan. References: Pittman (1988)=Z; Collins (1976)=Y; Epling (1942)=X; Leonard (1892); Harley et al. in Kadereit (2004).

Identification notes: Recognizable by the "tractor seat"-shaped protuberance on the upper calyx.

1 Flowers axillary, bracts resembling stem leaves; stem leaves sessile **or** petioles < 4 mm.
2 Corollas 12-32 mm long ..... ***Sc. galericulata***
2 Corollas 5-10 mm long.
3 Lower leaves hastate; plants glabrous ..... ***Sc. racemosa***
3 Lower leaves ovate or deltoid-ovate; plants puberulent or pubescent.
4 Stems glabrate, the pubescence ascending, curled or appressed, eglandular.
5 Median leaves 10-15 mm long; corolla 6.5-9 mm long ..... ***Sc. leonardii***
5 Median leaves 20-40 mm long; corolla 8-10 mm long ..... ***Sc. nervosa***
4 Stems obviously hairy, pubescence spreading, glandular or not (or both).
6 Lower leaf surface with glandular hairs only; leaf veins tending to anastomose along leaf margins ..... ***Sc. australis***
6 Lower leaf surface with glandular hairs or eglandular; leaf veins usually unbranched along margins ..... ***Sc. parvula***
1 Flowers in racemes, bracts much reduced (not leaf-like); stem leaf petioles > 4 mm.
7 Corolla tube glabrous within or sparsely hairy, lacking a sharply defined ring of hairs at bend of tube (non-annulate).
8 Racemes secund.
9 Corollas ca. 6 mm long; racemes terminal and axillary ..... ***Sc. lateriflora***
9 Corollas ca. 10 mm long; racemes terminal or terminating axillary branches ..... ***Sc. saxatilis***
8 Racemes not secund, flowers on more than one side of axis.
10 Stems and petioles with ascending hairs; at least some racemes from axillary branches; mid to upper leaves truncate basally ..... ***Sc. saxatilis***
10 Stems and petioles with spreading or retrorse hairs; racemes terminal or in panicles; mid to upper leaves strongly cordate.
11 Margins of lower lip cleft and erose; lower lip with large lateral auricles (flabelliform) ..... ***[Sc. ovata ssp. bracteata]***
11 Margins of lip entire; lip undulate or weakly auriculate.

12 Lower lip entirely white with a few blue spots; leaf surface smooth with sparse glandular hairs ..... ***Sc. ovata ssp. ovata***
12 Lower lip blue with two longitudinal white bands; leaf surface rugose, usually densely glandular hairy (but may be eglandular).
13 [of the Ridge and Valley (especially shale barrens) of VA, WV, MD] ..... ***Sc. ovata ssp. rugosa var. rugosa***
13 [of the Blue Ridge (moist talus slopes) of NC, TN] ..... ***Sc. ovata ssp. rugosa var. 1***
7 Corolla tube with sharply defined ring of hairs (annulus) at bend of tube.
14 At least some upper leaves entire.
15 Leaves with stipitate glands ..... ***Sc. multiglandulosa***
15 Leaves without stipitate glands.
16 Corolla glabrous, lower lip with immaculate white central band; leaf bases long-attenuate ..... ***Sc. glabriuscula***
16 Corolla short pilose, lower lip with blue spots or lines on white central band; leaf bases cuneate to deltoid.
17 Lowest pedicels of main axis of inflorescence >4 mm, or if less, then subtending bracts < 13 mm ..... ***Sc. arenicola***
17 Lowest pedicels < 4 mm, or if more, then bracts >13 mm ..... ***Sc. integrifolia***
14 All leaves serrate or crenate.
18 Second internode below base of inflorescence stipitate glandular.
19 Corollas 24-33 mm long **and** upper surfaces of leaves punctate glandular ..... ***Sc. pseudoserrata***
19 Corollas 14-23 mm long, or if longer, then upper surfaces of leaves eglandular.
20 Corollas 25-36 mm long; bracts elliptic to oblanceolate, apices acute ..... ***Sc. montana***
20 Corollas 14-23 mm; bracts obovate to broadly oblanceolate, apices obtuse.
21 Bases of upper leaves cuneate to rounded; corollas 14-18 (-21) mm ..... ***Sc. elliptica var. hirsuta***
21 Bases of upper leaves cordate to rounded; corollas 18-23 mm ..... ***Sc. ocmulgee***
18 Second internode below base of inflorescence eglandular.
22 Corollas > 21 mm long*.
28 Stems glabrous or glabrate below inflorescence; calyces eglandular; [of the Mountains and Piedmont] ..... ***Sc. serrata***
28 Stems canescent below inflorescence; calyces stipitate glandular or punctate glandular.
29 Lower lip with 20+ blue spots; calyces stipitate glandular; [of peninsular FL and s GA] ..... ***Sc. arenicola***
29 Lower lip lacking blue spots; calyces punctate glandular; [of s SC-se GA; disjunct to c AL] ..... ***Sc. mellichampii***
22 Corollas < 21 mm long*.
23 Calyces densely to sparsely canescent, eglandular or with punctate glands (stipitate glands may also be present).
24 Leaves softly villous beneath; calyces and bracts eglandular ..... ***Sc. incana var. incana***
24 Leaves glabrate, with appressed hairs on veins.
25 Stems canescent; calyces and bracts densely punctate glandular ..... ***Sc. incana var. australis***
25 Stems glabrate (rarely puberulent); calyces and bracts eglandular ..... ***Sc. incana var. punctata***
23 Calyces pilose with spreading stipitate glandular hairs.
26 Bracts with stipitate glands; leaves eglandular ..... ***Sc. elliptica var. elliptica***
26 Bracts without stipitate glands; leaves densely punctate glandular.
27 Corollas 19-22 mm long; [of the Mountains of AL] ..... ***[Sc. alabamensis]***
27 Corollas 11-16 mm long; [of the Coastal Plain of SC and GA] ..... ***Sc. altamaha***

*Note: in key break 22b, corollas of *S. alabamensis* may reach 22 mm long; its calyces are both stipitate glandular and punctate glandular, thus differing from *S. arenicola* and *S. mellichampii*. In key break 22a, corollas of *S. mellichampii* may be as short as 21 mm; its calyces are punctate glandular only, unlike *S. incana* var. *australis* which has both punctate glands and stipitate glands on calyces.

Scutellaria altamaha Small, Altamaha Skullcap. Cp (GA), {NC, SC}: sandy deciduous forests; rare (GA Special Concern). [= K, S, Y; < *S. mellichampii* Small – RAB]

Scutellaria arenicola Small, Sandhill Skullcap. Cp (GA): sandy scrub; rare (GA Special Concern). GA south to s. FL. [= K, S, Y]

Scutellaria australis (Fassett) Epling, Southern Skullcap. Pd (GA, NC, SC, VA), Cp (GA): bottomland forests; rare. VA, WV, KY, IN, IL, MO, and KS, south to Panhandle FL, LA, and e. TX. [= G, X; < *S. parvula* – RAB, S; = *S. parvula* Michaux var. *australis* Fassett – F, K]

Scutellaria elliptica Muhlenberg ex Sprengel *var. **elliptica***. Mt, Pd (GA, NC, SC, VA), Cp (GA, NC, SC, VA): mesic to dry forests; common (rare in FL). Late May-June; June-July. NY, KY and MO, south to s. GA, Panhandle FL, LA, and e. TX. [= C, F, G, K, W, Y; < *S. elliptica* – RAB; < *S. ovalifolia* – S; = *S. ovalifolia* ssp. *mollis* Epling – X]

Scutellaria elliptica Muhlenberg ex Sprengel *var. **hirsuta*** (Short & Peter) Fernald. Mt (GA, NC, VA), Pd (VA): mesic to dry forests; uncommon. Late May-June; June-July. PA and MI south to n. VA, w. NC, nw. GA, s. AL, and e. TX. [= C, F, G, K, W, Y; < *S. elliptica* – RAB; < *S. ovalifolia* – S; = *S. ovalifolia* ssp. *hirsuta* (Short & Peter) Epling – X]]

Scutellaria galericulata Linnaeus, Hooded Skullcap. Mt (NC, VA): spring-fed seepage; rare. The NC occurrence is based on a single specimen from the 19th century. Reported recently from MD (Steury, Tyndall, & Cooley 1996). [= C, G, K, X; > *S. epilobiifolia* A. Hamilton – F, S]

Scutellaria glabriuscula Fernald, Georgia Skullcap. Cp (AL, FL, GA, MS): sandhills; rare. Sw. GA and FL Panhandle west through s. AL to s. MS. [= K, S, Y]

Scutellaria incana Biehler *var. **incana***. Pd, Cp (NC, VA): dry to mesic forests and woodlands; uncommon. NY, OH, IN, and IL, south to e. VA, c. NC, KY, w. TN, MS, and AR. [= C, F, G, K, Y; < *S. incana* – RAB, S; = *S. incana* – X]

Scutellaria incana Biehler *var. **punctata*** (Chapman) C. Mohr. Mt (GA, NC, SC, VA): dry to mesic forests and woodlands; common. Southern Appalachian endemic: sw. VA south through w. NC, nw. SC, e. TN to n. GA and ne. AL. [= C, F, G, K, W, Y; < *S. incana* – RAB, S; *S. punctata* (Chapman) Leonard – X]

Scutellaria integrifolia Linnaeus. Cp, Pd, Mt (GA, NC, SC, VA): wet pine savannas, seeps in forests, bottomlands, other moist sites; common. May-July; July-August. MA south to FL, west to TX, northward in the interior to OH, KY, and TN. [= C, G, GW, K, S, W, Y; > *S. integrifolia* var. *hispida* Bentham – RAB, F; > *S. integrifolia* var. *integrifolia* – RAB, F]

Scutellaria lateriflora Linnaeus, Mad Dog Skullcap. Cp (NC, SC, VA), Pd, Mt (GA, NC, SC, VA): alluvial forests, bogs, seeps, marshes; common. July-November. Newfoundland west to British Columbia, south to GA and CA. [= RAB, C, F, G, GW, S, W; > *S. lateriflora* var. *lateriflora* – K]

Scutellaria leonardii Epling, Shale-barren Skullcap, Glade Skullcap. Mt (GA, VA), Pd (NC, VA), Cp (VA): limestone glades, diabase barrens; rare (GA Special Concern). April-May; May-June. MA west to MI and ND, south to se. VA, nc. NC, AR, and OK. [= C, G, W, X; < *S. parvula* – RAB; > *S. nervosa* Pursh var. *ambigua* (Nuttall) Fernald – F; = *S. parvula* Michaux var. *missouriensis* (Torrey) Goodman & Lawson – K; = *S. ambigua* Nuttall – S; > *S. parvula* Michaux var. *leonardii* (Epling) Fernald – F]

Scutellaria mellichampii Small, Mellichamp's Skullcap. Cp (GA, NC?, SC): sandy deciduous forests on river bluffs; rare (GA Special Concern). June; July. Se. SC (se. NC?) south to e. GA. [= S, X, Y; < *S. mellichampii* – RAB; = *S. incana* Biehler var. *australis* (Epling) Collins, comb. nov. ined. – K; = *S. altamaha* Small ssp. *australis* Epling]

Scutellaria montana Chapman, Large-flowered Skullcap. Mt (GA): mesic hardwood (or hardwood-shortleaf pine) forests; rare (US Threatened, GA Endangered). Se. TN south to nw. GA. [= K, S, Y; = *S. serrata* Andrzedowski var. *montana* (Chapman) Penland – F]

Scutellaria multiglandulosa (Kearney) Small ex R.M. Harper. Cp, Pd (SC, GA): sandhills, dry sandy bluff forests; rare. SC (Abbeville and Anderson counties) to e. GA, and in Panhandle FL. [= K, S, Y; = *S. integrifolia* Linnaeus var. *multiglandulosa* Kearney – F]

Scutellaria nervosa Pursh, Bottomland Skullcap, Veined Skullcap. Pd (NC, SC, VA), Cp (NC, VA), Mt (VA), {GA}: alluvial forests, mesic forests; uncommon, rare south of VA (GA Special Concern). May-June; June-July. NY, MI, and IA, south to GA, AL, and LA. [= RAB, K, S, W; > *S. nervosa* var. *nervosa* – C, F, G; *S. nervosa* var. *calvifolia* Fernald – C, F, G]

Scutellaria ocmulgee Small, Ocmulgee Skullcap. Cp (GA): bluff forests and other mesic hardwood forests; rare (GA Threatened). Endemic to e. GA. [= K, S, Y]

Scutellaria ovata Hill *ssp.* ***bracteata*** (Bentham) Epling. Mt (GA): dry forests and woodlands; rare. MO south through AR and OK to c. TX; disjunct eastward in s. MS, c. and n. AL, and nw. GA. [= K, W, X; < *S. ovata* var. *ovata* – C, F, G; = *S. ovata* var. *bracteata* Bentham; > *Scutellaria ovata* Hill ssp. *cuthbertii* (Alexander) Epling – K, X; > *S. cuthbertii* Alexander – S; = *S. ovata* ssp. *bracteata* (Bentham) Epling var. *bracteata* – Z] {synonymy incomplete}

Scutellaria ovata Hill *ssp.* ***ovata*** *var.* ***ovata***. {GA, NC, SC, VA}. [= Z; > *S. ovata* ssp. *ovata* – K; < *S. ovata* – RAB, S; >< *S. ovata* var. *ovata* – C, F, G; > *S. ovata* var. *calcarea* (Epling) Gleason – C, G; > *S. ovata* var. *versicolor* (Nuttall) Fernald – C, G; = *S. ovata* ssp. *ovata* – W; > *S. ovata* ssp. *calcarea* Epling – X; > *S. ovata* ssp. *versicolor* (Nuttall) Epling – X; > *Scutellaria ovata* Hill *ssp. venosa* Epling – K, X]

Scutellaria ovata Hill *ssp.* ***rugosa*** (Wood) Epling *var.* ***rugosa***. Mt (VA): shale barrens, other dry woodlands; common. [= *S. ovata* var. *rugosa* – F; > *S. ovata* ssp. *rugosa* – K, W, X; > *Scutellaria ovata* Hill ssp. *pseudoarguta* Epling – K, X; < *S. ovata* – RAB, S; = *S. ovata* ssp. *rugosa* (Wood) Epling var. *rugosa* – Z; > *Scutellaria ovata* Hill *ssp. virginiana* Epling – K, X]

Scutellaria ovata Hill *ssp.* ***rugosa*** (Wood) Epling *var. 1*, Appalachian Skullcap. Mt (GA, NC, VA): moist boulderfields at high elevations; rare. [*Scutellaria arguta* Buckley – C, G, K, S, W, X; = *S. saxatilis* Riddell var. *pilosior* Bentham – F; "*S. ovata* Hill ssp. *rugosa* (Wood) Epling var. *arguta* (Buckley) Pittman" – Z (not published)]

Scutellaria parvula Michaux, Dwarf Skullcap. Pd (SC, VA). ME west to MN, south to GA and TX. In c. TN and scattered locations in e. TN (Chester, Wofford, & Kral 1997). [= G, W, X; = *S. parvula* var. *parvula* – C, F, K; < *S. parvula* – RAB, S]

Scutellaria pseudoserrata Epling. Mt, Pd (GA), {NC?, SC}: rich, rocky forests; rare. Also in e. TN (Chester, Wofford, & Kral 1997), nc. and c. GA (Jones & Coile 1988). Cultivated in Highlands, Macon Co., NC. [= K, W, X, Y]

* ***Scutellaria racemosa*** Persoon, South American Skullcap. Cp (GA, SC), Pd (NC): disturbed areas, native of South America. Reported from FL, AL, GA, and SC by Kral (1981). Krings & Neal (2001a, 2001b) report it for Chatham Co., NC and discuss its occurrence in se. United States. [= GW, K]

Scutellaria saxatilis Riddell, Rock Skullcap. Mt (GA, NC, SC, VA): June-August. [= RAB, C, G, K, S, W, X, Z; = *S. saxatilis* var. *saxatilis* – F]

Scutellaria serrata Andrzedowski, Showy Skullcap, Serrate Skullcap. Mt, Pd (NC, VA), {GA, SC?}. Mid May-late June. [= RAB, C, G, K, S, W, X, Y; = *S. serrata* var. *serrata* – F]

Scutellaria alabamensis Alexander. AL (Epling 1942, Kartesz 1999). [= K, S, X, Y]

Scutellaria drummondii Bentham *var.* ***drummondii***, Drummond's Skullcap. Cp (FL*, GA): blackland prairies, disturbed areas; rare. GA west to LA, south into Mexico. First reported for GA by Lee Echols in 2005 (pers. comm.). [= K] {not yet keyed}

Scutellaria floridana Chapman, Florida Skullcap. Cp (FL): pine flatwoods; rare. Endemic to FL Panhandle. [= K] {not yet keyed; add to synonymy}

Sideritis Linnaeus

A genus of about 140-150 species, herbs and shrubs, of temperate Eurasia. References: Harley et al. in Kadereit (2004).

* *Sideritis romana* Linnaeus, Ironwort. Introduced and naturalized as far south as PA (Rhoads & Klein 1991, Cronquist 1991) and WV (Cronquist 1991). [= C, K] {synonymy incomplete}

Stachydeoma Small 1903

Stachydeoma graveolens (Chapman ex A. Gray) Small. Cp (FL): sandhills, pine flatwoods; rare. Endemic to Panhandle FL. [= K, S; = *Hedeoma graveolens* Chapman ex A. Gray]

Stachys Linnaeus 1753 (Hedge-nettle)
(contributed by John B. Nelson)

A genus of about 300 species, herbs and shrubs, mainly temperate, nearly cosmopolitan (except Australia and New Zealand). References: Nelson (1981)=Z; Nelson & Fairey (1979); Mulligan & Munro (1989); Pringle (2002); Harley et al. in Kadereit (2004).

Identification notes: This treatment will be revised substantially.

Key 1

1 Fruiting calyx lobes deltoid to broadly triangular.
  2 Stem sides pubescent.
    3 Petioles short to absent, blades mostly rounded to truncate; top of blooming stem stiff, erect ..... ***S. eplingii***
    3 Petioles well developed, blades commonly cordate at the base; top of blooming stem frequently flexuous, somewhat lax ..... ***S. cordata***
  2 Stem sides glabrous.
    4 Leaf margins serrate or serrulate, but always with sharp teeth; nodes not bearded; stem angles with scattered, swollen-based, short, retrorse trichomes (not spreading pubescent); [plants of the Mountains or upper Piedmont] ..... ***S. latidens***
    4 Leaf margins finely crenate; nodes bearded; stem angles abundantly pubescent with 3-celled, spreading hairs; [of the lower Piedmont of NC] ..... ***S. species 1***
1 Fruiting calyx lobes lanceolate, narrowly triangular, or nearly subulate.
  5 Leaf blades linear to lanceolate.
    6 Stem sides with at least moderate pubescence on the highest sterile internode, moderately to densely pubescent on higher internodes; lower leaf surface abundantly pubescent to velvety-pilose ..... ***S. pilosa***
    6 Stem sides without pubescence, except for internodes within the inflorescence, which may bear light villous or glandular hairs; lower leaf surface glabrous or pubescent, but not velvety.
      7 Leaf blade margins entire to crenate; plants generally glabrous ..... ***S. hyssopifolia***
      7 Leaf blade margins serrulate with at least a few teeth; plants glabrous or pubescent.
        8 Stems strict or sparingly branched; leaves sessile or barely petioled, the blades crenate to serrate with shallow teeth ..... ***S. aspera***
        8 Stems frequently branched from the upper nodes; leaves obviously petioled, the blades sharply toothed ..... ***S. tenuifolia***
  5 Leaf blades wider, oblong to elliptic.
    9 Petioles poorly developed, essentialy absent ..... ***S. hispida***
    9 Petioles obvious, frequently 1/5 the length of the blade.
      10 Leaf blades sharply serrate, nearly dentate; stem angles abundantly pubescent with spreading or somewhat retrorse, long (to 3 mm) hairs ..... ***S. clingmanii***
      10 Leaf margins crenate to serrulate, but never dentate; stem angles glabrous or pubescent (if the latter, then with scattered, stiffish, retrorse hairs).
        11 Plant producing thick, segmented, tuber-like rhizomes; stem sides and calyx usually strongly glandular; [weedy, mostly on the Coastal Plain] ..... ***S. floridana***
        11 Plant producing slender rhizomes; stem sides and calyx usually scarcely glandular, or glabrous; [not weedy, mostly of the Piedmont and Mountains].
          12 Calyx usually abundantly pubescent with stiff, eglandular hairs; fruiting calyx lobes straight ..... ***S. hispida***
          12 Calyx usually glabrous to sparingly pubescent; fruiting calyx lobes frequently curved or curling ..... ***S. tenuifolia***

Key 2 (Alternate Key)

1 Petioles obvious (at least some of those in the middle portion of the stem at least 1/5 as long as the leaf blade).
  2 Calyx tubes glandular.
    3 Leaf blade margins strongly serrate (dentate or nearly so); stem angles copiously pubescent with long (to 3 mm), spreading hairs ***S. clingmanii***
    3 Leaf blade margins mostly crenate; stem angles glabrate or pubescent with mostly short, retrorse hairs.
      4 Calyx lobes about as long as the tube, lanceolate; leaf blades never greater than 3 cm wide ..... ***S. floridana***
      4 Calyx lobes shorter than the tube, deltoid; leaf blades frequently > 3 cm wide ..... ***S. cordata***
  2 Calyx not glandular, or very slightly so.
    5 Calyx glabrous to sparsely pubescent; petioles well-developed, especially in shade forms ..... ***S. tenuifolia***
    5 Calyx variously hairy, but at least hispidulous, frequently strongly hispid; petioles short or long.
      6 Petioles usually well developed; blade margins commonly dentate ..... ***S. clingmanii***
      6 Petioles frequently short to nearly absent; blade margins toothed, but never dentate ..... ***S. hispida***
1 Petioles short or absent.
  7 Leaves linear-lanceolate to narrowly lanceolate, usually widest at or near the base; leaf margins entire to crenulate, rarely serrulate, and then mostly toward the apex.
    8 Corolla very pale pink to white; leaf blades abundantly pubescent below with appressed hairs, the surface soft-velvety ..... ***S. pilosa***
    8 Corolla dark pink; leaf blades variously pubescent or glabrate, but never velvety.
      9 Leaf blades narrow, 3-6 mm wide; plants generally glabrous to moderately pubescent; blade margins entire to obscurely crenulate ..... ***S. hyssopifolia***

9 Leaf blades broader, 5-8 mm wide; plants frequently hispidulous or at least moderately pubescent, or abundantly hairy; blade margins crenulate to serrulate ..... ***S. aspera***

7 Leaves ovate to elliptic, widest near the center or toward the apex, oblong; leaf margins crenate to sharply serrate for nearly the entire length.

10 Stem sides commonly pubescent above ..... ***S. eplingii***

10 Stem sides glabrous, the angles pubescent.

11 Fruiting calyx lobes lanceolate, about half as long as the calyx tube ..... ***S. hispida***

11 Fruiting calyx lobes deltoid or triangular, shorter than half the length of the calyx tube.

12 Leaf margins serrate or serrulate, but always with sharp teeth; nodes not bearded; stem angles with scattered, swollen-based, short, retrorse trichomes (not spreading pubescent); [of the Mountains or upper Piedmont] ..... ***S. latidens***

12 Leaf margins finely crenate; nodes bearded; stem angles abundantly pubescent with 3-celled, spreading hairs; [of the lower Piedmont of NC] ..... ***S. species 1***

Stachys aspera Michaux, Rough-leaved Hedge-nettle. Cp, Pd (GA, NC, SC, VA), Mt (VA): moist or wet sandy soil of savannas, marshes, or swamp forests; uncommon (VA Rare). June-August; August-September. {distribution} [= C, G, K; = *S. hyssopifolia* Michaux var. *ambigua* A. Gray – RAB, F, GW, Z; = *S. ambigua* (A. Gray) Britton – S; *? S. grayana* House]

Stachys clingmanii Small, Clingman's Hedge-nettle. Mt (NC), Cp? (VA?), {SC?}: cove forests, especially periglacial boulderfields, mostly at high elevations (and see comments below); rare (NC Rare). June-August; September-October. A narrow Southern Appalachian endemic, known only from sw. NC and se. TN. Some plants similar to and perhaps referable to this species occur in Surry County VA (calcareous bushy thickets and ravines) and in IN. [= C, F, G, K, S, W, Z; < *S. clingmanii* – RAB]

Stachys cordata Riddell, Heart-leaved Hedge-nettle, Nuttall's Hedge-nettle. Mt (GA, NC, VA), Pd (NC, VA): moist forests, especially alluvial bottomlands or over calcareous rocks; uncommon (rare in NC) (GA Rare, NC Watch List). June-August; September-October. {distribution} Primarily montane, but extending east to Stokes County, North Carolina. See Pringle (2002) for a discussion of nomenclature. [= S; = *S. nuttallii* Shuttleworth ex Bentham – K, W, Z; < *S. clingmanii* – RAB; > *S. cordata* – C; > *S. subcordata* Rydberg – C, G; = *S. riddellii* House – F, G; > *S. salvioides* Small – S]

Stachys eplingii J. Nelson, Epling's Hedge-nettle. Mt (GA, NC, SC, VA): mesic forests, bogs, wet meadows over calcareous or mafic substrates; rare (GA Rare, NC Rare, VA Rare). June-August; August-September. This species has a scattered and sporadic range in the southern and central Appalachians, occurring also in the Ozarks. See Nelson & Fairey (1979) for a discussion of the nomenclatural change. [= C, GW, K, W, Z; = *S. nuttallii* – RAB, F, G, S, misapplied]

* ***Stachys floridana*** Shuttleworth ex Bentham, Florida Betony, Rattlesnake-weed. Cp (FL, GA*?, NC*, SC*?, VA*), Pd* (GA, NC, SC, VA): disturbed sites, roadsides; uncommon, probably not native northwards, native of Florida. April-July; May-August. {distribution} The common name "Rattlesnake-weed" refers to the moniliform rhizomes. [= RAB, GW, K, S, Z]

Stachys hispida Pursh, Hispid Hedge-nettle. Mt (NC, VA), Pd, Cp (VA), ?? (GA): wet meadows and mesic forests; uncommon (GA Rare). {distribution} A highly variable taxon. [= C, G; = *S. tenuifolia* Willdenow var. *hispida* (Pursh) Fernald – F; < *S. tenuifolia* var. *tenuifolia* – K, Z]

Stachys hyssopifolia Michaux *var.* ***hyssopifolia***, Hyssop-leaved Hedge-nettle. Cp, Pd (GA, NC, SC, VA), Mt (VA): moist soils of savannas, marshes, seasonally flooded sinkhole ponds, roadside ditches; uncommon (VA Watch List). June-August; August-September. {distribution} [= RAB, F, GW, Z; = *S. hyssopifolia* – C, G, K, S, W; *? S. atlantica* Britton]

Stachys latidens Small ex Britton, Broad-toothed Hedge-nettle. Mt, Pd (GA, NC, SC, VA): mesic forests in coves and on mountain slopes, mountain pastures and forest edges; common (GA Rare, SC Rare). June-August; September-October. {distribution} [= RAB, C, F, G, S; = *S. tenuifolia* Willdenow var. *latidens* (Small ex Britton) J. Nelson – K, W, Z; < *S. tenuifolia* – GW]

Stachys pilosa Nuttall, Woundwort. Mt, Pd (VA), Cp (SC): marl fens, roadsides, banks of waterfowl impoundments; rare, possibly adventive in part from further west, but some populations at least native. {distribution} [= *S. palustris* Linnaeus var. *pilosa* (Nuttall) Fernald – C, F, G; = *S. palustris* Linnaeus ssp. *pilosa* (Nuttall) Epling; > *S. pilosa* var. *arenicola* (Britton) Mulligan & Monroe – K]

Stachys species 1, Yadkin Hedge-nettle. Pd (NC, VA): in sandy alluvium along forest edges in river floodplain; rare. {distribution}

Stachys tenuifolia Willdenow, Smooth Hedge-nettle. Mt (NC), Pd (VA), Cp (NC, SC, VA): wooded alluvial river bottoms, swamp forests, and roadsides; rare (NC Watch List). June-August; September-October. {distribution} [= RAB, C, G, K, S; > *S. tenuifolia* var. *tenuifolia* – F, Z; > *S. tenuifolia* var. *perlonga* Fernald – F, Z; > *S. tenuifolia* var. *platyphylla* Fernald – F; < *S. tenuifolia* – GW; = *S. tenuifolia* var. *tenuifollia* – W]

* ***Stachys annua*** (Linnaeus) Linnaeus. Cp (VA): disturbed area; rare, probably only a waif. Reported for VA (Kartesz 1999). [= C, F, G, K] {not yet keyed}

* *Stachys arvensis* (Linnaeus) Linnaeus. Reported for VA by C, G, and K; documentation uncertain (Virginia Botanical Associates 2006). [= C, F, K] {not keyed}

* ***Stachys byzantina*** K. Koch ex Scheele. Pd (VA): roadside; rare, doubtfully established. Reported for VA (Virginia Botanical Associates 2006). [= C, K; = *S. olympica* Poiret – F, G] {not yet keyed}

Stachys crenata Rafinesque. Cp (FL): calcareous hammocks; rare. {distribution} Reported for AL, KY, FL (Kartesz 1999). [= K] {not yet keyed; add synonymy}

* ***Stachys germanica*** Linnaeus. Mt (VA): roadsides; rare, doubtfully established. Reported for VA, TN, FL (Kartesz 1999). [= C, F, G, K]

Stachys hyssopifolia Michaux *var.* ***lythroides*** (Small) J. Nelson. Cp (FL, GA): floodplain forests. (GA Rare). E. Panhandle of FL and adjacent GA. [= Z]

* *Stachys palustris* Linnaeus. {distribution} South to MD, PA, NJ. [= K; > *S. palustris* var. *palustris* – C, F, G]

Synandra Nuttall 1818 (Synandra)

A monotypic genus, an herb, of e. North America. References: Cantino (1985); Harley et al. in Kadereit (2004).

Synandra hispidula (Michaux) Baillon, Synandra, Gyandotte Beauty. Mt (NC, VA): moist, rich forests; rare (NC Rare, VA Rare). Late April-May; May-June. A broad Appalachian endemic: s. OH west to s. IL, south to sw. VA, w. NC, and n. AL. [= RAB, C, F, G, K, S, W]

Teucrium Linnaeus 1753 (Germander)

A genus of about 100-250 species, herbs and shrubs, nearly cosmopolitan in distribution. References: Harley et al. in Kadereit (2004).

Teucrium canadense Linnaeus *var.* ***canadense***. {GA, NC, SC, VA}. [= C, F, G, K; < *T. canadense* – RAB, GW, W; = *T. littorale* Bicknell – S]

Teucrium canadense Linnaeus *var.* ***hypoleucum*** Grisebach. {GA, NC, SC}. [= K; < *T. canadense* – RAB, GW, W; = *T. nashii* Kearney – S]

Teucrium canadense Linnaeus *var.* ***occidentale*** (A. Gray) McClintock & Epling. (VA). Reported for VA (Kartesz 1999). {investigate} Occurs at least as far south and east as PA (Rhoads & Klein 1993). [= C, G, K; > *T. occidentale* A. Gray var. *occidentale* – F; > *T. occidentale* A. Gray var. *boreale* (Bicknell) Fernald – F]

Teucrium canadense Linnaeus *var.* ***virginicum*** (Linnaeus) Eaton. [= C, F, G, K; < *T. canadense* – RAB, GW, W; = *T. canadense* – S]

Teucrium cubense Jacquin var. *cubense*. AL. [= K] {not yet keyed; synonymy incomplete}

Thymus Linnaeus (Thyme)

A genus of about 220-350 species, herbs and shrubs, of temperate Eurasia. References: Harley et al. in Kadereit (2004).

* ***Thymus praecox*** Opiz *ssp.* ***arcticus*** (Dur.) Jalas, Mother-of-Thyme. Pd (NC), Mt (GA): commonly cultivated and sometimes escaped or persisting; rare, native of Eurasia. July-September. [= K; *? Th. serpyllum* Linnaeus – RAB, C, F, G, misapplied]

* ***Thymus pulegioides*** Linnaeus, Lemon Thyme. Pd (VA). [= K]

Trichostema Linnaeus 1753 (Blue Curls)

A genus of about 18 species, shrubs, annual and perennial herbs, of temperate North America (especially diverse in w. North America, with a second center of diversity in se. North America). References: Weakley (in prep.)=Z; Harley et al. in Kadereit (2004).

1 Calyx lobes essentially equal; stamens straight, < 10 mm long; leaves acute to slightly acuminate, the two main lateral veins reconnecting to the midvein; [section *Orthopodium*] ..... ***T. brachiatum***
1 Calyx strongly bilabiate; stamens strongly arched, 12-20 mm long; leaves obtuse, the two main lateral veins not reconnecting to the midvein; [section *Trichostema*].
  2 Plants annual; larger leaves 3-7 cm long (including the petiole); plants with long internodes near the base, near-basal branches absent, the best-developed branches from the mid or upper stem; hairs on the upper stem long (0.5-2.0 mm long) or short (0.1-0.4 mm long); [collectively widespread, in a wide variety of habitats, primarily inland, though occasionally occurring as a weed in coastal areas].
    3 Leaves 2.5-4× as long as wide; longer hairs of the upper stem (0.3-) 0.5-2.0 mm long ..... ***T. dichotomum***
    3 Leaves 5-15× as long as wide; longer hairs of the upper stem 0.1-0.3 (-0.4) mm long ..... ***T. setaceum***
  2 Plants perennial; larger leaves 1-4 cm long (including the petiole); plants with short internodes near the base, near-basal branches well-developed, these often branching again; hairs on the upper stem short (0.1-0.4 mm long).
    4 Corolla deep blue (almost black in bud); flowers stems typically virgate, not branched above the base; hairs of the stem not longer at each node; [of peninsular FL, inland as well as on sand ridges near the coasts] ..... ***T. suffrutescens***
    4 Corolla pastel blue or pink; stems typically rebranching above the base, the plant more-or-less bushy; hairs of the stem longer at the node (in a line between the 2 petioles); [of NC south to s. FL and west to s. MS; restricted to barrier islands, coastal peninsulas, and other maritime situations within 10 km of the ocean]
      5 Anthers lemon yellow; leaves ovate-rhombic, 1-1.5× as long as wide; corolla lavender (definitely with a pinkish tint); bark on older stems dark, tight; plants 1-4 dm tall, forming a tight, compact, hemispheric bush; [of maritime dunes, grasslands, and forest openings from 10 km north of Cape Hatteras (Dare County, NC) south to near Cape Romain (Georgetown County, SC] ..... ***T. species 1***
      5 Anthers blue; leaves spatulate, the petiole relatively well-developed, 1.5-3× as long as wide; corolla bluish (lacking a well-developed pinkish tint); bark on older stems yellow to tan, somewhat papery; plants 3-7 dm tall, often gangly and irregularly shaped; [of maritime dunes, grasslands, and coastal scrub from e. GA around the FL peninsula west to s. MS] ..... ***T. species 2***

Trichostema brachiatum Linnaeus, Glade Blue Curls, False Pennyroyal. Mt (GA, NC, VA), Pd (NC, SC, VA): shale barrens, outcrops of calcareous or mafic rock, diabase barrens, calcareous dry prairies, disturbed rocky areas; uncommon (NC

Rare). August-September. VT and s. Ontario west to MN and NE, south to c. NC, nw. GA, AL, TX, and AZ. Morphology, pollen, and phytogeography suggest the plausible recognition of *Trichostema* section *Orthopodium* (which includes this species andseveral from w. North America) as *Isanthus*, a genus distinct from section *Trichostema* (which includes all other eastern North American species). [= W; = *Isanthus brachiatus* (Linnaeus) Britton, Sterns, & Poggenburg – C, F, K, S; > *Isanthus brachiatus* var. *brachiatus* – G]

Trichostema dichotomum Linnaeus, Common Blue Curls. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry woodlands, disturbed areas, thin soils around rock outcrops; common. August-November. Widespread in e. North America. [= RAB, C, K, S, W, Z; > *T. dichotomum* var. *dichotomum* – F; >< *T. dichotomum* var. *puberulum* Fernald & Griscom – F; = *T. dichotomum* var. *dichotomum* – G; < *T. dichotomum* – WH]

Trichostema setaceum Houttuyn, Narrowleaf Blue Curls. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): thin soils around rock outcrops, especially granite flatrocks, dry sandy soils of the Coastal Plain; uncommon (NC Watch List, VA Rare). August-November. CT west to OH, south to FL and TX, primarily on the Coastal Plain. [= RAB, C, F, K, W, Z; = *T. dichotomum* var. *lineare* (Walter) Pursh – G; = *T. lineare* Walter – S]

Trichostema species 1, Dune Blue Curls, Carolina Blue Curls. Cp (NC, SC): dunes on barrier islands, vegetated with perennial grasses (especially *Uniola paniculata*), openings in maritime scrub; rare (US Species of Concern, NC Rare). August-November. Endemic to barrier islands from slightly north of Cape Hatteras, NC south to North Island, Georgetown County, SC, north of Cape Romain. When growing together, the flowering period of *T. species 1* is about 2-3 weeks later than that of *T. dichotomum*. Despite a considerable overlap of blooming period, only one hybrid has been seen, and that in common-garden cultivation in the Piedmont. [= Z]

Trichostema species 2, Florida Blue Curls. Cp (AL, FL, GA, MS): maritime dunes, grasslands, and coastal scrub; uncommon. August-November. E. GA around the FL peninsula west to s. MS; Bahamas. [= Z; >< *T. dichotomum* var. *puberulum* Fernald & Griscom – F; < *T. dichotomum* – WH]

Trichostema suffrutescens Kearney, Scrub Blue Curls. Cp (FL): scrub, sandhills; rare. August-November. Ne. FL (Clay County) south to s. peninsular FL. [= S, Z; < *T. dichotomum* – WH]

Vitex Linnaeus 1753 (Chaste Tree)

A genus of about 250 species, trees and shrubs, tropical to temperate. References: Harley et al. in Kadereit (2004).

1 Leaves palmately compound; plant an upright small tree ..... ***V. agnus-castus***
1 Leaves simple; plant a sprawling and spreading shrub/vine ..... ***V. rotundifolia***

* ***Vitex agnus-castus*** Linnaeus, Chaste Tree. Cp (FL, GA, NC, VA), Pd (GA, NC, VA), Mt (VA): pastures, woodland edges, suburban woodlands; rare, native of Mediterranean Europe. June-July. [= RAB, C, G, S, WH; > *V. agnus-castus* var. *agnus-castus* – K; > *V. agnus-castus* var. *caerulea* Rehder – K]

* ***Vitex rotundifolia*** Linnaeus f., Beach Vitex, Roundleaf Chaste-tree. Cp (GA?, NC, SC): coastal dunes; uncommon, planted for ornament and stabilization and now spreading aggressively as an invasive species. See Roecker & Socha (2004) for additional information. The runners are reported to reach 10 m in length. [= K]

LARDIZABALACEAE Decaisne 1839 (Lardizabala Family)

A family of about 8 genera and 35 species, shrubs and vines, primarily Asian, but also in s. South America. References: Thieret & Kartesz in FNA (1997); Cheng-Yih & Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Akebia Decaisne 1837 (Akebia)

A genus of 5 species, vines, of temperate e. Asia. References: Cheng-Yih & Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

* ***Akebia quinata*** (Houttuyn) Decaisne, Five-leaf, Five-leaf Akebia, Chocolate-vine. Mt, Pd (NC, SC, VA), Cp (GA): escaped from cultivation to roadbanks, suburban woodlands, and floodplains; rare, native of Japan, China, and Korea, potentially invasive and difficult to eradicate. April-June; June-July. [= RAB, C, F, FNA, K]

LAURACEAE A.L. de Jussieu 1789 (Laurel Family)

A family of about 50 genera and 2500-3500 species, trees and shrubs, of tropical, subtropical, and (rarely) warm temperate regions. References: van der Werff in FNA (1997); van der Werff & Richter (1996); Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves evergreen; flowers perfect; [tribe *Perseeae*].
2 Leaves glabrous, bright green, with yellow callosities in the principal vein axils; crushed leaves with the odor of camphor ... ***Cinnamomum***
2 Leaves pubescent to glabrate, dark green, without yellow callosities in the principal vein axils; crushed leaves with the odor of bay..... ***Persea***

1 Leaves deciduous; flowers imperfect; [tribe *Laureae*].
3 Some of the leaves with 1-2 (-5) rounded lobes; small to medium trees ..... ***Sassafras***
3 None of the leaves lobed; medium to large shrubs.
4 Leaves 4-16 cm long, 2-6 cm wide, obovate, ovate, or broadly elliptic ..... ***Lindera***
4 Leaves 1.2-4 cm long, 0.5-1.5 (-1.9) cm wide, narrowly elliptic ..... ***Litsea***

Cinnamomum Schaeff 1760 (Cinnamon)

A genus of about 350 species, trees and shrubs, of e. and se. Asia, Oceania, and tropical America. References: Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

* ***Cinnamomum camphora*** (Linnaeus) J. Presl, Camphortree. Cp (FL, GA, NC, SC): disturbed areas; uncommon (rare north of FL), native of e. Asia, planted as an ornamental and rarely escaped to adjoining areas, such as in Southern Pines, Moore County, NC. April-May. Reported as escaped and apparently naturalized in South Carolina by Hill & Horn (1997). [= FNA, K, WH; = *Camphora camphora* (Linnaeus) Karsten – S]

Laurus Linnaeus 1753 (Laurel, Bay)

A genus of 1-2 species, trees, of Mediterranean Europe, the Canary Islands, Madeira, and the Azores. References: Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

* *Laurus nobilis* Linnaeus, Laurel, Bay. Native to the Mediterranean region of Europe and the bay leaf of commerce; planted as an ornamental and spice, but is not known to escape in our area.

Lindera Thunberg 1783 (Spicebush, Benzoin)

A genus of about 100 species, trees and shrubs, of tropical and temperate Asia, Australia, and e. North America. References: Wofford (1983)=Z; Steyermark (1949); McCartney, Wurdack, & Moore (1989); Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves typically with a thick, subcoriaceous texture (though sometimes thinner in texture if growing in shade), 4-8 cm long, 2-3.5 cm wide, narrowly obovate to oblanceolate, pubescent and strongly whitened below; leaves and bark aromatic, the odor lemony ..... ***L. subcoriacea***
1 Leaves with a thin, membranous texture, 6-16 cm long, 2-6 cm wide, obovate, elliptic, or ovate, glabrous to pubescent below, but not strongly whitened; leaves and bark strongly aromatic, the odor spicy or like sassafras.
2 Leaf base widely cuneate to rounded; leaves narrowly ovate, reticulate-rugose, with an acute apex, pubescent above, drooping, fragrant when crushed with an odor like sassafras; shrubs colonial, short (to 2 m tall) ..... ***L. melissifolia***
2 Leaf base cuneate; leaves widely obovate, plane (not rugose), with a short-acuminate apex, glabrous above, borne horizontally, spicy-fragrant when crushed; shrubs not colonial, often multi-stemmed from base, short to tall (to 5 m tall).
3 Leaves glabrous beneath; young twigs glabrous ..... ***L. benzoin var. benzoin***
3 Leaves pubescent beneath, at least on the midrib; young twigs pubescent ..... ***L. benzoin var. pubescens***

Lindera benzoin (Linnaeus) Blume *var.* ***benzoin***, Smooth Northern Spicebush. Mt (GA, NC, VA), Pd (VA): rich alluvial forests, mesic forests on slopes with circumneutral soils, bottomlands, swamps; common. March-April; August-September. The species is widespread in e. North America; var. *benzoin* is northern, ranging south to VA and MO, and in the mountains to GA. Where occurring on upland slopes, *L. benzoin* is an excellent indicator of base-rich soils, generally derived from calcareous sedimentary rocks or mafic metamorphic or igneous rocks. [= C, F, G, K; < *L. benzoin* – RAB, FNA, GW, W, Z; < *Benzoin aestivale* (Linnaeus) Nees – S]

Lindera benzoin (Linnaeus) Blume *var.* ***pubescens*** (Palmer & Steyermark) Rehder, Hairy Northern Spicebush. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): rich alluvial forests, mesic forests on slopes with circumneutral soils, bottomlands, swamps; common. March-April; August-September. Var. *pubescens* is the more southern of the two varieties, ranging through much of se. North America, north to se. VA, sw. VA, s. OH, MI, and MO. Where occurring on upland slopes, *L. benzoin* is an excellent indicator of base-rich soils. [= C, F, G, K; < *L. benzoin* – RAB, FNA, GW, W, WH, Z; < *Benzoin aestivale* (Linnaeus) Nees – S]

Lindera melissifolia (Walter) Blume, Southern Spicebush, Pondberry. Cp (FL, GA, NC, SC), Pd (NC): wet flats and depressions, generally with pocosin shrubs; rare. March-April; August-September. This species is southern in range, with a very scattered distribution in se. and c. NC, e. SC, e. & sw. GA, nw. FL, sw. AL (?), nw. MS, se. MO-AR, and se. AR-LA (recent collections unknown from FL and LA). It is nearly extirpated in NC, currently known only from three populations, in Sampson, Bladen, and Cumberland counties. A historic record from Orange County, NC (in the lower Piedmont), collected by Elisha Mitchell in 1820 and 1822, appears to be bonafide (McVaugh, McVaugh, & Ayers 1996). [= RAB, F, FNA, GW, K, WH, Z; = *Benzoin melissaefolium* (Walter) Nees – S]

Lindera subcoriacea B.E. Wofford, Bog Spicebush. Cp (FL, GA, NC, SC, VA), Pd (NC): peaty seepage bogs in headwaters of blackwater streams, in the sandhills and immediately adjacent Piedmont, with other pocosin shrubs; rare. March-April; July-August. The overall range of this newly described species is still poorly known; it appears to be a Southeastern Coastal Plain endemic, ranging from se. VA (perhaps s. NJ) south to FL and west to LA. Occurring in our area primarily in a scattering of small populations in the fall line Sandhills of NC and SC, with an outlier or two in "Piedmont pocosins" just west of

the Sandhills. Distinctive characteristics of sun-grown plants include the rounded apex of the leaf, the leaf strongly whitened beneath and borne in an ascending to even appressed position in relation to the twigs, and a typically fastigiate or virgate branching pattern, with multiple stems or branches ascending vertically and nearly parallel to one another. Shade plants have a different form. [= FNA, K, Z; < *L. benzoin* – WH]

Litsea Lamarck 1792 (Pondspice)

A genus of about 400 species, trees and shrubs, of warm temperate and tropical areas, especially se. Asia and Australia. The genus is very heterogeneous and probably needs division into more natural groups. References: Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

Litsea aestivalis (Linnaeus) Fernald, Pondspice. Cp (FL, GA, NC, SC, VA): margins of limesink ponds and Carolina bays, less commonly in wet depressions dominated by shrubs; rare. March-April; May-June. A Southeastern Coastal Plain endemic: e. MD (Wicomico County) and se. VA (York and Isle of Wight counties) south to n. FL (and allegedly also in LA, based on an old and poorly labeled specimen). The fine, zigzag twigs are distinctive. It grows to 6 m tall, characteristically forming a rounded bush. [= RAB, F, FNA, GW, K, WH]

Persea P. Miller 1754 (Bay)

A genus of about 200 species, trees and shrubs, of Asia and America. The avocado is a member of this genus, *Persea americana* P. Miller. References: Godfrey (1988); Clewell (1985); Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

1 Twigs glabrous or glabrate; lower surfaces of leaves with minute, silvery to shining-golden hairs (the color depending on age), appressed to the surface; peduncles 1-3 cm long; leaves gtending to be smaller and blunter ..... ***P. borbonia***
1 Twigs densely rusty-pubescent; lower surfaces of leaves with longer, rusty, often crooked hairs, not appressed, especially evident along the midrib and principal veins; peduncles 4-7 cm long; leaves tending to be larger and more acute ..... ***P. palustris***

Persea borbonia (Linnaeus) Sprengel, Red Bay. Cp (FL, GA, NC, SC): dunes, maritime forests, in dry sandy soils on barrier islands, known only north to Carteret County, NC; common (rare north of FL). May-June; September-October. E. NC (Carteret County) south to FL and west to se. TX; reports of the species north of NC are based on the inclusion of *P. palustris* in a broadly defined *P. borbonia*, or are simply in error, based on less hairy plants of *P. palustris*. This species is rare in our area and becoming rarer with the destruction of most maritime forests for the construction of vacation homes and tourist accomodations. [= FNA, G, GW, K, WH; < *P. borbonia* – RAB, F (also see *P. palustris*); = *Tamala borbonia* (Linnaeus) Rafinesque – S; = *P. borbonia* var. *borbonia*]

Persea palustris (Rafinesque) Sargent, Swamp Bay. Cp (FL, GA, NC, SC, VA): swamps, pocosins, bay forests, maritime forests, generally in wet peaty soils, but also in fairly dry, sandy soils in maritime forests; common. May-June; September-October. A Southeastern Coastal Plain endemic: DE, e. MD, and se. VA south to FL and west to se. TX. Though variable in amount of hairs on the leaves, the hairs of *P. palustris* are always of a distinctly different character than those of *P. borbonia*. [= C, FNA, G, GW, K, WH; < *P. borbonia* – RAB, F; = *Tamala pubescens* (Pursh) Small – S; = *P. borbonia* var. *pubescens* (Pursh) Little]

Sassafras Presl 1825 (Sassafras)

A genus of 3 species, trees, of temperate e. Asia (2 species) and e. North America (1 species). References: Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

Sassafras albidum (Nuttall) Nees, Sassafras. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): a wide variety of forests, old fields, disturbed areas, fencerows; common. March-April; June-July. Widespread in e. United States. The original source of "root beer." [= RAB, C, FNA, G, K, W, WH; > *S. albidum* var. *molle* (Rafinesque) Fernald – F; > *S. albidum* var. *albidum* – F]

LENTIBULARIACEAE Richard 1808 (Bladderwort Family)

A family of 3 genera and about 270-320 species, insectivorous herbs, cosmopolitan. References: Fischer et al. in Kadereit (2004).

1 Leaves ovate or elliptic, in a basal rosette; carnivory via the viscid-slimy upper leave surfaces; flowers solitary on bractless peduncles ..... ***Pinguicula***
1 Leaves or leaf segments linear, borne along a subterranean or submersed stem; carnivory via specialized bladder-like traps; flowers in (1-) many-flowered racemes, each flower pedicel subtended by a bract ..... ***Utricularia***

Pinguicula Linnaeus 1753 (Butterwort)

A genus of about 46-80 species, herbs, of America, Mediterranean Europe, and circumboreal America and Eurasia. References: Schnell (2002b)=Z; Godfrey & Stripling (1961); Wood & Godfrey (1957); Schnell (1980a); Fischer et al. in Kadereit (2004). Key based in part on GW.

1 Expanded corolla < 1.5 cm across; palate not exserted from the throat of the corolla; rosettes usually 2-4 cm in diameter; flowers usually white to pale violet (rarely medium violet); seeds 0.4 mm long ..... ***P. pumila***
1 Expanded corolla > 1.8 cm across; palate markedly exserted from the throat of the corolla; rosettes usually 5-10 (-15) cm across; corolla yellow, violet, or white; seeds (0.4-) 0.5-0.8 mm long.
2 Corolla yellow ..... ***P. lutea***
2 Corolla lavender-blue or white.
3 Hairs on the lower portion of the scape elongated, pointed, multicellular, nonglandular, transitioning upward to 1-celled glandular hairs; expanded portion of corolla markedly "veiny" (darker along the veins); [of se. NC southward to s. peninsular FL and e. Panhandle FL] .. ***P. caerulea***
3 Hairs throughout scape glandular; expanded portion of corolla not "veiny;" [collectively of sw. GA and FL Panhandle westward to s. MS].
4 Fresh leaves dull red or reddish green; corolla lobes ca. 2× as long than broad, the lobes notched almost ½ their length.... ***P. planifolia***
4 Fresh leaves bright yellow-green; corolla lobes ca. 1× as long than broad, the lobes notched about 1/4 their length
5 Corolla tube violet, with darker violet veins; hairs of the inner corolla tube white ..... ***P. ionantha***
5 Corolla tube yellow, with reddish-brown veins; hairs of the inner corolla tube yellow ..... ***P. primuliflora***

Pinguicula caerulea Walter, Blue Butterwort. Cp (FL, GA, NC, SC): pine savannas and wet pine flatwoods, mostly in the outer Coastal Plain, rarely extending inland to seepages and sandhill-pocosin ecotones in the fall-line Sandhills of NC and SC; uncommon. April-May. Se. NC (Carteret and Johnston counties) south to s. peninsular FL, west to e. panhandle FL. Schnell (1980a) discusses populations with white corollas. [= RAB, GW, K, S, WH, Z; *Pinguicula elatior* Michaux]

Pinguicula ionantha Godfrey, Panhandle Butterwort. Cp (FL): pond margins, bogs, flatwoods; rare. Endemic to FL Panhandle. [= GW, K, WH, Z]

Pinguicula lutea Walter, Yellow Butterwort. Cp (FL, GA, NC, SC): pine savannas and wet pine flatwoods, mostly in the outer Coastal Plain, rarely extending inland to seepages and sandhill-pocosin ecotones in the fall-line Sandhills of SC; uncommon. Late March-May. Se. NC (Pender and New Hanover counties) south to s. FL, west to e. LA. [= RAB, GW, K, S, WH, Z]

Pinguicula planifolia Chapman, Chapman's Butterwort. Cp (FL): pond margins, bogs, flatwoods; rare. S. AL, Panhandle of FL, and s. MS. [= GW, K, S, WH, Z]

Pinguicula primuliflora Wood & Godfrey, Clearwater Butterwort. Cp (FL, GA): clearwater streams and seeps; rare (GA Threatened). Sw. GA, s. AL, Panhandle FL, and s. MS. [= GW, K, WH, Z]

Pinguicula pumila Michaux, Small Butterwort. Cp (FL, GA, NC, SC): pine savannas and wet pine flatwoods; common (uncommon in GA and SC, rare in NC). April-May. Se. NC (Carteret and Pender counties) south to s. FL, west to se. TX; and in the Bahamas. [= RAB, GW, K, S, WH, Z]

Utricularia Linnaeus 1753 (Bladderwort)

Utricularia, as monographed by Taylor (1989), consists of 214 species in 35 sections, with a nearly cosmopolitan distribution. In our area, 14 or 15 species in 5 sections are known to occur. References: Taylor (1989)=Z; Schnell (2002b)=Y; Müller & Borsch (2005); Fischer et al. in Kadereit (2004). Key based in part on Z and GW.

1 Flowers white or cream-white, 1-3 mm long; inflorescence peduncles very reduced, the pedicels appearing to arise directly from the stolons; traps 0.3-0.8 mm long; plants floating unattached in water (sometimes deposited land by dropping water, but then the principal branch systems stranded on the soil surface); capsules ca. 1 mm long, fusiform, indehiscent, with 1 seed; seeds essentially smooth, unornamented; leaves absent; [section *Utricularia*] ..... ***U. olivacea***
1 Flowers yellow, pink, or purple (sometimes fading whitish), (2-) 5-20 mm long; inflorescence peduncles well-developed, the inflorescence clearly a raceme; traps 0.2-5.0 mm long (< 0.7 mm long only in the terrestrial species (see key lead 2); plants attached (with principal branch systems within the soil), or floating unattached in water (sometimes deposited on land by dropping water, but then the principal branch systems stranded on the soil surface); capsules 1-8 mm long, globose, subglobose, or ovoid, with many seeds; seeds reticulate, papillose, echinate, multi-angled, or winged (rarely more-or-less smooth); leaves present (sometimes absent in the terrestrial species).
2 Plants attached (with principal branch systems within the soil); leaves absent or simple, linear, grass-like aerial leaves; bladders 0.2-1.1 mm long, most or all on a plant usually < 1.0 mm long; seeds reticulate-alveolate (also angled in *U. resupinata*), 0.20-0.25 mm long.
3 Flowers pink; inflorescence 1 (-2)-flowered; bract at base of the pedicel tubular, attached circumferentially around the stem; aerial leaves (when present) terete, septate; [very rare in our area]; [section *Lecticula*] ..... ***U. resupinata***
3 Flowers yellow (sometimes fading whitish); inflorescence (1-) 2-15-flowered; bract at base of the pedicel peltate or ovate, attached on one side of the stem; aerial leaves (when present) flattened, not septate; [collectively common in our area].
4 Bracts subtending the pedicels peltate (attached near their middles), unattached at either end; pair of bracteoles absent; spur of the corolla oriented forward, more-or-less appressed to the lower lip; aerial leaves (when present) with subacute to obtuse apex; [section *Setiscapella*] ..... ***U. subulata***
4 Bracts subtending the pedicels ovate (attached at their bases), free only at their upper end; pair of bracteoles associated with each bract present, linear to lanceolate; spur of the corolla oriented downward or backward, at approximately a right angle to the lower lip; aerial leaves (when present) with acute apex; [section *Stomoisia*].
5 Corolla 1.5-2.0 cm long; spur 8-12 mm long; raceme usually short, the (1-) 2-6 flowers crowded together, all of them chasmogamous ..... ***U. cornuta***

5 Corolla 0.25-1.5 cm long; spur 5-7 (-9) mm long; raceme usually elongate, the (1-) 2-15 flowers well-spaced, often the lower (sometimes all) cleistogamous and much smaller than the chasmogamous flowers ..... ***U. juncea***

2 Plants floating unattached in water (sometimes deposited on land by dropping water, but then the principal branch systems stranded on the soil surface); leaves present and dissected into linear segments; bladders 0.7-5.0 mm long, most or all on a plant > 1.0 mm long; seeds papillose, reticulate, ridged, angled, or winged, 0.5-2.0 mm long.

6 Flowers purple; leaves divided into verticillate segments with terminal traps; [section *Vesiculina*] ..... ***U. purpurea***

6 Flowers yellow; leaves divided into alternate segments with lateral traps; [section *Utricularia*].

7 Peduncle with whorl of inflated leaf-like organs (floats).

8 Floats 4-7, not fused basally to one another, fusiform, tapering gradually to base and apex from a widest point near the middle; leaves with the 2 primary divisions unequal; bracts of the scape longer than broad, entire; flowers (6-) 9-14 (-17) per scape; apex of corolla spur bifid ..... ***U. inflata***

8 Floats (5-) 6-8 (-10), fused basally to one another, cylindrical, more-or-less parallel-sided through most of their length, tapering abruptly to base and apex; leaves with the 2 primary divisions equal; bracts of the scape broader than long, the apex slightly to strongly 3-lobed; flowers (1-) 3-4 (-7) per scape; apex of corolla spur usually entire (rarely bifid) ..... ***U. radiata***

7 Peduncle without whorl of inflated leaf-like organs (floats).

9 Main axes distinctly flattened in cross-section, up to 10 mm wide ..... ***U. foliosa***

9 Main axes round in cross-section.

10 Lower lip of corolla 3-lobed; seeds disk-shaped, not angular or winged; inflorescences of 2 types, the chasmogamous on erect peduncles 5-25 cm long bearing 2-8 flowers, the cleistogamous without a peduncle, the solitary pedicels borne directly on the stolons, 0.5-2 cm long, deflexed ..... ***U. geminiscapa***

10 Lower lip of corolla entire or slightly irregular, not 3-lobed; seeds angular or winged; inflorescences of 1 type (erect, chasmogamous).

11 Upper corolla lip smaller than the lower, entire; capsule circumscissilely dehiscent; seeds 0.7-1.0 mm long, 4-6-angled; corolla without stipitate glands on its external surface.

12 Leaves of one kind only, divided into numerous capillary segments bearing lateral traps; bracts scarcely auriculate; plant distinctly aquatic, floating in water and only rarely stranded; [of the Coastal Plain] ..... ***U. macrorhiza***

12 Leaves of 2 or 3 kinds, some divided into capillary or narrowly linear segments and bearing few or no traps, others divided into fewer capillary segments and bearing more-or-less numerous traps; bracts distinctly auriculate; plants typically in boggy situations, in shallow water or frequently stranded; [**either** of the Mountains at high elevations **or** of various physiographic provinces northward].

13 Broadest leaf segments with 9-20 lateral setae (use 10× magnification); spur of corolla cylindrical, distinctly longer than wide, the apex distinctly curved forward ..... ***[U. intermedia]***

13 Broadest leaf segments lacking lateral setae; spur of corolla shortly saccate to broadly conical, wider than long, the apex not curved forward ..... ***U. minor***

11 Upper corolla lip larger than the lower, obscurely 3-lobed; capsule laterally 2-valved or indehiscent; seeds 0.8-2.5 mm long, lenticular, with an irregular, lobed, or continuous wing; corolla (or at least the spur) with a few to many short stipitate glands (sometimes patchily distributed).

14 Vegetative shoots of 2 kinds, some bearing leafy segments and few or no traps, others bearing reduced segments and more-or-less numerous traps; seeds 1.0-2.5 mm long, with an irregularly deeply lobed or partial wing.

15 Plant anchored in mud up to 100 cm below water surface; green leafy shoots up to 40 cm long and 5 cm wide; peduncle flexuous, to 100 cm long, only the uppermost ca. 10 cm emergent ..... ***U. floridana***

15 Plant in shallow water or stranded; green leafy shoots usually not > 10 cm long and 2 cm wide; peduncle erect, straight, to 30 cm long, the uppermost 10-25 cm emergent ..... ***U. striata***

14 Vegetative shoots uniform, all bearing rather sparsely divided leaf segments bearing traps, seeds 0.8-1.1 mm long, with a continuous, circumferential wing, slightly to irregularly lobed.

16 Lower corolla lip 8-10 mm long, about equalling or slightly shorter than the conical 5-9 mm long spur; leaves usually forked twice ..... ***U. biflora***

16 Lower corolla lip 5-6 mm long, exceeding the blunt 3.5-4.5 mm long spur; leaves usually forked once ..... ***U. gibba***

Utricularia biflora Lamarck, Longspur Creeping Bladderwort. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA): ponds, lakes, and diches; common. June-October. This species may not be distinct from *U. gibba* (which see for discussion). E. MA south FL, west to TX and OK. [= RAB, C, F, G, GW, W; = *U. pumila* Walter – S, apparently misapplied; < *U. gibba* – K, WH, Y, Z]

Utricularia cornuta Michaux, Horned Bladderwort. Cp (FL, GA, NC, SC), Mt (GA, NC), Pd (GA): shores of limesink ponds (dolines), bogs, mountain bogs; common (uncommon in GA, rare in NC, SC, VA). (May-September. Newfoundland and Québec west to n. Ontario, Alberta, and MN, south to s. FL and e. TX; also in the Bahamas and Cuba. Taylor (1989) states that where sympatric with *U. juncea*, *U. cornuta* flowers much earlier. [= RAB, C, F, G, GW, K, W, WH, Y, Z; = *Stomoisia cornuta* (Michaux) Rafinesque – S]

Utricularia floridana Nash, Florida Bladderwort. Cp (FL, GA, NC, SC): in deep water of natural Carolina bay lakes, other natural lakes, and limesink ponds (dolines); uncommon (rare in GA, NC, and SC). July-August. Se. NC south to c. peninsular FL, west to panhandle FL and sw. GA. [= GW, K, S, WH, Y, Z]

Utricularia foliosa Linnaeus, Flatstem Bladderwort. Cp (FL, GA, NC): in deep water of natural lakes and ponds; rare. Se. NC south to s. FL, west to TX (Brown & Marcus 1998); West Indies, South America, Africa. This species is reported for NC by Taylor (1989). See GW for a detailed description of this species. [= GW, K, S, WH, Y, Z]

Utricularia geminiscapa Benjamin, Two-flowered Bladderwort, Hidden-fruited Bladderwort. Cp (NC, VA), Mt (VA): beaver ponds, mucky seepages; rare (NC Rare, VA Watch List). Newfoundland and Québec west to n. MI and n. WI, south to PA and sc. NC. [= C, F, G, K, W, Y, Z]

Utricularia gibba Linnaeus, Shortspur Creeping Bladderwort. Cp (FL, GA, NC, SC, VA), Mt (GA, NC, VA), Pd (SC, VA): ponds, lakes, and diches; uncommon. May-September. Québec west to WI, south to FL and LA; also in the West Indies and Central America and apparently in the Old World. Taylor (1989) includes *U. biflora* in *U. gibba*. Other authors have expressed doubts about the distinction, including RAB ("doubtfully distinct"). Taylor suggests that "further research is clearly indicated, but to be at all meaningful, it must be conducted on a worldwide basis." I have here, for the moment, retained the 2 traditionally

recognized species, though intermediates will be encountered. [= RAB, C, F, G, S, W; < *U. gibba* – K, Y, Z (also see *U. biflora*)]

Utricularia inflata Walter, Swollen Bladderwort, Inflated Bladderwort. Cp (FL, GA, NC, SC, VA), Mt (NC): ponds, lakes, ditches; common. May-November. NJ south to s. FL, west to e. TX; disjunct in WA (probably introduced). Also disjunct in an artificial pond in Henderson County, NC (Carl Sandburg Home National Historic Site). [= C, G, GW, K, S, WH, Y, Z; = *U. inflata* var. *inflata* – RAB, F]

Utricularia juncea M. Vahl, Southern Bladderwort. Cp (FL, GA, NC, SC, VA), Pd (NC): shores of limesink ponds (dolines), borrow pits, wet sands; common (uncommon in NC and SC, rare in VA). July-September. NY (Long Island) and NJ south to s. FL, west to e. TX and se. AR; also in the West Indies, Central America and South America. [= RAB, C, F, G, GW, K, WH, Y, Z; > *Stomoisia juncea* (M. Vahl) Barnhart – S; > *Stomoisia virgatula* Barnhart – S]

Utricularia macrorhiza Le Conte, Greater Bladderwort. Cp (NC, SC, VA): pools and ponds; rare. May-September. Newfoundland west to AK, south to NC, SC, TX, CA, and Mexico; also in e. Asia. See Taylor (1989) for a discussion of the differences between this species and *U. vulgaris* of Europe and w. Asia, with which it has often been combined or associated as a variety. [= K, S, Y, Z; < *U. vulgaris* Linnaeus – RAB, C, F, G, misapplied to American plants]

Utricularia minor Linnaeus, Lesser Bladderwort, Small Bladderwort. Mt (NC): mountain bog at about 1400 meters elevation; rare. Circumboreal, south in North America to NJ, PA, IN, IL, IA, NE, CO, UT, NV, and CA; disjunct in w. NC. [= C, F, G, K, W, Y, Z]

Utricularia olivacea Wright ex Grisebach, Dwarf Bladderwort, Minute Bladderwort. Cp (FL, GA, NC, SC, VA): in floating mats (often algal) in water of limesink ponds (dolines), artificial lakes or beaver ponds; rare. September-October. NJ south to FL, west to s. AL and s. MS (Sorrie & Leonard 1999), in the Coastal Plain; also in the West Indies (Cuba), Central America, and South America. [= RAB, GW, K, WH, Y, Z; = *Biovularia olivacea* (Wright ex Grisebach) Kam. – S]

Utricularia purpurea Walter, Purple Bladderwort. Cp (FL, GA, NC, SC, VA): in water of ponds, ditches, other slow-moving water; common (uncommon in NC and SC, rare in VA). May-September. Nova Scotia and Québec west to MN, south to NY, n. IN, s. MI, and WI, and on the Coastal Plain south to s. FL, west to se. TX; also in Mexico, the West Indies, and Central America. [= RAB, C, F, G, GW, K, WH, Y, Z; = *Vesiculina purpurea* (Walter) Rafinesque – S]

Utricularia radiata Small, Floating Bladderwort, Small Swollen Bladderwort. Cp (FL, GA, NC, SC, VA), Mt (VA): ponds, depression ponds, lakes, and ditches; uncommon. May-November. Nova Scotia south to s. FL, west to TX; disjunct in w. VA, w. TN, nw. IN; reports of this species in Cuba and South America are apparently in error. [= C, G, GW, K, S, W, WH, Y, Z; = *U. inflata* var. *minor* Chapman – RAB, F]

Utricularia resupinata B.D. Greene ex Bigelow, Northeastern Bladderwort, Resupinate Bladderwort. Cp (FL, GA, NC): wet pine flatwoods, pond margins, shores of natural lakes; uncommon (rare in GA and NC). Nova Scotia west to nw. WI, south (irregular and scattered in part) to FL and sw. GA; also in the Bahamas (Sorrie & LeBlond 1997). Although "the curious gap in the North American range" [NC, SC, and VA] (Taylor 1989) is no longer strictly a gap, *U. resupinata* does appear to have a strangely bimodal range, with a center of distribution in ne. United States and se. Canada and a second extending from se. United States south into the West Indies and Central America. [= C, F, G, GW, K, WH, Y, Z; = *Lecticula resupinata* (B.D. Greene) Barnhart – S]

Utricularia striata Le Conte ex Torrey, Fibrous Bladderwort. Cp (FL, GA, NC, SC, VA), Mt (VA): ponds, lakes, and ditches; uncommon (rare in FL and VA). May-November. Se. MA south to n. FL, west to e. TX and e. OK. [= K, WH, Y, Z; = *U. fibrosa* Walter – RAB, C, F, G, GW, S, of uncertain application and likely misapplied]

Utricularia subulata Linnaeus, Slender Bladderwort, Zigzag Bladderwort. Cp (FL, GA, NC, SC, VA), Mt (GA, NC, VA), Pd (GA, NC): moist sands or peats of various kinds of acidic wetlands, including wet pine savannas and flatwoods, shores of limesink ponds (dolines), borrow pits, ditches; common (VA Watch List). March-July (-later). In North America primarily in the Coastal Plain, from Nova Scotia and e. MA south to s. FL, west to TX, north in the interior to TN and AR; also in the West Indies, Central America, South America, Africa, and Asia. Taylor (1989) terms this "the most widespread of *Utricularia* species." [= RAB, C, F, G, GW, K, W, WH, Y, Z; > *Setiscapella subulata* (Linnaeus) Barnhart – S; > *Setiscapella cleistogama* (A. Gray) Barnhart – S]

Utricularia intermedia Hayne, Northern Bladderwort. South to se. PA (Rhoads & Klein 1993), DE, and MD (Kartesz 1999). The report from sc. GA (Jones & Coile 1988) is in error. [= C, F, G, K, Y, Z]

LIMNANTHACEAE R. Brown 1838 (False-mermaid Family, Meadow-foam Family)

A family of 2 genera and 8 species, herbs, of temperate North America. References: Bayer & Appel in Kubitzki & Bayer (2003).

Floerkea Willdenow 1801 (False-mermaid)

A peculiar and monotypic genus, an annual herb, endemic to North America.

Floerkea proserpinacoides Willdenow, False-mermaid. Pd, Mt (VA): moist, rich floodplain forests; rare. April-May. Nova Scotia and Québec west to British Columbia, south to n. VA, TN, and CA. [= C, F, G, K, S, W]

LINACEAE A.P. de Candolle ex Gray 1821 (Flax Family)

A family of about 10-14 genera and 250-350 species, trees, vines, shrubs, and herbs, cosmopolitan. References: Robertson (1971)=Y.

Linum Linnaeus 1753 (Flax)

A genus of about 180 species, herbs, of temperate and subtropical areas. References: Rogers (1984)=Z; Rogers (1963)=Y.

1 Petals blue, red, or pink; capsule 5-10 mm long; [section *Linum*].
  2 Petals red or pink ..... ***L. grandiflorum***
  2 Petals blue.
    3 Inner sepals with minutely ciliate margins; stigmas slender, elongate; capsule 6-10 mm long ..... ***L. usitatissimum***
    3 Inner sepals entire; stigmas capitate; capsule 5-7 mm long.
      4 Flowers homostylous (flowers with stigmas at about the level to slightly above the anthers) ..... ***[L. lewisii var. lewisii]***
      4 Flowers heterostylous (some flowers with stigmas below the anthers, others with stigmas well above the anthers) ..... ***[L. perenne]***
1 Petals yellow; capsules 1-4 mm long; [section *Linopsis*].
  5 Inner and outer sepals all very conspicuously glandular-toothed; annual; leaves with 2 brownish glands flanking the attachment to the stem; styles united basally for (0.2-) 0.5-1.2 (-1.8) mm; [section *Linopsis*, subsection *Rigida*].
    6 Sepals 2.3-3.5 mm long, acute; inflorescence consisting of 1 or more elongate and racemiform branches; dried plants dark, purple-dotted ..... ***L. harperi***
    6 Sepals (3.1-) 3.6-5 (-7.3) mm long, acuminate; inflorescence an open panicle; dried plants pale green ..... ***L. sulcatum***
  5 Outer sepals entire (very rarely sparsely glandular-toothed), inner sepals entire or sparsely to conspicuously glandular-toothed; perennial; leaves without brownish glands flanking the attachment to the stem; styles free; [section *Linopsis*, subsection *Linopsis*].
    7 Fruit as long as broad or longer, its apex acute, apiculate, or obtuse, (2-) 2.2-3.2 (-3.3) mm long; leaves mostly 1.3-4.3 mm wide.
      8 Leaves (1.2-) 2.3-4.3 (-5.6) mm wide, mostly 25-50 below the inflorescence; septa of the fruit sparsely but conspicuously ciliate; false septa incomplete; fruit apex acute, the exposed portions purple ..... ***L. intercursum***
      8 Leaves (1.0-) 1.3-2.0 (-3.2) mm wide, mostly 50-120 below the inflorescence; septa of the fruit glabrous; false septa virtually complete; fruit apex rounded to apiculate, the exposed portions purple or yellow.
        9 Fruit pyriform, (2.0-) 2.3-2.8 (-3.0) mm long, 1.7-2.6 mm in diameter, the apex rounded, the exposed portions purple; seeds (1.6-) 1.7-2.0 (2.1) mm long; anthers averaging 0.8 mm long ..... ***L. floridanum var. floridanum***
        9 Fruit ovate, (2.8-) 3.0-3.2 (-3.3) mm long, 2.5-3.1 mm in diameter, the apex minutely apiculate, the exposed portions yellow; seeds 2.1-2.4 mm long; anthers averaging 1.2 mm long ..... ***L. floridanum var. chrysocarpum***
    7 Fruit broader than long, its apex depressed, flattened, or broadly rounded, (1.3-) 1.5-2.1 (-2.3) mm long; leaves mostly 1.9-9.3 mm wide.
      10 Margins of the inner sepals with conspicuous stalked glands; mature fruits of dried specimens usually adhering to the plant ..... ***L. medium var. texanum***
      10 Margins of the inner sepals glandless, or with a few inconspicuous, sessile glands; mature fruits of dried specimens usually shattering and falling freely.
        11 Inflorescence paniculate, the lower inflorescence branches not elongate, their tips not nearly reaching the tips of the upper inflorescence branches; branchlets striate-ridged; leaves mostly opposite (usually to beyond the midpoint from the base of the plant to the first inflorescence branch) ..... ***L. striatum***
        11 Inflorescence corymbose, some (at least) of the lower branches of the inflorescence elongate, their tips nearly equalling the tips of the upper inflorescence branches; branchlets terete or nearly so; leaves mostly alternate (usually the opposite leaves of the lower stem not extending beyond the midpoint from the base of the plant to the first inflorescence branch) ..... ***L. virginianum***

Linum floridanum (Planchon) Trelease *var.* ***chrysocarpum*** Rogers, Yellow-fruited Yellow Flax. Cp (FL, GA, NC, SC): wet savannas; uncommon (rare north of FL). June-October. Se. NC south to s. FL and west to s. MS. [= K, Y, Z; < *L. virginianum* var. *floridanum* Planchon – RAB; < *L. floridanum* – GW, WH; < *Cathartolinum floridanum* (Planchon) Small – S]

Linum floridanum (Planchon) Trelease *var.* ***floridanum***, Florida Yellow Flax. Cp (FL, GA, NC, SC, VA?): savannas, sandhill seeps; common. June-October. E. NC south to s. FL and west to LA, also in the West Indies, essentially limited to the Coastal Plain. [= K, Y, Z; < *L. virginianum* var. *floridanum* Planchon – RAB (also see *L. floridanum* var. *chrysocarpum* and *L. intercursum*); < *L. floridanum* – C, F, G, GW, WH; < *Cathartolinum floridanum* (Planchon) Small – S; > *Cathartolinum macrosepalum* Small – S]

* ***Linum grandiflorum*** Desfontaines, Red Flax. Cp (FL): disturbed areas; rare, native of Africa. [= F, K, WH; = *Adenolinum grandiflorum* (Desfontaines) W.A. Weber]

Linum harperi Small, Harper's Grooved Flax. Cp (FL, GA): dry pinelands; rare (GA Special Concern). This is a rare taxon of longleaf pine woodlands or savannas in w. FL, sw. GA, and c. AL. It is probably distinct from *L. sulcatum* at the species level, needing additional study. [= *L. sulcatum* Riddell var. *harperi* (Small) Rogers – K, Y, Z; = *Cathartolinum harperi* (Small) Small – S; < *L. sulcatum* -- WH]

Linum intercursum Bicknell, Bicknell's Yellow Flax. Pd, Mt (GA, NC, SC, VA), Cp (NC, VA): dry to moist places; common. June-October. MA south to c. TN, nw. GA, and c. AL; from MA to MD, nearly restricted to the Coastal Plain, in VA, NC, SC, GA, AL, and se. TN, however it is primarily on the Piedmont and Mountains. It also occurs disjunctively in n. IN near the Great Lakes. [= C, F, G, K, W, Y, Z; < *L. virginianum* var. *floridanum* (Planchon) – RAB; = *Cathartolinum intercursum* (Bicknell) Small – S]

Linum medium (Planchon) Britton *var.* ***texanum*** (Planchon) Fernald, Texas Yellow Flax. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry to moist places; common (rare in Mountains). Var. *texanum* ranges from s. ME MI, and n. IL south to s. FL and TX, and in the West Indies. Var. *medium* is limited to area around the Great Lakes. [= C, F, GW, K, W, WH, Y, Z; < *L. virginianum* var. *medium* Planchon – RAB; < *L. medium* – G; < *Cathartolinum medium* (Planchon) Small – S]

Linum striatum Walter, Ridgestem Yellow Flax. Mt, Cp, Pd (GA, NC, SC, VA): bogs, seepages, other wet places, often growing in *Sphagnum*; common (uncommon in FL). June-October. MA, PA, MI, and IL south to Panhandle FL, LA, and e. TX. [= RAB, C, G, GW, K, W, WH, Y, Z; > *L. striatum* var. *striatum* – F; = *Cathartolinum striatum* (Walter) Small – S]

Linum sulcatum Riddell, Grooved Yellow Flax. Mt (GA, VA), Pd (NC): dry calcareous places in the mountains of VA (where also somewhat weedy in adjacent disturbed areas), diabase barrens in the Piedmont of NC; rare. May-August. Primarily a species of the Great Plains of s. Manitoba, ND, and MN south through SD, IA, WI, NE, MO, IL, KS, and MO to OK, *L. sulcatum* occurs farther east as a rare disjunct on glades or barrens over rocks such as limestone or diabase. [= RAB, C, F, G, W; = *Linum sulcatum* Riddell var. *sulcatum* – K, Y, Z; = *Cathartolinum sulcatum* (Riddell) Small – S; = *Mesynium sulcatum* (Riddell) A. & D. Löve]

* ***Linum usitatissimum*** Linnaeus, Common Flax. Pd (NC, SC, VA), Cp (FL, NC, SC, VA), Mt (VA): disturbed places; rare, native of Europe. This is the flax of commerce, used both for its fiber, the source of flax, and the oil expressed from its seeds (linseed oil). [= RAB, C, F, G, K, S, WH, Z]

Linum virginianum Linnaeus, Virginia Yellow Flax. Mt, Pd (GA, NC, SC, VA), Cp (VA): dry or moist places; uncommon. June-October. MA, NY, Ontario, MI, and IL south to SC, GA, AL, and MO. [= C, F, G, GW, K, W; = *L. virginianum* var. *virginianum* – RAB; = *Cathartolinum virginianum* (Linnaeus) Reichenbach – S]

Linum lewisii Pursh var. *lewisii*, Prairie Flax, a western blue-flowered species, occurs as a disjunct at Smoke Hole Caverns, WV, and several adjacent counties. [= K; < *L. perenne* – C, apparently misapplied to WV material; < *L. lewisii* – F; < *L. perenne* Linnaeus var. *lewisii* (Pursh) Eaton & J. Wright – G; < *Adenolinum lewisii* (Pursh) A. & D. Löve]

Linum macrocarpum C.M. Rogers, Spring Hill Flax. Cp (FL): pitcher plant bogs, wet savannas; rare. FL Panhandle west through s. AL and s. MS to se. LA. [= K, WH] {not yet keyed; add synonymy}

* *Linum perenne* Linnaeus, Perennial Flax. Cultivated and "rarely naturalized along roadsides" in scattered locations in PA (Rhoads & Klein 1993) and reported tentatively for VA (Kartesz 1999). [= K; < *L. perenne* – C (also see *L. lewisii*)]

Linum westii C.M. Rogers, West's Flax. Cp (FL): bogs, margins of flatwoods ponds; rare. Ne. FL; Panhandle FL. [= K, WH] {not yet keyed; add synonymy}

LINDERNIACEAE Borsch, K. Müller, & Eb. Fischer 2005 (False-pimpernel Family)

References: Tank et al. (2006).

Lindernia Allioni (False-pimpernel)

A genus of about 80 species, of warm temperate and subtropical regions of the Old and New Worlds. Probably not a member of Plantaginaceae (Albach, Meudt, & Oxelman 2005). References: Cooperrider & McCready (1975)=Z; Qualls (1984)=Y; Lewis (2000)=X.

1 Fertile stamens 4; calyx lobes connate at anthesis for > ½ their length, later separating; [section *Torenioides*] ..... ***L. crustacea***
1 Fertile stamens 2 (with 2 staminodia without anthers, or with rudimentary anthers); calyx lobes distinct to the base at anthesis and after; [section *Brachycarpae*].
  2 Pedicels shorter than or about as long as the subtending leaves ..... ***L. dubia var. dubia***
  2 Pedicels longer than the subtending leaves (or bracteal leaves in some species).
    3 Leaves nearly orbicular; stems creeping ..... ***L. grandiflora***
    3 Leaves distinctly longer than wide; stems erect (sometimes decumbent at the base and rooting if knocked down by water).
      4 Leaves not glandular punctate; seeds 2-3× as long as wide ..... ***L. dubia var. anagallidea***
      4 Leaves glandular punctate; seeds ca. 1× as long as wide.
        5 Leaves primarily in a basal rosette, leaves of the stem strongly reduced upward to bracts; capsule (1.8-) 3.4-7 mm long; [primarily of seepage of flatrocks] ..... ***L. monticola*** *("monticola" form)*
        5 Leaves primarily on the stem, not conspicuously reduced upward; capsule 1.4-3.4 mm long; [of stream or river banks] ..... ***L. monticola*** *("saxicola" form)*

* ***Lindernia crustacea*** (Linnaeus) F. Mueller. Cp (GA, SC), Pd (SC), {NC}: lawns; uncommon, native of Malaysia. September. [= RAB, GW, K, P, X, Y]

Lindernia dubia (Linnaeus) Pennell *var.* ***anagallidea*** (Michaux) Cooperrider. Cp, Pd, Mt (GA, NC, SC, VA): wet sandy or muddy areas; common (rare in Mountains). June-September. Nearly throughout North America, Central America, and South America. The extensive and essentially coincident ranges of the two varieties of *L. dubia* suggests that they may be merely forms, as suggested by Voss (1996). [= C, K, X, Y, Z; = *L. anagallidea* (Michaux) Pennell – RAB, F, G, GW, P; = *Ilysanthes inequalis* (Walter) Pennell – S; < *L. dubia* – W]

Lindernia dubia (Linnaeus) Pennell *var.* ***dubia***. Cp, Pd, Mt (GA, NC, SC, VA): wet sandy or muddy areas; common. May-November. Nearly throughout North America, Central America, and South America. [= C, X, Y, Z; = *L. dubia* (Linnaeus) Pennell – RAB, GW; > *L. dubia* var. *dubia* – F, G, K; > *L. dubia* var. *riparia* (Rafinesque) Fernald – F, G; > *L. dubia* var. *inundata* Pennell – F, G, K; > *L. dubia* var. *major* (Pursh) Pennell – P; > *L. dubia* var. *typica* – P; = *Ilysanthes dubia* (Linnaeus) Barnhart – S; < *L. dubia* – W]

Lindernia grandiflora Nuttall. Cp (GA): depressional wetlands; rare. S. GA south to s. FL. [= GW, K, P, X, Y; = *Ilysanthes grandiflora* (Nuttall) Bentham – S]

Lindernia monticola Muhlenberg ex Nuttall, Flatrock Pimpernel, Riverbank Pimpernel. Pd, Mt (GA, NC, SC), Cp (GA): in seasonal seepage on granitic flatrocks, and on river-scoured siliceous rocks; rare (GA Endangered – "*saxicola*", NC Watch

List). April-June (-September). Nc. and sw. NC south to ne. FL and ec. AL. *L. saxicola* appears to be merely a form of *L. monticola*, the leafy stems the result of the basal leaves being covered by silt deposited by floodwaters (Qualls 1984; Lewis 2000); this needs additional study. [= K, X; > *L. monticola* – RAB, GW, P, W, Y; > *L. saxicola* M.A. Curtis – RAB, P, W, Y; > *Ilysanthes monticola* (Muhlenberg ex Nuttall) Rafinesque – S; > *Ilysanthes saxicola* (M.A. Curtis) Chapman – S]

Lindernia diffusa (Linnaeus) Wettstein. Reported for SC by Kartesz (1999) on the basis of specimens at NCU, but the specimens so labelled are actually *L. dubia*. {not keyed}

Micranthemum Michaux

The appropriate generic treatment is unclear. If treated (as here) as including *Hemianthus*, a genus of about 14 species, of tropical to warm temperate America.

1 Calyx lobes uneven, 3 of the sinuses extending about halfway to the base of the calyx, the lowermost sinus extending to the base..... ***M. micranthemoides***
1 Calyx lobes even, all of the sinuses reaching nearly to the base of the calyx..... ***M. umbrosum***

Micranthemum micranthemoides (Nuttall) Wettstein, Nuttall's Micranthemum. Cp (VA): muddy, freshwater intertidal shores; rare, possibly extinct (US Species of Concern, VA Rare). NY (Hudson River) south to VA (Chesapeake Bay, Potomac River, James River). [= F, K; = *Hemianthus micranthemoides* Nuttall – C, G, P]

Micranthemum umbrosum (J.F. Gmelin) Blake, Shade Mudflower. Cp (GA, NC, SC, VA): shallow pools, stagnant streams, wet depressions in swamp forests; uncommon (VA Rare). May-October. Se. VA south to FL, west to TX, and south into tropical America. [= RAB, C, F, G, GW, K, P; = *Globifera umbrosa* J.F. Gmelin – S]

LINNAEACEAE (Rafinesque) A. Backlund 1998 (Twinflower Family)

A family of 5 genera and about 35 species, shrubs and suffrutescent herbs. Various segregate families (or reassignments) of taxa traditionally placed in the Caprifoliaceae have been proposed, including the transfer of *Sambucus* and *Viburnum* to the Adoxaceae, placement of *Diervilla* and *Weigela* in the Diervillaceae (Backlund & Pyck 1998), placement of *Abelia*, *Linnaea*, and *Kolkwitzia* in the Linnaeaceae (Backlund & Pyck 1998), and retention of *Lonicera, Symphoricarpos,* and *Triosteum* in a much more narrowly circumscribed Caprifoliaceae. Alternatively, all these taxa could be included in the Caprifoliaceae, along with Dipsacaceae and Valerianaceae, as a very broadly circumscribed Caprifoliaceae. References: Backlund & Pyck (1998).

1 Trailing shrubby herb; [native] ..... ***Linnaea***
1 Upright shrub; [planted and persistent or weakly naturalizing].
  2 Sepals oblanceolate, the larger > 1 mm wide; fruit and ovaries free, not hirsute ..... ***Abelia***
  2 Sepals lanceolate to linear, < 1 mm wide; fruit and ovaries fused in pairs, densely hirsute ..... ***Kolkwitzia***

Abelia R. Brown, Abelia

A genus of about 30 species, shrubs, primarily of s. and e. Asia.

* ***Abelia ×grandiflora*** (André) Rehder [***chinensis*** × ***uniflora***], Abelia. Cp (FL, NC): suburban thickets; commonly planted in our area; sometimes persistent or rarely weakly naturalizing, the parent species native of China. [= K, WH]

Kolkwitzia Graebner (Beautybush)

A monotypic genus, a shrub, of c. China.

* ***Kolkwitzia amabilis***, Beautybush. Mt (NC) {KY}: disturbed areas; planted as an ornamental shrub, rarely naturalized from plantings, native of c. China. [= K]

Linnaea Linnaeus (Twinflower)

A monotypic genus, a trailing weak shrub, circumboreal.

Linnaea borealis Linnaeus *ssp.* ***americana*** (Forbes) Hultén ex Clausen, American Twinflower. Mt (MD, TN, WV): northern hardwoods; rare. Greenland, Labrador, and AK south to WV, IN, IL, IA, NM, AZ, and CA; disjunct in e. TN. *L. borealis* is documented by an early specimen (1892) from Sevier County, TN, presumably from the Great Smoky Mountains; the TN population (not seen since) is disjunct from e. WV and w. MD. [= K; = *L. borealis* var. *longiflora* Torrey – C, G; = *L. borealis* var. *americana* (Forbes) Rehder – F; < *L. borealis* – W; = *L. americana* Forbes; = *L. borealis* ssp. *longiflora* (Torrey) Hultén]

LOASACEAE A.L. de Jussieu 1804 (Loasa Family)

A family of 20 genera and 260-330 species, mainly herbs, primarily of America. References: Weigend in Kubitzki (2004).

Mentzelia Linnaeus (Blazingstar)

A genus of about 80 species, herbs, shrubs, and trees, of America, especiially in sw. United States and Mexico. References: Weigend in Kubitzki (2004).

Mentzelia floridana Nuttall ex Torrey & A. Gray, Stickleaf. Cp (FL): hammocks, shell middens, dunes, other dry sands; rare. From ne. FL (Duval County) south to s. FL. [= K, S, WH]

LOGANIACEAE R. Brown ex Martius 1827 (Logania Family)

As here rather narrowly interpreted, Loganiaceae consists of 12 genera and about 420 species, herbs and subshrubs, of tropical, subtropical, and warm temperate areas of the Old and New Worlds. Other genera in our area which have traditionally been considered components of the Loganiaceae now are clearly better placed in the small families Tetrachondraceae *(Polypremum)*, Gelsemiaceae (*Gelsemium*), and Scrophulariaceae (*Buddleja*), more closely related to other families (such as Rubiaceae) than to Loganiaceae sensu stricto (Struwe, Albert, & Bremer 1994). The affinities of *Spigelia* appear to be with a small group of tropical and subtropical genera, the largest of which is *Strychnos*. Struwe, Albert, & Bremer (1994) treated this group as the family Strychnaceae, based on a cladistic analysis of data. A later, more thorough analysis suggested that Strychnaceae is best recombined with Loganiaceae (Backlund, Oxelman, & Bremer 2000). References: Rogers (1986). [also see *GELSEMIACEAE*, *SCROPHULARIACEAE*, and *TETRACHONDRACEAE*]

1 Woody vine ..... ***Gelsemium*** *[see GELSEMIACEAE]*
1 Herb.
  2 Corolla funnelform, 0.1-0.2 cm long, white ..... ***Mitreola***
  2 Corolla tubular, 3-6 cm long, red and yellow ..... ***Spigelia***

Mitreola Linnaeus 1758 (Miterwort)

A genus of about 6 species, herbs, tropical, subtropical, and warm temperate. References: Nelson (1980)=Y; Rogers (1986)=Z.

1 Leaves 2-8 cm long petiolate or sessile and tapering to a cuneate base ..... ***M. petiolata***
1 Leaves 1-4 cm long, sessile, the base rounded.
  2 Mature seed reticulate; mature capsule smooth to slightly and finely tuberculate; larger leaves ca. 4× as long as wide ..... ***M. angustifolia***
  2 Mature seed smooth; mature capsule markedly papillose-warty; larger leaves 1.5-2× as long as wide ..... ***M. sessilifolia***

Mitreola angustifolia (Torrey & A. Gray) J.B. Nelson, Narrow-leaved Miterwort. Cp (FL, GA, SC): clay-based Carolina bays, other Coastal Plain depressional wetlands; rare. June-August. Se. SC south to n. FL, and west to s. AL and se. MS (Sorrie & Leonard 1999). [= GW, WH, Y; < *M. sessilifolia* – K, Z; = *Cynoctonum angustifolium* (Torrey & A. Gray) Small – S]

Mitreola petiolata (J.F. Gmelin) Torrey & A. Gray, Caribbean Miterwort. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): swamps, marshes, ditches, other wet habitats; common (uncommon in NC and SC, rare in VA, rare in the Piedmont). July-September; September-November. Se. VA south to FL and west to AR and c. TX, north in the interior to nw. GA and c. and se. TN; Mexico, the West Indies, and n. South America. [= GW, K, WH, Y; = *Cynoctonum mitreola* (Linnaeus) Britton – RAB, C, F, G, S]

Mitreola sessilifolia (J.F. Gmelin) G. Don, Small-leaved Miterwort. Cp (FL, GA, NC, SC), Pd (GA, VA): wet savannas, pocosins, ditches, margins of limesink depressions (dolines); common (rare in VA). Late June-August; September-October. Se. VA south to FL, west to e. TX, and in the Bahama Islands. [= GW, WH, Y; = *Cynoctonum sessilifolium* J.F. Gmelin – RAB, C, F, G, S; < *M. sessilifolia* – K, Z (also see *M. angustifolia*)]

Spigelia Linnaeus 1753 (Pinkroot)

A genus of about 50 species, herbs, of tropical and warm temperate America. References: Gould (1996)=Z; Rogers (1986)=Y.

1 Corolla scarlet on the outer surface, yellow on the inner surface ..... ***S. marilandica***
1 Corolla light pink to white on the outer and inner surfaces.
  2 Corolla 36-50 mm long; pistil 24-27 mm long; sepals 8-11 mm long; inflorescence with 2-4 flowers; [of dolomitic glades in Bibb Co. AL] ..... ***S. gentianoides var. alabamensis***
  2 Corolla 25-30 mm long; pistil 17-19 mm long; sepals 4-6 mm long; inflorescence with 3-8 flowers; [of pine savannas of Panhandle FL] ..... ***S. gentianoides var. gentianoides***

Spigelia gentianoides Chapman ex Alphonse de Candolle *var.* ***alabamensis*** K. Gould. Mt (AL): dolostone glades; rare. Endemic to Bibb County, AL (Gould 1996, Allison & Stevens 2001). [= K, Z]

Spigelia gentianoides Chapman ex Alphonse de Candolle *var.* ***gentianoides***. Cp (FL): pine savannas; rare. Endemic to FL Panhandle (Calhoun, Jackson, and Washington counties). [= K, Z; = *S. gentianoides* – S, Y (var. *alabamensis* not discovered at the time); < *S. gentianoides* -- WH]

Spigelia marilandica (Linnaeus) Linnaeus, Pinkroot, Wormgrass. Mt (GA, NC, SC), Pd (GA, SC), Cp (FL, GA, SC): woodlands and forests, usually on circumneutral soils; common (rare in FL). May-June; late June-July. SC, sw. NC (Cherokee Co. and Macon Co.), and TN west to s. IN and OK, south to Panhandle FL and TX; some floras allege its occurrence north to VA, MD, NJ, and PA. *S. marilandica* will likely be found in sw. VA. [= RAB, C, F, G, K, S, W, WH]

LYTHRACEAE J. St.-Hilaire 1805 (Loosestrife Family)

A family of about 27-35 genera and about 600 species, herbs, shrubs, and trees, primarily tropical (a few warm temperate). References: Graham (1975)=Z; Graham in Kubitzki, Bayer, & Stevens (2007). Keys adapted, in large part, from Z. [including *PUNICACEAE* and *TRAPACEAE*]

1 Plant woody or suffrutescent, a shrub or a small tree 1-10 m tall; petals present, showy, 8-20 mm long.
  2 Aquatic shrubs with arching suffrutescent or woody stems; leaves opposite or whorled; [native] ..... ***Decodon***
  2 Terrestrial shrubs or small trees with erect woody stems; leaves alternate to subopposite; [aliens cultivated and sometimes persistent].
    3 Flowers in many-flowered terminal or axillary panicles; fruit a loculicidal capsule ..... ***Lagerstroemia***
    3 Flowers solitary or several in terminal or axillary clusters; fruit a leathery berry (pomegranate) ..... ***[Punica]***
1 Plant not woody, an herb 0.1-1.2 m tall; petals absent or present, inconspiscuous or showy, 1-10 mm long.
  4 Fruit with 2-4 prominent spines; leaves coarsely toothed ..... ***Trapa***
  4 Fruit not spinose; leaves entire.
    5 Stems pubescent.
      6 Floral tube (hypanthium) swollen obliquely at its base; capsule dehiscing longitudinally along the upper surface ..... ***Cuphea***
      6 Floral tube (hypanthium) symmetrical; capsule dehiscing septicidally at the apex ..... ***Lythrum***
    5 Stems glabrous.
      7 Floral tube cylindric to turbinate, about 2× as long as wide ..... ***Lythrum***
      7 Floral tube campanulate to globose, about 1× long as wide.
        8 Flowers or fruits (1-) 3-10 in the leaf axils (at least some axils with 2 or more flowers or fruits on a given plant) ..... ***Ammannia***
        8 Flowers or fruits solitary in the leaf axils (never > 1 per axil).
          9 Capsule indehiscent; petals 0; sepals 4, broadly triangular, lacking intersepalary appendages; seeds spatulate or oblanceolate, about 1 mm long, minutely granular on one face and smooth on the other ..... ***Didiplis***
          9 Capsule dehiscing septicidally; petals 4; sepals 4 (-6), triangular, with intersepalary appendages of size about equal to the calyx lobes; seeds hemispheric, about 0.3 mm long, the surface very finely reticulate ..... ***Rotala***

Ammannia Linnaeus 1753 (Toothcup)

A genus of about 25 species, herbs, cosmopolitan. Grahm (2007) suggests that *Ammannia* is probably congeneric with *Nesaea; Ammannia* has nomenclatural priority. References: Graham (1985)=Y; Graham (1975)=Z; Graham in Kubitzki, Bayer, & Stevens (2007). Key based on Y.

1 Style included in fruit, thick, 0.5-1.0 mm long (much shorter than the ovary); calyx lobes obtuse, often with the apices minutely mucronate; petals 0, 1, or 4, pale pink to white, to 1 mm long and 1 mm wide ..... ***A. latifolia***
1 Style exserted in fruit, filiform, 1.5-3.0 mm long (equal to or longer than the ovary); calyx lobes triangular, with acute apices; petals 4 (-5), deep rose-purple or pale lavender, ca. 2 mm long and 2 mm wide.
  2 Inflorescence usually a short- or long-pedunculate cyme (sometimes reduced); flowers usually > 3 per axil; petals deep rose-purple; fruits 3.5-5 mm in diameter ..... ***A. coccinea***
  2 Inflorescence sessile; flowers usually 1-3 per axil; petals pale lavender; anthers yellow; fruits 4-6 mm in diameter ..... ***[A. robusta]***

Ammannia coccinea Rottböll. Cp, Pd, Mt (GA, NC, SC, VA): marshy areas, ditches, exposed muddy river shores and banks, other wet places; uncommon (VA Watch List). July-October. NJ, OH, IN, IL, IA, and SD south to FL and TX; disjunct in CA; south through Mexico and Central America to n. South America. [= RAB, C, K, W, Y; > *A. coccinea* ssp. *purpurea* (Lamarck) Koehne – G; < *A. coccinea* – F, GW, S, Z]

Ammannia latifolia Linnaeus. Cp (GA, NC, SC, VA): tidal marshes, wet places, ditches; uncommon. July-September. NJ south to s. FL and west to TX (mostly on the coastal plain), and also in the West Indies, Yucatan, Central America, and South America. All plants in North America north of Florida have flowers with petals; most plants from FL south through the West Indies into Central and South America have flowers without petals. Graham (1985) considered these forms; additional study is warranted. The name *A. koehnei* Britton is available for the petaliferous North American plant should its recognition prove warranted. [= C, GW, K, W, Y, Z; > *A. teres* Rafinesque – RAB, G; > *A. teres* var. *teres* – F; > *A. teres* var. *exauriculata* (Fernald) Fernald – F; > *A. latifolia* – S; > *A. koehnei* Britton – S]

Ammannia robusta Heer & Regel. OH and British Columbia south to w. KY, w. TN, LA, TX, CA, Mexico, and Belize; West Indies; introduced in NJ and n. South America. [= C, K, Y; < *A. coccinea* – F, GW, S, Z]

Cuphea P. Browne 1756 (Waxweed)

A genus of about 260 species, herbs, of America, primarily tropical and subtropical. References: Graham (1975)=Z; Graham in Kubitzki, Bayer, & Stevens (2007).

1 Floral tube green, 4.5-6 mm long, glabrous inside; stamens much shorter than the floral tube; petioles to 8 mm long, often very short ..... ***C. carthagenensis***
1 Floral tube purple-green, 6-10 mm long, villous inside; stamens equal to or exceeding the the floral tube; petioles to 20 mm long..... ***C. viscosissima***

* ***Cuphea carthagenensis*** (Jacquin) J.F. Macbride. Cp (GA, NC, SC), Pd (GA): marshes, ditches, wet places; common, native of South America. June-September. [= GW, K, Z; = *C. carthagensis* – RAB (a misspelling); = *Parsonsia balsamona* (Chamisso & Schlechtendahl) Standley – S]

Cuphea viscosissima Jacquin. Pd, Mt (GA, NC, SC, VA), Cp (VA): dry or wet places; uncommon. July-October. NH west to IA and KS, south to c. GA, LA, and e. OK. [= RAB, C, GW, K, W, Z; = *C. petiolata* (Linnaeus) Koehne – F, G; = *Parsonsia petiolata* (Linnaeus) Rusby – S]

* *Cuphea procumbens* Gómez Ortega is reported for NC by Small (1933). Graham (1975) considers this Mexican species to be represented in se. United States only by "garden escapes that do not persist." {not keyed} [= K, Z; = *Parsonsia procumbens* (Gómez Ortega) Heller – S]

Decodon J.F. Gmelin 1791 (Water-oleander, Water-willow)

A monotypic genus, a weak shrub, endemic to e. North America (more widespread in the fossil record). References: Graham (1975)=Z; Graham in Kubitzki, Bayer, & Stevens (2007).

Decodon verticillatus (Linnaeus) Elliott, Water-oleander, Water-willow, Swamp Loosestrife, Peatweed. Cp (GA, NC, SC, VA), Mt (GA, VA): natural lakes, limesink ponds, peatlands, peaty swamps, not known in the Piedmont or Mountains of NC or SC, but scattered in the Ridge and Valley of VA; common. July-September. Nova Scotia, Ontario, and MN south to c. peninsular FL and e. TX. The lower stems are spongy in texture. [= RAB, GW, K, S, W, Z; > *D. verticillatus* var. *verticillatus* – C, F, G; > *D. verticillatus* var. *laevigatus* Torrey & Gray – C, F, G]

Didiplis Rafinesque 1833 (Water-purslane)

A monotypic genus, an herb, endemic to e. North America. Perhaps better merged into *Lythrum*. References: Graham (1975)=Z; Graham in Kubitzki, Bayer, & Stevens (2007).

Didiplis diandra (Nuttall ex A.P. de Candolle) Wood, Water-purslane. Cp (NC, VA), Pd (SC): stagnant water of pools, streams, and old beaverponds; rare. April-August. VA, IN, and WI south to NC, SC, MS, and LA. [= C, G, GW, K, S, Z; = *Peplis diandra* Nuttall ex A.P. de Candolle – RAB, F; ***Lythrum***]

Lagerstroemia Linnaeus 1759 (Crape-myrtle)

A genus of 53-56 species, trees, of tropical se. Asia and Australia. References: Graham (1975)=Z; Graham in Kubitzki, Bayer, & Stevens (2007).

* ***Lagerstroemia indica*** Linnaeus, Crape-myrtle. Cp, Pd (FL, GA, NC, SC): commonly cultivated, persistent around old plantings, weakly spreading; rare (in the wild), native of Asia. June-September. [= C, K, S, Z]

Lythrum Linnaeus 1753 (Loosestrife)

A genus of about 36 species, herbs, cosmopolitan. References: Graham (1975)=Z; Graham in Kubitzki, Bayer, & Stevens (2007).

1 Flowers numerous in terminal spike-like thyrses; stamens usually 12; leaves opposite or whorled..... ***L. salicaria***
1 Flowers solitary or paired in axils; stamens usually (4-) 6; leaves opposite or alternate.
  2 Leaves opposite throughout, mostly shorter than to as long as the internodes, 1-4 mm wide ..... ***L. lineare***
  2 Leaves opposite below, alternate above, mostly longer than the internodes, 2-14 mm wide.
    3 Floral tube 3-4 mm long; petals 2-3 mm long; calyx appendages about the same length as the calyx lobes; branch leaves abruptly and definitely reduced in size relative to the stem leaves, and widely spaced; [of sw. GA southward] ..... ***L. curtissii***
    3 Floral tube 5-6 mm long; petals 5-6 mm long; calyx appendages about 2× as long as the calyx lobes; branch leaves gradually reduced relative to the stem leaves, dense and overlapping; [collectively widespread in our area].
      4 Leaves ovate to lanceolate, widest at a point 1/6 to 1/2 of the way from the base to the apex, the base rounded to subcordate; stems mostly slender, to 8 dm tall; bracteoles mostly at the base of the pedicel ..... ***L. alatum***

4 Leaves lanceolate to linear-lanceolate, widest at a point 1/3 to 2/3 of the way from the base to the apex, the base cuneate, often narrowly so; stems stout, to 13 dm tall; bracteoles mostly on the upper pedicel, immediately below the floral tube..... ***L. lanceolatum***

Lythrum alatum Pursh, Northern Winged Loosestrife. Mt (GA, VA), Pd (VA): calcareous meadows, marl fens, and disturbed wet calcareous places; rare (VA Rare). June-September. ME, NY, MI, and ND south to n. and w. VA, e. TN, nw. GA, n. AL, n.. AR, ne. OK, and CO. [= F, S, W; = *L. alatum* var. *alatum* – C, G, GW, K, Z]

Lythrum curtissii Fernald, Curtiss's Loosestrife. Cp (GA): calcareous swamps; rare (GA Threatened). June-early September. Sw. GA south to Panhandle FL; the report from Emanuel County, GA (Jones & Coile 1988) is in error. [= GW, K, S, Z]

Lythrum lanceolatum Elliott, Southern Winged Loosestrife. Cp, Pd (GA, NC, SC, VA): moist to wet places; uncommon (VA Rare). May-September. Se. VA, se. NC, SC, GA, AL, MS, n. AR, and OK south to s. FL, s. TX, and in the West Indies. Although Graham (1975) argues that *L. lanceolatum* should be reduced to a variety of *L. alatum*, her evidence can also be interpreted as warranting specific status. [= RAB, F, S; = *L. alatum* Pursh var. *lanceolatum* (Elliott) Torrey & A. Gray ex Rothrock – C, G, GW, K, Z]

Lythrum lineare Linnaeus, Narrowleaf Loosestrife. Cp (GA, NC, SC, VA): nearly fresh, brackish, and saline marshes; uncommon. July-October. NJ south to FL and west to TX. [= RAB, C, F, G, GW, K, S, Z]

* ***Lythrum salicaria*** Linnaeus, Purple Loosestrife. Mt, Pd (NC, VA), Cp (VA): wet places; uncommon, native of Eurasia. June-September. An extremely noxious weed in the ne. United States, aggressively colonizing and coming to dominate a wide variety of freshwater wetlands, sometimes to the near exclusion of native vegetation. [= RAB, C, G, K, W, Z; > *L. salicaria* var. *salicaria* – F; > *L. salicaria* var. *gracilior* Turczaninow – F; > *L. salicaria* var. *tomentosum* (P. Miller) A.P. de Candolle – F]

Punica Linnaeus 1753 (Pomegranate)

A genus of 2 species, trees, of Mediterranean Europe and w. Asia. Sometimes treated in the monogeneric family Punicaceae; here included in Lythraceae, following Angiosperm Phylogeny Group (2003). References: Zohary & Hopf (1994); Graham in Kubitzki, Bayer, & Stevens (2007).

* *Punica granatum* Linnaeus, Pomegranate, is reported as cultivated on Hatteras Island (Dare County, NC) (Brown 1959). It is probably not established, but may be persistent. This species has been cultivated in the Old World at least since the 3rd millenium B.C. [= K, S]

Rotala Linnaeus 1771 (Toothcup)

A genus of about 44 species, wetland herbs, of temperate to tropical areas, closely related to *Didiplis*. References: Graham (1975)=Z; Graham in Kubitzki, Bayer, & Stevens (2007).

Rotala ramosior (Linnaeus) Koehne. Cp, Pd, Mt (GA, NC, SC, VA): marshes, ditches, exposed drawdown muds and silts; common. June-October. Widespread in e. North America, also in the West Indies, Central America, South America, and on the west coast of the United States and Mexico. [= RAB, C, GW, K, S, W, Z; > *R. ramosior* var. *ramosior* – F, G; > *R. ramosior* var. *interior* Fernald & Griscom – F, G]

Trapa Linnaeus 1753 (European Water-chestnut)

A genus of 1 highly polymorphic or up to 45 more narrowly defined species, annual aquatic herbs, native of the Old World. Often placed in a monogeneric family, Trapaceae. References: Angiosperm Phylogeny Group (2003); Graham in Kubitzki, Bayer, & Stevens (2007).

* ***Trapa natans*** Linnaeus, European Water-chestnut, Water-caltrop. Cp (VA): farm ponds and other stagnant or slow-moving water; rare, native of Eurasia and Africa. June-September. [= C, F, G, K]

MAGNOLIACEAE A.L. de Jussieu 1789 (Magnolia Family)

A family of about 7 genera and 223 species, trees and shrubs, tropical and warm temperate, of e. and se. Asia, and from e. North America south through West Indies and Central America to Brazil. References: Hardin (1972); Hardin & Jones (1989)=Z; Meyer in FNA (1997); Figlar & Nooteboom (2004); Frodin & Govaerts (1996); Nooteboom in Kubitzki, Rohwer, & Bittrich (1993); Kim et al. (2001).

1 Leaves about as broad as long, (2-) 4 (-8)-lobed; fruit a 2-seeded, indehiscent samara; [subfamily *Liriodendroideae*]..... ***Liriodendron***

1 Leaves longer than broad, not lobed (in some species the leaves auriculate-cordate basally); fruit a cone-like aggregate, each follicle dehiscing to reveal the scarlet seed, at first connected to the follicle by a thread-like strand; [subfamily *Magnolioideae*]..... ***Magnolia***

Liriodendron Linnaeus (Tulip-tree)

A genus of 2 species, trees, relictually distributed, with *L. tulipifera* in e. North America and *L. chinense* (Hemsley) Sargent in c. China and n. Vietnam. References: Nooteboom in Kubitzki, Rohwer, & Bittrich (1993); Weakley & Parks (in prep.), abbreviated as Z.

1 Leaves large, 4-8-lobed, the terminal lobes acute; [of the Mountains, Piedmont, and Coastal Plain (especially brownwater rivers and mesic bluffs and slopes)] ..... ***L. tulipifera* var. *tulipifera***
1 Leaves small, 0-4-lobed, the terminal lobes obtuse to broadly rounded; [of the Coastal Plain, especially fire-maintained, acidic, and peaty sites] ..... ***L. tulipifera* var. *1***

Liriodendron tulipifera Linnaeus *var.* ***tulipifera***, Tulip-tree, Yellow Poplar, Whitewood. Mt, Pd, Cp (GA, NC, SC, VA): mesic forests, cove forests in the Mountains to at least 1500m in elevation, bottomland forests and swamps; common. April-June; September-October. Widespread in e. North America. An important timber tree in the Southern Appalachians. [= Z; < *L. tulipifera* – RAB, C, F, FNA, G, GW, K, S, W, Z]

Liriodendron tulipifera Linnaeus *var.* ***1***, Coastal Plain Tulip-tree, Southern Yellow Poplar. Cp (GA, NC, SC, VA): blackwater swamps, streamhead pocosins in the fall-line sandhills; uncommon. April-June; September-October. Its occurrence in fire-maintained, acid soil habitats in the Coastal Plain is surprising to people used to *Liriodendron* as a tree of mesic, rich soil forests. It is, however, a typical species of streamhead pocosins in the fall-line sandhills, growing with *Pinus serotina*, *Nyssa biflora*, and *Acer rubrum*, and often with scorch marks twenty feet up the trunk. [= Z; < *L. tulipifera* – RAB, C, F, FNA, G, GW, K, S, W, Z]

Magnolia Linnaeus 1753 (Magnolia, Cucumber-tree)

A genus of about 130 species, trees and shrubs, of e. Asia (Himalayas and Sri Lanka to Japan and w. Malaysia) and America (e. North America to West Indies, Central America, and South America). Molecular phylogenetics show *Magnolia virginiana* and *M. grandiflora* as closely related in a New World primarily subtropical clade, *M. macrophylla* in a clade with its close relatives, *M. fraseri* and *M. pyramidata* together, *M. acuminata* as basal in a clade that is otherwise Asian (equivalent to subgenus *Yulania*), and *M. tripetala* grouped in another clade that is otherwise Asian (Azuma et al. 2001). The sections used follow Figlar & Nooteboom (2004). References: Tobe (1998)=Y; Spongberg (1998)=X; Frodin & Govaerts (1996)=V; Azuma, Thien, & Kawano (1999); Azuma et al. (2001); Figlar & Nooteboom (2004); Nooteboom in Kubitzki, Rohwer, & Bittrich (1993); Kim et al. (2001); Hunt (1998).

1 Leaves cordate-auriculate at base; [subgenus *Magnolia*].
  2 Leaves glaucous and finely appressed-pubescent beneath; buds and twigs pubescent; [subgenus *Magnolia*, section *Macrophylla*] ..... ***M. macrophylla***
  2 Leaves green and glabrous beneath; buds and twigs glabrous; [subgenus *Magnolia*, section *Auriculata*].
    3 Stamens 8-15 mm long; leaves (most of them) over 25 cm long; conelike aggregate fruit 6.5-11 (-14) cm long ..... ***M. fraseri***
    3 Stamens 4-8 (-10.5) mm long; leaves (most of them) < 25 cm long; conelike aggregate fruit 3.5-5.5 (-6) cm long ..... ***M. pyramidata***
1 Leaves cuneate to rounded (subcordate) at base.
  4 Leaves evergreen, coriaceous in texture, glossy dark green above as if varnished, rusty tomentose or green beneath; [subgenus *Magnolia*, section *Magnolia*] ..... ***M. grandiflora***
  4 Leaves variably evergreen to deciduous, herbaceous or subcoriaceous in texture, medium green above with a slightly glossy or dull finish; glaucous or green beneath.
    5 Leaves evergreen to deciduous, aromatic when fresh, 8-20 cm long, elliptic, strongly glaucous beneath; [subgenus *Magnolia*, section *Magnolia*].
      6 Leaves evergreen; previous year's stems densely pubescent; mature leaves with pubescent midveins; flowers opening near sundown (2-5 hours later than var. virginiana); medium to large tree, to >20 m tall; [of the Gulf Coast and inland, north and east to s. SC (e. NC?)] ..... ***M. virginiana* var. *australis***
      6 Leaves evergreen to deciduous (at least tardily); previous year's stems glabrous; mature leaves with few hairs along the midvein below; flowers opening mid-afternoon; shrub to multi-stemmed small tree, to 10 m (rarely to 15 m) tall; [of the Atlantic Coastal Plain and inland, south and west to s. SC and w. NC] ..... ***M. virginiana* var. *virginiana***
    5 Leaves deciduous, non-aromatic, 10-50 cm long, either ovate or lance-obovate, green beneath.
      7 Leaf base cuneate-attenuate; leaves 15-50 cm long, broader toward the tip, borne clustered on the end of the twig; buds glabrous; [subgenus *Magnolia*, section *Rhytidospermum*, subsection *Rhytidospermum*] ..... ***M. tripetala***
      7 Leaf base rounded to subcordate (often cuneate to widely cuneate in *M. acuminata* var. *subcordata*); leaves 10-30 cm long, broader near the middle or toward the base, borne scattered along the twig; buds pubescent; [subgenus *Yulania*, section *Yulania*, subsection *Tulipastrum*].
        8 Twigs of the current year glabrous; petals greenish or greenish-yellow; medium to large tree ..... ***M. acuminata* var. *acuminata***
        8 Twigs of the current year pubescent, or at least with persistent hair-bases, petals golden-yellow above, light-yellow below; small tree (rarely larger) ..... ***M. acuminata* var. *subcordata***

Magnolia acuminata (Linnaeus) Linnaeus *var.* ***acuminata***, Cucumber-tree, Cucumber Magnolia. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (KY), Ip (KY): mesic to subxeric forests, especially (but by no means strictly) over mafic or calcareous rocks, up to at least 1550m (where growing with *Betula alleghaniensis, Abies fraseri, Picea rubens,* and *Sorbus americana*), ultramafic outcrop barrens (where codominant with *Pinus rigida* and *Quercus alba*); common (rare in Piedmont, Coastal Plain, and Interior Low Plateau). April-May; July-August. Widespread in e. North America, primarily in or near the Appalachians. The recognition of two varieties is uncertain (see discussion below). [= C, F, G, V, W, X, Y; < *M. acuminata* – RAB, FNA, K, Z; = *Tulipastrum acuminatum* (Linnaeus) Small – S]

MAGNOLIACEAE

Magnolia acuminata (Linnaeus) Linnaeus *var.* ***subcordata*** (Spach) Dandy, Yellow Cucumber-tree, Showy Cucumber Magnolia. Pd (GA, NC, SC), {Cp (FL?)}: moist to dry slopes and bottomlands over mafic or calcareous rocks; uncommon. Var. *subcordata* ranges from sc. NC south to AL, in the lower Piedmont in our area. It has been treated variously as a variety, a species, or merged with *M. acuminata*. Coker (1943) discusses its history, distribution, and taxonomic status. Additional study is needed. [= V, X, Y; < *M. acuminata* – RAB, FNA, K, W, Z; = *Tulipastrum cordatum* (Michaux) Small – S; = *Magnolia cordata* Michaux]

Magnolia fraseri Walter, Fraser Magnolia, Earleaf Umbrella-tree. Mt, Pd (GA, NC, SC, VA): mesic forests; common (uncommon in upper Piedmont only). April-May; July-August. A Southern Appalachian endemic: KY and w. VA south through w. NC and e. TN to nw. SC, n. GA, and ne. AL. [= RAB, C, F, FNA, G, K, S, W, Z; = *M. fraseri* var. *fraseri* – V, X; = *M. fraseri* ssp. *fraseri* – Y]

Magnolia grandiflora Linnaeus, Southern Magnolia, Bull Bay. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): maritime forests, mesic Coastal Plain bluffs and flats, bottomlands, now also widely naturalized, spreading from cultivation into wet to mesic forests; common (rare in the Piedmont, rare in NC), common as a native species in NC (NC Watch List). May-June; October. Curtis (1860) states that "the northern limit of this tree is in Brunswick County, south of the Cape Fear; but it flourishes in cultivation through all the lower part of the State." The pre-Columbian range was apparently from se. NC south to FL, west to e. TX, largely on the Coastal Plain, now somewhat expanded northwards and inland by naturalization from centuries of horticultural planting. This is, of course, the classic "southern magnolia," along with live oak (*Quercus virginiana*), and bald-cypress (*Taxodium distichum*), one of the totem trees of the Deep South. [= RAB, C, FNA, GW, K, S, V, Y, Z]

Magnolia macrophylla Michaux, Bigleaf Magnolia. Pd (GA, NC, SC), Mt (VA), Cp (GA, SC*): mesic forests, primarily over limestone, other calcareous sedimentary rocks (calcareous shales, sandstones, etc.), or mafic rocks (east of the Blue Ridge), mesic hammocks in the Coastal Plain; uncommon (rare in NC, SC, and VA). May-June; July-August. The range of this species is often stated in such a way as to imply that it is a tree of the southern mountains. Actually, it avoids the Southern Blue Ridge, reaching its greatest abundance in the sedimentary rock Appalachians west of the Blue Ridge, particularly the Cumberland Plateau, and occurs east of the Blue Ridge only as a rare disjunct. *M. macrophylla* ranges from s. OH and sw. VA south through e. TN to w. GA, west to AL, MS, n. LA, and se. AR (Sundell et al. 1999); disjunct on Crowleys Ridge in ne. AR (population now extirpated), c. and nc. SC, and e. SC (where probably not native). The leaves are up to 1.1 meter long and 3.5 dm wide. See Williams (1999) for additional information about the discovery and nomenclature of this species. The Gulf Coast endemic *Magnolia ashei* Weatherby is related and is sometimes treated as a variety or subspecies of *M. macrophylla*. [= RAB, C, F, FNA, G, K, S, W, Z; = *M. macrophylla* ssp. *macrophylla* – V, X, Y]

Magnolia pyramidata Bartram, Pyramid Magnolia. Cp (FL, GA, SC): mesic forests, especially of bluffs and ravines; uncommon (rare in GA and SC). April-May; August. A Southeastern Coastal Plain endemic: c. SC south to panhandle FL, west to e. TX. Sometimes treated as a variety or subspecies of *M. fraseri*, to which it is clearly closely related, but the distributional and morphological differences are discrete and specific status seems warranted. [= RAB, FNA, K, S, Z; = *M. fraseri* Walter var. *pyramidata* (Bartram) Pampinini – V, X; = *M. fraseri* Walter ssp. *pyramidata* (Bartram) E. Murray – Y]

Magnolia tripetala (Linnaeus) Linnaeus, Umbrella Magnolia, Umbrella-tree. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): mesic forests; common (uncommon in Mountains and Coastal Plain). April-May; July-October. Centered in the Southern Appalachians, but avoiding higher elevations, and therefore occurring primarily "around" the Blue Ridge; ranging from sc. and sw. PA, s. OH, s. IN south to SC, GA, Panhandle FL (Tobe 2007), AL, and MS; also disjunct in the Ouachita Mountains of c. AR and e. OK. [= RAB, C, F, FNA, G, K, S, W, V, X, Y, Z]

Magnolia virginiana Linnaeus *var.* ***australis*** Sargent, Southern Sweet Bay. Cp (FL, GA, NC?, SC), Pd (GA), Mt (GA): pocosins, bay forests, and swamps in the Coastal Plain, streamhead pocosins, swamps, and sandhill seeps in the Sandhills, bogs and peaty swamps in the Piedmont and Mountains; common (rare in Piedmont and Mountains). April-July; July-October. Primarily a species of the Southeastern Coastal Plain: s. SC (se. NC?) south to s. FL, and west to e. TX, rarely extending into adjacent, more interior provinces. Morphological, molecular, and chemical studies have shown strong variation in *M. virginiana*, but the patterns are not clear based on the limited current studies (Azuma, Thien, & Kawano 1999). Tobe (1998), McDaniel (1966), and Figlar (pers. comm. 2005) recommend the recognition of two varieties; additional study is needed. [= F, Y; < *M. virginiana* – RAB, C, FNA, G, GW, K, S, V, W, X, Z]

Magnolia virginiana Linnaeus *var.* ***virginiana***, Northern Sweet Bay. Cp (GA, NC, SC, VA), Pd (NC, VA), Mt (VA): pocosins, bay forests, and swamps in the Coastal Plain, streamhead pocosins, swamps, and sandhill seeps in the Sandhills, bogs and peaty swamps in the Piedmont; common (rare in Piedmont and Mountains). April-July; July-October. Se. MA south to w. NC, s. SC, and e. GA. [= F, Y; < *M. virginiana* – RAB, C, FNA, G, GW, K, S, V, W, X, Z]

Magnolia ashei Weatherby, Ashe's Magnolia. Cp (FL): moist to wet hammocks; rare. Endemic to FL Panhandle. [= K; = *M. macrophylla* Michaux var. *ashei* (Weatherby) D.L. Johnson – WH; = *M. macrophylla* ssp. *ashei* (Weatherby) Spongberg] {not yet keyed; add to synonymy}

MALVACEAE A.L. de Jussieu 1789 (Mallow Family)

Malvaceae has always been difficult to circumscribe cleanly, relative to members of such families as Sterculiaceae and Tiliaceae. Molecular evidence now adds to morphologic evidence that traditional circumscriptions of these families are highly polyphyletic. Bayer et al. (1999) present a new classification of an expanded Malvaceae, with 9 subfamilies recognized. If circumscribed broadly (as here) to include Sterculiaceae and Tiliaceae, a family of about 243 genera and 4000-4500 species, herbs, shrubs, and trees, of cosmopolitan distribution, but especially diverse in the tropics and subtropics. This family includes several economically important species, including cacao or chocolate, *Theobroma cacao* Linnaeus, and cola, *Cola acuminata* R. Brown. References: Bayer et al. (1999); Bayer & Kubitzki in Kubitzki & Bayer (2003). [including *STERCULIACEAE* and *TILIACEAE*]

Subfamily Byttnerioideae: *Melochia*

Subfamily Grewioideae: *Triumfetta*

Subfamily Malvoideae:
Tribe Gossypieae: *Gossypium*
Tribe Hibisceae: *Abelmoschus, Hibiscus, Kosteletzkya, Malvaviscus, Pavonia, Urena*
Tribe Malveae: *Abutilon, Alcea, Althaea, Anoda, Callirhoe, Iliamna, Malva, Malvastrum, Modiola, Napaea, Sida*

Subfamily Sterculioideae: *Firmiana*

Subfamily Tilioideae: *Tilia*

Abelmoschus Medikus 1787 (Okra, Gumbo)

A genus of about 15 species, herbs, of the Old World tropics. Perhaps better included in a broadly circumscribed *Hibiscus* (Pfeil & Crisp 2005). References: Bayer & Kubitzki in Kubitzki & Bayer (2003).

* ***Abelmoschus esculentus*** (Linnaeus) Moench, Okra, Gumbo. Cp, Pd (GA, NC, SC, VA): frequently cultivated in gardens, rarely persistent or self-seeding the year following; common (in cultivation), rare (as an escape), native of Africa. The young capsules are a famous component of southern cooking. [= K, S; = *Hibiscus esculentus* Linnaeus – F]

Abutilon P. Miller 1754 (Indian-mallow, Indian-hemp)

A genus of about 100-160 species, herbs, of tropical and warm temperate areas. References: Fryxell (2002)=Z; Bayer & Kubitzki in Kubitzki & Bayer (2003).

* ***Abutilon theophrasti*** Medikus, Velvetleaf, Pie-marker, Butterprint. Cp (FL, GA, NC, VA), Pd (NC, SC, VA), Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common (rare in FL), native of s. Asia. June-October. [= F, G, K, W, WH, Z; = *A. theophrastii* – RAB, orthographic variant; = *Abutilon abutilon* (Linnaeus) Rusby – S]

Alcea Linnaeus 1753 (Hollyhock)

A genus of about 50-60 species, warm temperate Eurasian (Mediterranean Europe to c. Asia). References: Bayer & Kubitzki in Kubitzki & Bayer (2003).

* ***Alcea rosea*** Linnaeus, Hollyhock. Cp, Pd, Mt (NC, VA) {GA}: roadsides, dumps, frequently cultivated, less commonly escaped or persistent; rare, native of Eurasia. Late May-August (rarely later). [= K; = *Althaea rosea* (Linnaeus) Cavanilles – RAB, C, F, G]

Althaea Linnaeus 1753 (Marsh-mallow)

A genus of about 12 species, herbs, Eurasian. References: Bayer & Kubitzki in Kubitzki & Bayer (2003).

* ***Althaea officinalis*** Linnaeus, Marsh-mallow. Cp (VA): marshes; rare, native of Europe. The roots of this plant were the original source of the mucilaginous paste used to make marshmallows (which are now made with a synthetic mucilage). [= C, F, G, K]

Anoda Cavanilles 1785 (Anoda)

A genus of about 24 species, herbs, of sw. North America, Central America, and South America. References: Bayer & Kubitzki in Kubitzki & Bayer (2003).

* ***Anoda cristata*** (Linnaeus) Schlechtendahl, Spurred Anoda. Cp (VA), Pd (GA, NC, SC, VA): disturbed areas; rare, native of sw. United States, Central and South America. July-October. [= G, K; = *A. crista* – C, orthographic variant; > *A. cristata* var. *cristata* – F; > *A. cristata* var. *brachyanthera* (Reichenbach) Hochreutiner – F]

Callirhoe Nuttall 1821 (Poppy-mallow)

A genus of about 9 species, herbs, of North America. References: Dorr (1990)=Z; Bayer & Kubitzki in Kubitzki & Bayer (2003).

1 Calyx not subtended by an epicalyx.
  2 Inflorescence racemose, corymbose, or nearly umbellate; petals white, pink, or mauve; plants ascending, 1.5-8.5 dm tall; mericarps pubescent with simple, appressed hairs ..... *[C. alcaeoides]*
  2 Inflorescence paniculate; petals deep red, with a white basal spot; plants erect, 5-20 dm tall; mericarps glabrous ..... ***C. digitata***
1 Calyx subtended by an epicalyx of 3 bractlets.
  3 Calyx lobes distinct and divergent in bud; stems decumbent ..... ***C. involucrata* var. *involucrata***
  3 Calyx lobes valvate in bud, forming a point; stems erect, ascending, or decumbent.
    4 Bractlets of the epicalyx linear, 0.1-1.7 mm wide; peduncles 1-flowered; calyx lobes lanceolate, 7-15.4 mm long; mericarps indehiscent; leaves cordate or ovate in outline, palmately deeply divided into 5-7 lobes ..... ***C. papaver***
    4 Bractlets of the epicalyx obovate, 2.5-4.6 mm wide; peduncles several-flowered; calyx lobes deltoid, 2-5 (-6.5) mm long; mericarps dehiscent; leaves triangular, not lobed or only slightly so ..... ***C. triangulata***

* ***Callirhoe digitata*** Nuttall, Finger Poppy-mallow. Mt (GA): occasionally mowed roadside and adjacent powerline right-of-way, with other species of calcareous prairie habitats, one occurrence recorded to date; rare, perhaps only adventive from a native range in prairies of the Ozark region (nw. AR, sw. MO, se. KS, and ne. OK). [= C, F, G, K, Z]

* ***Callirhoe involucrata*** (Torrey & A. Gray) A. Gray *var.* ***involucrata***, Purple Poppy-mallow. Pd (VA): disturbed areas; rare, adventive from its native range in the midwestern United States. [= C, G, K, Z; < *C. involucrata* var. *involucrata* – F; < *C. involucrata* – G]

Callirhoe papaver (Cavanilles) A. Gray, Woods Poppy-mallow. Cp (GA): forest openings; rare (GA Special Concern). Sw. GA and FL west to e. TX and s. AR (Dorr 1990). [= F, G, K, Z; = *Callirrhoë papaver* – S, orthographic variant]

Callirhoe triangulata (Leavenworth) A. Gray, Sand Poppy-mallow, Clustered Poppy-mallow. Cp (GA, SC, NC): sandhills, sandy scrub, and other dry, open habitats; rare (GA Special Concern). Sc. NC south to GA and west to ec. MA (upper Coastal Plain and lower Piedmont); also sw. WI amd ne. IA south to s. IN and s. IL. [= C, F, G, K, Z; *Callirrhoë triangulata* – S, orthographic variant]

Callirhoe alcaeoides (Michaux) A. Gray, Pale Poppy-mallow. Calcareous prairies, glades, and other open habitats. East to c. TN (Chester, Wofford, & Kral 1997), IL, KY, and AL (Dorr 1990, Kartesz 1999) from a primary distribution in NE, KS, OK, and TX. [= C, F, G, K, Z; = *Callirrhoë alceoides* – S, orthographic variant]

Firmiana Marsili (Chinese Parasol-tree, Phoenix Tree)

A genus of about 12 species, trees, of Africa and Asia. References: Whetstone (1983)=Z; Brizicky (1966)=Y; Bayer & Kubitzki in Kubitzki & Bayer (2003).

* ***Firmiana simplex*** (Linnaeus) W. Wight, Chinese Parasol-tree, Phoenix Tree. Cp, Pd (GA, NC, SC, VA): planted and occasionally naturalized nearby; rare, native of se. Asia, probably China. [= C, K, Y, Z; = *F. platanifolia* (Linnaeus f.) Schott & Endlicher – RAB, S]

Gossypium Linnaeus 1753 (Cotton)

A genus of about 40-50 species, herbs, shrubs, and trees, of warm temperate to tropical areas. References: Bayer & Kubitzki in Kubitzki & Bayer (2003).

* ***Gossypium hirsutum*** Linnaeus, Upland Cotton. Cp (GA, NC, SC, VA): frequently cultivated crop, especially in sandy soils of the Coastal Plain, rarely adventive or a waif; common (as a crop), rare (as an adventive), native of tropical America. [= C, G; *? G. hirsutum* var. *hirsutum* – K; *? G. herbaceum* Linnaeus – F, S; *? G. barbadense* Linnaeus]

Hibiscus Linnaeus 1753 (Hibiscus, Rose-mallow)

A genus of about 200-300 species, trees, shrubs, and herbs, of tropical to warm temperate areas. References: Blanchard (2008)=Z; Wise & Menzel (1971); Bayer & Kubitzki in Kubitzki & Bayer (2003). Key based in part on GW.

1 Woody shrub, the stems usually solitary from a creeping rhizome ..... ***H. syriacus***
1 Herb (sometimes robust and to as tall as 3.5 m), often several from ground level, from a crown or taproot.
  2 Annual from a taproot, to 0.5 m tall; calyx inflated at maturity; capsule 1.0-1.3 cm long; petals 1.5-4 cm long; leaves 2-6 cm long, deeply cleft ..... ***H. trionum***
  2 Perennial from a crown, usually 0.7-3.5 m tall; calyx not inflated at maturity; capsule 1.7-3.5 cm long; leaves 4-25 cm long, deeply cleft, hastate-lobed, or not at all lobed or cleft.
    3 Leaves and stems harshly scabrous; calyx lobes each with an elongate purplish nectary on the back; [of pine savannas and dry sandy soils of maritime forest edges, from se. NC southward] ..... ***H. aculeatus***
    3 Leaves and stems glabrous, softly pubescent, or slightly scabrous; calyx lobes lacking nectaries; [of marshes and swamps (sometimes cultivated in drier soils), collectively widespread in our area]; [section *Muenchhusia*].

4 Stem glabrous; leaves glabrous; leaves either palmately 3-5-lobed, or prominently halberd-lobed at the base (uncommonly unlobed).
5 Leaves either palmately 3-5-lobed; petals bright scarlet ..... ***H. coccineus***
5 Leaves halberd-lobed at the base (uncommonly unlobed); petals pink or white with a purplish base ..... ***H. laevis***
4 Stem pubescent at least when young; leaves pubescent on at least one surface; leaves unlobed or slightly lobed toward the tip (except *H. grandiflorus*).
6Capsule glabrous and dark brown to black; bracts of involucel eciliate; upper leaf surface glabrous or nearly so ..... H. moscheutos
6Capsule pubescent (the dark surface largely or completely obscured); bracts of the involucel usually ciliate; upper leaf surface usually densely stellate-pubescent. ..... [H. lasiocarpos]

6 Upper leaf surface densely pubescent; capsule densely pubescent.
7 Leaf blades 3-lobed ..... ***H. grandiflorus***
7 Leaf blades unlobed ..... ***H. moscheutos ssp. incanus***
6 Upper leaf surface glabrous or very sparsely pubescent; capsule glabrous.
8 Petals white or creamy, with a red or purple base; flower stalk bearing a leaf well above the base (often about halfway along its length) ..... ***H. moscheutos ssp. moscheutos***
8 Petals pink (rarely white), with or without a red or purple base; flower stalk without a leaf, borne in the axil of a leaf ..... ***H. moscheutos ssp. palustris***

Hibiscus aculeatus Walter, Savanna Hibiscus, Comfort-root. Cp (GA, NC, SC): pine savannas, dry sandy soils of maritime forest edges; uncommon (rare north of SC) (NC Rare). June-August; July-September. Se. NC south to sc. peninsular FL, west to LA. [= RAB, GW, K, S]

Hibiscus coccineus Walter, Scarlet Hibiscus. Cp (GA, *NC, *SC, *VA), *Pd (*NC): marshes, swamp forests, roadside swales, cultivated as an ornamental in yards; rare, presumably introduced from further south, but sometimes appearing native. Native in FL, s. GA, and s. AL. [= GW, K, S]

Hibiscus grandiflorus Michaux, Large-flowered Hibiscus. Cp (GA): tidal marshes, lakeshores, wet flatwoods and savannas; rare (GA Special Concern). E. GA (Chatham Co., adjacent to the SC border) (Jones & Coile 1988) south to s. FL, west to e. LA. [= GW, K, S]

Hibiscus laevis Allioni, Smooth Rose-mallow, Halberd-leaved Marsh-mallow, Showy Hibiscus. Cp, Pd (GA, NC, SC, VA), Pd (GA), Mt (VA): freshwater marshes, exposed riverbanks, sandbars; common. June-August; August-October. S. PA south to FL, west to TX; north in the interior to around the Great Lakes. [= C, K, W; = *H. militaris* Cavanilles – RAB, F, G, GW, S]

Hibiscus moscheutos Linnaeus *ssp.* ***incanus*** (Wendland f.) Ahles, Eastern Rose-mallow. Cp (GA, NC, SC): marshes; rare. June-September; July-October. S. MD south to c. peninsular FL, west to e. TX. [= RAB, GW; < *H. moscheutos* var. *moscheutos* – C; = *H. incanus* Wendland f. – G, S; < *H. moscheutos* ssp. *moscheutos* – K, Z]

Hibiscus moscheutos Linnaeus *ssp.* ***moscheutos***, Eastern Rose-mallow. Cp, Pd, Mt (GA, NC, SC, VA): marshes; common. June-September; July-October. MD west to s. IN, south to n. FL, and se. TX. [= RAB, GW, W; < *H. moscheutos* var. *moscheutos* – C; = *H. moscheutos* Linnaeus – F, G; < *H. moscheutos* ssp. *moscheutos* – K, Z; *H. oculiroseus* Britton – S]

Hibiscus moscheutos Linnaeus *ssp.* ***palustris*** (Linnaeus) R.T. Clausen, Eastern Rose-mallow. Cp (NC): marshes; rare. June-September; July-October. E. MA south to e. NC; also around the Great Lakes in NY, OH, IN, MI, IL, and Ontario. [= RAB, GW, W; < *H. moscheutos* var. *moscheutos* – C; = *H. palustris* Linnaeus – F, G; < *H. moscheutos* ssp. *moscheutos* – K, Z; ? *H. moscheutos* – S]

* ***Hibiscus syriacus*** Linnaeus, Rose-of-Sharon, Althaea. Pd (GA, NC, SC, VA), Cp, Mt (NC, SC, VA): escaped or persistent after cultivation, often spreading by rhizomes; uncommon, native of e. Asia. June-September; August-October. [= RAB, C, F, G, K, S, W]

* ***Hibiscus trionum*** Linnaeus, Flower-of-an-hour. Pd (GA, NC, SC, VA), Mt (NC, SC, VA), Cp (VA): fields, roadsides, disturbed areas; common, native of Europe. [= RAB, C, G, K, W; = *Trionum trionum* (Linnaeus) Wooton & Standley – S]

Hibiscus lasiocarpos Cavanilles. East to c. TN (Chester, Wofford, & Kral 1997), AL, KY, and GA (F, Kartesz 1999). [= F, S; = *Hibiscus moscheutos* Linnaeus ssp. *lasiocarpos* (Cavanilles) O.J. Blanchard – K, Z] {not yet keyed; add to synonymy}

Iliamna Greene 1906 (Globe-mallow)

A genus of 7 species, perennial herbs, of North America. Some authors (such as Mabberley 1997) include *Iliamna* in *Sphaeralcea*. References: Bodo Slotta & Porter (2006)=Y; Porter & Wieboldt in Terwilliger (1991)=Z; Bayer & Kubitzki in Kubitzki & Bayer (2003).

1 Leaves 5-7-lobed, the lobes narrowly triangular, the sinuses acute; flowers odorless; plant to ca. 1 m in height; [sandstone outcrops on ridgetop] ..... ***I. corei***
1 Leaves 5-7-lobed, the lobes broadly triangular or deltoid, the sinuses obtuse; flowers fragrant; plant to ca. 2.5 m in height; [of river shores and along railroads] ..... ***I. remota***

Iliamna corei Sherff, Peters Mountain Mallow. Mt (VA): in shallow soil in crevices of outcroppings of Clinch sandstone, near the summit of Peters Mountain; rare (US Endangered, VA Endangered). June-August; July-October. Endemic to the summit of Peters Mountain, Giles County, VA. The validity of *I. corei* as a species distinct from *I. remota* is supported by Bodo Slotta & Porter (2006). [= F, Y, Z; < *I. remota* – C, G, W; < *I. rivularis* (Douglas ex Hooker) Greene var. *rivularis* – K]

Iliamna remota Greene, Kankakee Globe-mallow. Mt (VA): shores and gravel bars along rivers, and along railroad embankments; rare (VA Rare). June-August; July-October. W. VA, nw. IN, and ne. IL. Considered by some to be introduced only in our area, however, the VA populations are genetically different than those in IN and IL (Bodo Slotta & Porter 2006). [=

F, Y, Z; < *I. remota* – C, G, W (also see *I. corei*); < *I. rivularis* (Douglas ex Hooker) Greene var. *rivularis* – K; ? *Sphaeralcea remota* (Greene) Fernald]

Kosteletzkya K. Presl 1835 (Seashore-mallow)

A genus of about 15-30 species, herbs, of North America, sub-Saharan Africa, and Madagascar. Perhaps better included in a broadly circumscribed *Hibiscus* (Pfeil & Crisp 2005). References: Blanchard (2008)=Z; Bayer & Kubitzki in Kubitzki & Bayer (2003).

1 Hairs of the fruit 0.5-1.0 (-1.5) mm long; flowering calyx mostly 6-10 mm long, the bractlets mostly 2.5-6 mm long; petals mostly 1.8-3 cm long; [of VA northward] ..... ***K. virginica var. aquilonia***
1 Hairs of the fruit 1.2-2.4 mm long; flowering calyx mostly 8-13 mm long, the bractlets mostly 6-10 mm long; petals mostly 3.2-4.5 mm long; [throughout our area] ..... ***K. virginica var. virginica***

Kosteletzkya virginica (Linnaeus) K. Presl ex A. Gray *var.* ***aquilonia*** Fernald, Northern Seashore-mallow. Cp (VA): brackish to freshwater tidal marshes; common. July-October. NY (Long Island) south to VA. While geographic trends are readily apparent, the recognition of infraspecific taxa is made problematic by the non-correlation of various characters. Blanchard (2008) does not recognize the varieties, and furthermore includes *K. virginica* within the Eurasian *K. pentacarpos*. [= C, F, G; < *Kosteletskya virginica* – RAB, orthographic variant; < *K. virginica* – GW, K; < *K. virginica* – S; < ***K. pentacarpos*** (Linnaeus) Ledebour – Z]

Kosteletzkya virginica (Linnaeus) K. Presl ex A. Gray *var.* ***virginica***, Southern Seashore-mallow. Cp (GA, NC, SC, VA): brackish to freshwater tidal marshes; common. July-October. DE south to FL, west to TX; also in the West Indies. [= C; < *Kosteletskya virginica* – RAB, orthographic variant; < *K. virginica* – GW, K; > *K. virginica* var. *virginica* – F, G; > *K. virginica* var. *althaeifolia* Chapman – F, G; >< *K. virginica* – S; > *K. althaeifolia* (Chapman) Rusby – S; < ***K. pentacarpos*** (Linnaeus) Ledebour – Z]

Malva Linnaeus (Mallow)

A genus of about 40 species, herbs, of temperate Eurasia and montane Africa. References: Bayer & Kubitzki in Kubitzki & Bayer (2003).

1 Upper leaves deeply 5-7-lobed, the sinuses cut over halfway to the middle; petals 2-3.5 cm long; erect perennial ..... ***M. moschata***
1 Upper leaves less deeply lobed, rarely to as deep as halfway to the middle; petals 0.5-2.5 cm long; prostrate to erect annual or biennial.
  2 Epicalyx of 3 oblong-ovate bractlets; petals reddish purple, 2.0-2.5 cm long; biennial, erect, usually not branched at the base... ***M. sylvestris***
  2 Epicalyx of 3 linear or narrowly lanceolate bractlets; petals white or pink, 0.6-1.2 cm long; annual, sprawling, usually branched at the base.
    3 Petals about 2× as long as the sepals..... ***M. neglecta***
    3 Petals about 1× as long as the sepals..... ***M. rotundifolia***

* ***Malva moschata*** Linnaeus, Musk Mallow, Rose Mallow. Mt (NC, VA), Pd (VA): pastures, roadsides, barnyards; rare, native of Europe. Late May-August. [= RAB, C, F, G, K, W]

* ***Malva neglecta*** Wallroth, Common Mallow, Cheeses. Mt, Pd (GA, NC, VA), Cp (VA) {SC}: pastures, roadsides, barnyards; rare, native of Europe. April-October. [= RAB, C, F, G, K, W; = *M. rotundifolia* – S, misapplied]

* ***Malva rotundifolia*** Linnaeus, Small Mallow, Dwarf Mallow, Cheeses. Mt (VA): pastures, roadsides, barnyards; rare, native of Europe. [= C, F, G, K, S; = *M. pusilla*, misapplied]

* ***Malva sylvestris*** Linnaeus, Common Mallow, High Mallow, Cheeses. Cp, Pd (NC, SC, VA), Mt (VA): pastures, roadsides, barnyards; rare, native of Europe. May-July. [= RAB, C, K, S, W; > *M. sylvestris* var. *sylvestris* – F, G; > *M. sylvestris* var. *mauritiana* (Linnaeus) Boissier – F, G]

* ***Malva parviflora*** Linnaeus. SC, MD, FL, etc. [= K] {not yet keyed; synonymy incomplete}

* *Malva verticillata* Linnaeus is reported as an introduction as far south as s. PA (Rhoads & Klein 1993), MD, and WV (Kartesz 1999). [= K; > *M. verticillata* var. *verticillata* – C, F, G; > *M. verticillata* var. *crispa* Linnaeus – C, F, G] {not yet keyed; synonymy incomplete}

Malvastrum A. Gray 1849

A genus of 14 species, herbs, of tropical and warm temperate areas. References: Bates (1967); Bayer & Kubitzki in Kubitzki & Bayer (2003).

Malvastrum hispidum (Pursh) Hochr. Mt (VA): limestone barrens; rare (VA Rare). July-August; August-October. KY, w. VA (Lee Co.), and c. TN, west to IA, KS, and OK. Discovered in our area in 1994 by J.C. Ludwig (Fleming & Ludwig 1996). [= C, K; ? *Malvastrum angustum* A. Gray – G, S; ? *Sphaeralcea angusta* (A. Gray) Fernald – F; = *Sidopsis hispidum* (Pursh) Rydberg; = *Sida hispida* Pursh]

* *Malvastrum coromandelianum* (Linnaeus) Garcke, introduced, south to se. PA (Rhoads & Klein 1993) and NJ (Kartesz 1999). [= K]

Malvaviscus Fabricius 1759 (Wax-mallow)

A genus of 3-4 species, herbs, of tropical and subtropical areas. Perhaps better included in a broadly circumscribed *Hibiscus* (Pfeil & Crisp 2005). References: Turner & Mendenhall (1993)=Z; Bayer & Kubitzki in Kubitzki & Bayer (2003).

* ***Malvaviscus drummondii*** Torrey & A. Gray, Wax-mallow, Turk's-cap Mallow. Cp (FL, GA, NC, SC): disturbed areas; rare, native of TX and n. Mexico. July-October. First reported for NC and SC by Leonard (1971b). Although Turner & Mendenhall (1993) cite Leonard's specimens as *M. arboreus* var. *arboreus*, they were correctly determined by Leonard as *M. drummondii*. Therefore the attribution of *M. arboreus* var. *arboreus* to NC by Kartesz (1999) is an error. [= S; = *M. arboreus* Dillenius ex Cavanilles var. *drummondii* (Torrey & A. Gray) Schery – K, Z; = ***Hibiscus drummondii*** (Torrey & A. Gray) M.J. Young]

Melochia Linnaeus (Chocolate-weed)

A genus of about 54 species, of tropical regions, especially America. References: Brizicky (1966)=Y; Bayer & Kubitzki in Kubitzki & Bayer (2003).

1 Petioles >1.5 cm long; pubescence of the stem and leaves sparse, of stellate, forked, and/or simple hairs; cymes terminal on primary and secondary branches.....***M. corchorifolia***
1 Petioles < 1 cm long; pubescence of the stem and leaves dense (tomentose), of stellate hairs; cymes in upper leaf axils.....***M. spicata***

* ***Melochia corchorifolia*** Linnaeus, Chocolate-weed. Cp (FL, GA, NC, SC): sandy fields, especially in low, wet places; uncommon, native of the Old World tropics. [= RAB, GW, K, S, Y, Z]
*? ***Melochia spicata*** (Linnaeus) Fryxell. Cp (FL, GA*): disturbed areas; rare, native of tropical America, the original distribution uncertain. In GA (Kartesz 1999) and FL (Brizicky 1966). [= K; = *Riedlea hirsuta* (Cavanilles) Alphonse de Candolle – S; = *Melochia villosa* (P. Miller) Fawcett & Rendle – Y]

Modiola Moench 1794 (Bristly-mallow)

A monotypic genus, an herb, of North America, Central America, and South America. References: Bayer & Kubitzki in Kubitzki & Bayer (2003).

Modiola caroliniana (Linnaeus) G. Don, Bristly-mallow. Cp, Pd (GA, NC, SC, VA): lawns, roadsides, disturbed areas, pondshores; uncommon (adventive in part of its range in our area). Late March-June (sometimes later). Ranging as a native from SC south to FL, west to TX, south into the tropics. [= RAB, C, F, G, GW, K, S]

Napaea Linnaeus 1753 (Glade-mallow)

A monotypic genus, an herb, of temperate c. North America. References: Bayer & Kubitzki in Kubitzki & Bayer (2003).

Napaea dioica Linnaeus, Glade-mallow. Mt (VA): floodplains; rare. June-August. PA and IA south to sw. VA and s. IL. The original distribution of this scarce species is difficult to determine. See the interesting discussion of this species' occurrence in VA in Wieboldt et al. (1998). [= C, F, G, K]

Pavonia Cavanilles 1787

A genus of about 150 species, of tropical and subtropical areas. Perhaps better included in a broadly circumscribed *Hibiscus* (Pfeil & Crisp 2005). References: Bayer & Kubitzki in Kubitzki & Bayer (2003).

1 Leaves hastate; calyx lobes broadly ovate; carpels un-awned; [introduced species of disturbed habitats].....***P. hastata***
1 Leaves ovate; calyx lobes lanceolate; carpels with 3 apical awns up to 10 mm long; [rare native].....***P. spinifex***

* ***Pavonia hastata*** Cavanilles, Swampmallow. Cp (GA): disturbed areas; rare, native of tropical America. In se. GA (Jones & Coile 1988). [= K, S]

Pavonia spinifex (Linnaeus) Cavanilles, Gingerbush. Cp (FL, SC): hammocks; rare. Reported for the vicinity of Charleston, SC on the basis of a specimen collected by Bachman (Chapman 1878). Small (1933) considers this species as likely native, at least in FL. [= K, S]

Sida Linnaeus 1753 (Sida)

A genus of about 100 species, shrubs and herbs, of tropical, subtropical, and warm temperate areas. References: Fryxell (1985)=Z; Fuertes, Fryxell, & Jansen (2003); Siedo (1999)=Y; Verdcourt (2004)=X; Bayer & Kubitzki in Kubitzki & Bayer (2003). Key adapted in part from Z.

1 Leaves deeply palmately lobed; plants 1-2 (-4) m tall; petals white; [section *Pseudonapaea*, to be removed from *Sida*]..... ***S. hermaphrodita***
1 Leaves unlobed; plants 0.2-1 m tall; petals yellow.
  2 Mericarps, styles, and stigmas 5; leaves usually truncate to subcordate at the base; [section *Spinosae*] ..... ***S. spinosa***
  2 Mericarps, styles, and stigmas (6-) avg. 10 (-13); leaves usually cuneate to rounded at the base.
    3 Leaves narrowly elliptic to linear, (3-) 4-20× as long as wide; [section *Ellipticifoliae*]..... ***S. elliottii** var. **elliottii***
    3 Leaves elliptic-rhombic, mostly 2-3× as long as wide; [section *Sidae*].
      4 Leaves and branches borne distichously; stipules usually falcate, several-veined..... ***S. acuta***
      4 Leaves and branches borne spirally; stipules linear, 1 (-3)-veined..... ***S. rhombifolia** var. **rhombifolia***

Sida acuta Burman f., Broomweed. Cp (GA, SC): disturbed areas; uncommon (rare in GA and SC), native of the Tropics, the original northern limit uncertain. June-October. [= K, WH, Z; *? S. carpinifolia* Linnaeus f. – RAB, S; ? *S. ulmifolia* P. Miller]

Sida elliottii Torrey & A. Gray *var.* ***elliottii***, Coastal Plain Sida. Cp (GA, NC, SC, VA), Pd (NC), Mt (GA): stream banks, sandy openings, pineland pond margins, limestone glades and barrens; uncommon (GA Special Concern). July-October. Var. *elliottii* ranges from se. VA south to n. FL, west to LA and north in the interior to c. TN and se. MO. A second variety, var. *parviflora* Chapman, occurs in Peninsular FL, se. TX, and through montane e. Mexico to Guatemala. *S. inflexa*, of se. VA and ne. NC, is alleged to differ as follows: *S. inflexa* with calyx 7-10 mm long, leaves elliptic to narrowly elliptic, 4-20 mm wide, (3-) 4-10× as long as wide (vs. *S. elliottii* var. *elliottii* with calyx 5-7 mm long; leaves narrowly lanceolate to linear, 1.5-7 mm wide, 10-20× as long as wide). [= Y; < *S. elliottii* – RAB, C, F, G, K, S, Z; > *S. inflexa* Fernald – F, K, Z]

Sida hermaphrodita (Linnaeus) Rusby, Virginia Sida, Virginia-mallow. Mt, Pd (VA): sandy or rocky areas along riverbanks; rare. July-August. C. PA and MD west to s. OH, south to DC, WV, w. VA, and ne. TN; disjunct in nw. OH, ne. IN, and s. MI (where presumably native) and with additional collections from e. MA, NY (Long Island), and s. NJ (where probably adventive) (Spooner et al. 1985). Fryxell (1985) comments that this species is so different from the rest of the genus that "one might plausibly argue that it be elevated to generic rank." A molecular phylogenetic analysis suggests that its affinities are not with *Sida*, but with the South American *Sidasodes* (Fuertes, Fryxell, & Jansen 2003). Spooner et al. (1985) provide a detailed review of the species. [= C, F, G, K, S, W, Z]

* ***Sida rhombifolia*** Linnaeus *var.* ***rhombifolia***, Arrowleaf Sida. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, SC): roadsides, fields, gardens, disturbed areas; common. April-October. Verdcourt (2004) discusses variation in this taxon, and suggests that "studies throughout the entire range of the species will necessitate recognition of more than one species." He recognizes 6 varieties in e. Africa, aside from the Linnaean var. *rhombifolia* (with type in Jamaica). [= X; < *S. rhombifolia* – RAB, C, F, G, K, S, W, Z]

* ***Sida spinosa*** Linnaeus, Prickly Sida, Prickly-mallow, False-mallow. Cp, Pd, Mt (GA, NC, SC, VA): disturbed areas, wet fields; common, native of the Tropics. June-November. [= RAB, C, F, G, K, S, W, Z]

Sida cordifolia Linnaeus. Cp (AL, FL): disturbed sandhills, disturbed hammocks; rare, native of tropical America. [= K, WH] {not yet keyed; synonymy incomplete}

Tilia Linnaeus (Basswood, Whitewood, Linden, Linn)

A genus of about 25-45 species, trees, of temperate regions of North America, Europe and Asia. Hardin's (1990) treatment of American *Tilia* seems a practical and reasonable approach; it gives taxonomic status to the more distinctive (and geographically based) elements of variation, while recognizing the intergradational nature of the variation. Further investigation of this complex group is, however, warranted. References: Hardin (1990)=Z; Bayer & Kubitzki in Kubitzki & Bayer (2003). Key adapted from Hardin (1990).

Identification notes: While the varieties treated below are broadly distinctive and have definite geographic distributions across e. North America, they are imperfectly distinct in geographic areas of overlap. In our area, their identification is particularly problematic in Virginia, where individuals in many parts of the state show intergradation between the northern var. *americana* and the Southern and Central Appalachian var. *heterophylla*.

1 Lower leaf surfaces puberulent with bulbous glands, acicular trichomes, and (rarely) sparsely scattered stellate trichomes; fruiting peduncles and pedicels glabrous or sometimes puberulent; [generally northern, south to VA and w. NC]..... ***T. americana** var. **americana***
1 Lower leaf surfaces usually tomentose or becoming puberulent, with bulbous glands, acicular trichomes, and a predominance of stellate or fasciculate trichomes; fruiting peduncles and pedicels stellate-tomentulose (becoming puberulent in age); [collectively widespread in our area].
  2 Lower leaf surfaces pale or whitish, densely stellate tomentose with appressed, sessile-stellate trichomes obscuring the surface (rarely becoming puberulent with age but with some stellate trichomes persisting along major veins, the margin, and/or the apex; lateral buds 5-8 mm long; pericarp 0.8-1.0 mm thick; [widespread in our area]..... ***T. americana** var. **heterophylla***
  2 Lower leaf surfaces grayish or brownish, loosely but densely tomentose with fasciculate and/or stipitate-stellate trichomes, either remaining tomentose or becoming puberulent, or puberulent from emergence and green beneath; lateral buds 3-5 mm long; pericarp 0.5-0.6 mm thick; [generally southern, Coastal Plain and Piedmont of NC, SC, GA and southward and westward]..... ***T. americana** var. **caroliniana***

Tilia americana Linnaeus *var.* ***americana***, Northern Basswood. Mt (NC, VA), Pd, Cp (VA): rich coves, rocky slopes, metabasalt boulderfileds, rich north-facing river bluffs, calcareous Coastal Plain ravines; common (rare in NC) (NC Watch List). June; August-September. New Brunswick and Manitoba south to e. VA, w. NC, and OK. In VA, var. *americana* occurs throughout the northern half of the state, with scattered populations southward in the mountains. [= C, K, Z; = *T. americana* – RAB, G, W; > *T. americana* – F; > *T. neglecta* Spach – F, S; > *T. glabra* Ventenat – S; > *T. truncata* Spach – S]

Tilia americana Linnaeus *var.* ***caroliniana*** (P. Miller) Castig., Southern Basswood, Carolina Basswood. Cp (FL, GA, NC), Pd (GA, NC, SC): mesic forests, in the outer Coastal Plain usually associated with shell deposits, Indian shell middens, or underlying coquina limestone ("marl"); uncommon. June-July; July-August. NC south to c. peninsular FL and west to OK and c. TX. [= K, WH, Z; > *T. caroliniana* P. Miller – RAB, S; > *T. floridana* Small – RAB, F, S; > *T. georgiana* Sargent – S; > *T. littoralis* Sargent – S]

Tilia americana Linnaeus *var.* ***heterophylla*** (Ventenat) Loudon, Mountain Basswood, White Basswood, Linn. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): rich coves and mesic to dry slopes (the drier sites usually on limestone), often one of the most abundant trees in Southern Appalachian cove forests; common, rare in Coastal Plain. June; July-August. Centered in the Southern Appalachians: sw. PA and WV south to c. NC, wc. GA, FL panhandle, and westward as disjunct populations to the Ozarkian Highlands of s. MO and n. AR. In VA, var. *heterophylla* dominates the scene in sw. VA and along southern Piedmont river bluffs, with disjunct populations in calcareous ravines in the upper Coastal Plain (Surry County); it also extends less commonly into the northern VA mountains and foothills, where var. *americana* is more prevalent, but seems to be absent (or very uncommon) in the Potomac valley east of the Blue Ridge. [= C, K, WH, Z; = *T. heterophylla* Ventenat – RAB, F, W; > *T. heterophylla* – G, S; > *T. monticola* Sargent – G; > *T. australis* Small - S; > *T. eburnea* Ashe – S; > *T. lasioclada* Sargent – S; > *T. michauxii* Nuttall – S; > *T. venulosa* Sargent]

Several European species are planted as street or yard trees; they differ from the native species in having smaller leaves (usually 4-12 cm long vs. 8-25 cm long) and lacking staminodes. Three of the more commonly planted species are *T. platyphyllos* Scopoli, *T. cordata* P. Miller, and *T.* ×*vulgaris* Hayne [*cordata* × *platyphyllos*]. Planted material should be identified by using appropriate manuals of cultivated species.

Triumfetta Linnaeus

A genus of about 70-150 species, trees, shrubs, and herbs, of tropical regions. References: Bayer & Kubitzki in Kubitzki & Bayer (2003).

* ***Triumfetta semitriloba*** Jacquin. Cp (GA): disturbed areas; rare, native of tropical America. In sw. GA (Jones & Coile 1988) and s. peninsular FL. [= K, S, WH]

Urena Linnaeus (Caesarweed)

A genus of about 6 species, of tropical and subtropical regions. References: Bayer & Kubitzki in Kubitzki & Bayer (2003).

* ***Urena lobata*** Linnaeus, Caesarweed, Bur Mallow, Congo Jute. Cp (FL, LA, SC): roadsides and vacant lots; rare, native of se. Asia. Introduced to se. SC via landscaping plantings, spreading to vacant lots and roadsides (P. McMillan, pers. comm., 2005). [= GW, K, S, WH]

MARTYNIACEAE Stapf 1895 (Martynia Family)

A family of 5 genera and about 16 species, herbs, tropical and subtropical. Bretting & Nilsson (1988) present evidence for maintaining the Martyniaceae as distinct from the Pedaliaceae. References: Ihlenfeldt in Kadereit (2004).

Proboscidea Schmidel 1763 (Unicorn-plant)

A genus of about 9 species, herbs, of warm temperate to subtropical America. References: Thieret (1977)=Y; Bretting & Nilsson (1988)=Z; Ihlenfeldt in Kadereit (2004).

* ***Proboscidea louisianica*** (Miller) Thellung, Unicorn-plant, Devil's-claw, Cow Catcher. Pd (GA, NC, SC), Cp (FL, GA, VA): disturbed areas; rare, native of farther west and south (apparently native to the Mississippi valley). The curious fruits are unmistakable. [= RAB, F, GW, Y; = *P. louisiana* – C, G, orthographic variant; = *Martynia louisiana* Miller – S; > *P. louisianica* ssp. *louisianica* – K, Z]

MELASTOMATACEAE A.L. de Jussieu 1789 (Melastome Family)

A family of about 200 genera and 4500-5000 species, trees, shrubs, vines, and herbs, of tropical, subtropical , and warm temperate areas.

Rhexia Linnaeus 1753 (Meadow-beauty)
(by Richard J. LeBlond)

A genus of about 15 species, herbs, of North America. *Rhexia* is the only genus of the Melastomataceae to occur in North America north of s. FL. References: Kral & Bostick (1969)=Z; Bounds (1987); Wurdack & Kral (1982); Snyder (1996).

Identification notes: Measurements of the hypanthium are to the base of the calyx lobes.

1 Anthers straight, ca. 2 mm long.
- 2 Stem internodes with at least some hairs; leaves oblong, linear, or spatulate; petals yellow ..... ***Rh. lutea***
- 2 Stem internodes glabrous; leaves ovate, suborbicular, or widely elliptic; petals lavender-rose to pink.
  - 3 Calyx segments blunt to acute; floral tube glandular-pubescent; surface of seeds irregularly ridged ..... ***Rh. nuttallii***
  - 3 Calyx segments acuminate-aristate; floral tube nearly glabrous except along the calyx lobes; surface of seeds pebbled ..... ***Rh. petiolata***

1 Anthers curvate, 5-11 mm long.
- 4 Stem nodes and internodes glabrous; stem and foliage blue-green ..... ***Rh. alifanus***
- 4 Stem nodes and usually also the internodes hirsute; stem and foliage green.
  - 5 Sepal lobes aristate, the awn-tip 0.5-1.5 mm long, and also with flaring, yellowish, stiff hairs 3-5 mm long ..... ***Rh. aristosa***
  - 5 Sepal lobes obtuse to acuminate, not aristate, the hairs shorter and not yellowish or stiff.
    - 6 Leaves 1-5 (-8) mm wide, linear, linear-elliptic, narrowly oblong, or narrowly spatulate.
      - 7 Four stem faces subequal, the angles narrowly winged; mature hypanthium neck shorter than body; calyx lobes 1.5-2 mm long; anthers 4-5 mm long ..... ***Rh. salicifolia***
      - 7 Four stem faces markedly unequal, the angle wings inconspicuous or absent; mature hypanthium neck as long as or longer than body; calyx lobes 2-4 mm long; anthers 5-10 mm long.
        - 8 Petals lavendar-rose, (1-) 1.5-2 (-2.5) cm long; mature hypanthium 10-14 mm long, with glandular hairs; marginal nerves of leaf abaxial surface either absent or obscure and discontinuous; anthers 7-10 mm long ..... ***Rh. cubensis***
        - 8 Petals white to pink (-rose-purple), (7-) 0.9-1.4 cm long; mature hypanthium 6-10 mm long, glabrous or sparsely glandular-hairy; marginal nerves of leaf abaxial surface prominent; anthers 5-8 mm long ..... ***Rh. mariana** var. **exalbida***
    - 6 Leaves (5-) 7-20 (-35) mm wide, lanceolate, elliptic, or ovate.
      - 9 Four stem faces at mid-stem markedly unequal, one pair of opposite faces broader, convex, darker green, the narrower pair concave or flat, pale.
        - 10 Mature hypanthium 6-10 (-11) mm long, glandular-setose; petals 12-15 (-18) mm long, glabrous on the lower surface; anthers 5-8 mm long ..... ***Rh. mariana** var. **mariana***
        - 10 Mature hypanthium (9-)10-15 (-20) mm long, glabrous or glabrate; petals (18-) 20-25 mm long, glandular-hairy on the lower surface (best seen in bud); anthers 8-11 mm long ..... ***Rh. nashii***
      - 9 Four stem faces at mid-stem about equal, almost flat, the angles sharp or winged.
        - 11 Roots tuberous; stem angles at mid-stem conspicuously winged; hypanthium 7-10 mm long, the neck shorter than the body ..... ***Rh. virginica***
        - 11 Roots not tuberous; stem angles sharp to narrowly winged; hypanthium 10_13 mm long, the neck as long as or longer than the body.
          - 12 Seeds irregularly ridged in concentric lines; [west of the Appalachians] ..... ***[Rh. mariana** var. **interior]***
          - 12 Seeds papillate, the papillae in concentric lines; [from NJ to SC, east of the Appalachians] ..... ***Rh. mariana** var. **ventricosa***

Alternate Key based largely on vegetative characters

1 Stem internodes glabrous.
- 2 Stem nodes as well as internodes glabrous, leaf margins entire or remotely low-toothed apically, glabrous ..... ***Rh. alifanus***
- 2 Stem nodes hirsute, leaf margins toothed, the teeth often tipped with hairs.
  - 3 Longest leaves 1.5 (-2) cm long, ovate or suborbicular ..... ***Rh. nuttallii*** **or** ***Rh. petiolata***
  - 3 Longest leaves > 2 cm long, lanceolate, elliptic, or ovate.
    - 4 Rhizomes present, roots not tuberiferous or spongy-thickened ..... ***Rh. mariana** var. **ventricosa***
    - 4 Rhizomes absent, roots tuberiferous or spongy-thickened.
      - 5 Stem leaves gradually reduced upward ..... ***Rh. virginica***
      - 5 Stem leaves gradually lengthening from the base to mid-stem ..... ***Rh. aristosa***

1 Stem internodes (and nodes) hirsute or glandular-hairy.
- 6 Leaves linear, narrowly elliptic, or broadest above the middle.
  - 7 Plant bushy-branched ..... ***Rh. lutea***
  - 7 Plant simple below the cymose inflorescence.
    - 8 Mature hypanthium 10-14 mm long, with glandular hairs; petals lavendar-rose, 1.5-2.0 cm long ..... ***Rh. cubensis***
    - 8 Mature hypanthium 6-10 mm long, glabrous or sparsely glandular-hairy; petals white, 1.2-1.5 cm long ..... ***Rh. mariana** var. **exalbida***
- 6 Leaves lanceolate, elliptic, or ovate, broadest at or below the middle.
  - 9 Four stem faces at mid-stem about equal, almost flat, the angles sharp or winged.
    - 10 Rhizomes present, roots not tuberiferous or spongy-thickened ..... ***Rh. mariana** var. **ventricosa***
    - 10 Rhizomes absent, roots tuberiferous or spongy-thickened ..... ***Rh. virginica***
  - 9 Four stem faces at mid-stem markedly unequal, one pair of opposite faces broader, convex, darker green, the narrower pair concave or flat, pale.
    - 11 Mature hypanthium 6-10 mm long, glandular-hairy; petals 1.2-1.5 cm long, glabrous on the lower surface ..... ***Rh. mariana** var. **mariana***
    - 11 Mature hypanthium 10-15 mm long, glabrous or glabrate; petals 2.0-2.5 cm long, glandular-hairy on lower surface (best seen in bud) ..... ***Rh. nashii***

Rhexia alifanus Walter, Smooth Meadow-beauty. Cp (GA, NC, SC): pine flatwoods and savannas, pocosins borders, more able to tolerate merely moist soils than other *Rhexia* species; common. May-September. A Southeastern Coastal Plain species: e. NC south to n. FL and west to se. Texas. Our tallest and showiest *Rhexia*: the unbranched (unless injured), wandlike stems, with strongly ascending, bluish-green, generally entire leaves make this species unmistakeable. [= RAB, GW, K, S, Z]

Rhexia aristosa Britton, Awned Meadow-beauty, Bristly Meadow-beauty. Cp (GA, NC, SC): clay-based Carolina bays, depression meadows, and limesink ponds (dolines); rare. June-September. This species has a very local and disjunct range extending (strictly on the Coastal Plain) from NJ south to AL. The long yellowish bristles at the summit of the calyx/hypanthium are diagnostic. *Rh. aristosa* × *virginica* is known from the Coastal Plain of NJ (Snyder 1996). [= RAB, C, F, G, GW, K, S, Z]

Rhexia cubensis Grisebach, West Indies Meadow-beauty. Cp (GA, NC, SC): limesink ponds (dolines); rare (NC Rare). June-September. Se. NC south to s. FL and west to sw. MS; also in the West Indies. [= RAB, GW, K, S, Z]

Rhexia lutea Walter, Yellow Meadow-beauty, Golden Meadow-beauty. Cp (GA, NC, SC): wet pine flatwoods and savannas, seepage slopes, and bogs; uncommon. April-July (and later in response to growing-season fire). A Southeastern Coastal Plain species: e. NC south to n. FL and west to se. TX. The only yellow-flowered *Rhexia* and also our bushiest species. [= RAB, GW, K, S, Z]

Rhexia mariana Linnaeus *var.* ***exalbida*** Michaux, White Meadow-beauty. Cp, Pd (GA, NC, SC): wet pine flatwoods and savannas, wet meadows, ditches, and wet roadsides; uncommon. June-September. NC south to FL and west to MS. Merging into *Rh. mariana* var. *mariana* from FL westward, var. *exalbida* appears quite distinct in NC. The white flowers and linear leaves are diagnostic. [= RAB; *Rh. lanceolata* – S; < *Rh. mariana* var. *mariana* – GW, K, Z]

Rhexia mariana Linnaeus *var.* ***mariana***, Maryland Meadow-beauty, Dull Meadow-beauty, Pale Meadow-beauty. Cp, Pd, Mt (GA, NC, SC, VA): pine flatwoods, wet meadows, bog margins, ditches, wet roadsides, often weedy; common. May-October. E. MA south to FL, west to TX, and north to s. IN and IL. [= RAB, G, W; < *Rh. mariana* var. *mariana* – F, GW, K, Z (also see *Rh. mariana* var. *exalbida*); > *Rh. mariana* var. *leiosperma* Fernald & Griscom – F; *? Rh. delicatula* Small – S]

Rhexia mariana Linnaeus *var.* ***ventricosa*** (Fernald & Griscom) Kral & Bostick, Swollen Meadow-beauty. Cp (NC, SC, VA), Pd (NC, VA): pine flatwoods and savannas, clearings in cypress-hardwood swamps, ditches, wet roadsides; uncommon. June-September. NJ south to SC. This variety is closely related to *Rh. mariana* var. *interior* (Pennell) Kral & Bostick, occurring west of the mountains. Gleason & Cronquist (1991) prefer to retain *Rh. interior* Pennell at the species level and hedge relative to the distinctiveness of *Rh. ventricosa*. [= GW, K, W, Z; = *Rh. ventricosa* Fernald & Griscom – RAB, F; < *Rh. interior* Pennell – C]

Rhexia nashii Small, Hairy Meadow-beauty. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): wet pine flatwoods and savannas; pondshores, bogs, marshes, ditches, wet roadsides; common (uncommon in Piedmont). May-October. Primarily a Southeastern Coastal Plain species: e. VA south to s. FL and west to se. LA. [= GW, K, S, Z; = *Rh. mariana* var. *purpurea* Michaux – RAB, F, G]

Rhexia nuttallii C.W. James, Nuttall's Meadow-beauty. Cp (GA): pine flatwoods, bogs; rare. Coastal Plain of se. GA west to FL Panhandle, south to s. peninsular FL. [= GW, K, Z; = *Rh. serrulata* Nuttall – S]

Rhexia parviflora Chapman, Small-flowered White Meadow-beauty. Cp (GA): limesink pond margins; rare. Occurs in sw. GA (Mitchell County) south into Panhandle FL. [= GW, K, S, Z]

Rhexia petiolata Walter, Ciliate Meadow-beauty, Short-stemmed Meadow-beauty. Cp (GA, NC, SC, VA), Pd (GA, SC): wet pine flatwoods and savannas, pocosin borders, and ditches; common (rare in VA). June-September. May-October. A Southeastern Coastal Plain endemic: se. VA south to n. FL and west to se. TX. The flowers are sessile, the petals ascending. [= RAB, C, G, GW, K, Z; = *Rh. ciliosa* Michaux – F, S]

Rhexia salicifolia Kral & Bostick, Willowleaf Meadow-beauty. Cp (AL, FL, GA): drawdown zones of Coastal Plain depression ponds and interdune swales; rare. Sw. Ga and FL Panhandle west to s. AL (Jensen 2007). [= GW, K, Z]

Rhexia virginica Linnaeus, Virginia Meadow-beauty, Deergrass, Handsome Harry, Wing-stem Meadow-beauty. Mt, Cp, Pd (GA, NC, SC, VA): wet pine flatwoods and savannas, pond shores, bogs, and ditches; common (uncommon in NC Piedmont and NC Coastal Plain). May-October. E. Canada and WI south to n. FL and TX. [= C, G, GW, K, W, Z; > *Rh. virginica* var. *purshii* (Sprengel) C.W. James – RAB; > *Rh. virginica* var. *virginica* – RAB, F; > *Rh. virginica* var. *septemnervia* (Walter) Pursh – F; = *Rh. stricta* Pursh – S]

Rhexia mariana Linnaeus var. *interior* (Pennell) Kral & Bostick. Moist to wet areas, ditches, prairies. S. IN, s. IL, s. MO, and se. KS south to c. AL, c, MS, n. LA, and se. OK. [= GW, K, Z; < *Rh. interior* – C; = *Rh. interior* Pennell – F, G]

MELIACEAE A.L. de Jussieu 1789 (Mahogany Family)

A family of about 50 genera and 565 species, trees and shrubs, of tropical and subtropical areas. The only native member of the family in e. North America is *Swietenia mahogani* (Linnaeus) Jacquin (West Indian Mahogany), a very valuable timber tree which ranges north to s. FL. References: Miller (1990)=Z in the synonymy.

Melia Linnaeus 1753 (Chinaberry)

A genus of 3 species, trees, of the Old World tropics.

* ***Melia azedarach*** Linnaeus, Chinaberry, Carolina Mahogany, Umbrella-tree, Pride-of-India. Cp, Pd (GA, NC, SC, VA), Mt (NC): disturbed areas, abandoned rural yards and fields; common (rare in the Mountains), native to se. Asia, commonly

cultivated in our area (mainly in the Coastal Plain) and commonly escaped. April-May; September-October. Rural children often play with the bony drupes, which are poisonous if ingested. [= RAB, C, F, G, K, S, Z]

MENISPERMACEAE A.L. de Jussieu 1789 (Moonseed Family)

A family of about 72 genera and 450 species, vines, shrubs, trees, and herbs, ot tropical, subtropical, and warm temperate areas. References: Rhodes in FNA (1997); Kessler in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves asymmetrically peltate (the stem attached 1-5 mm in from the leaf margin); stamens 12-24; petals 6-9; fruit bluish-black; [tribe *Menispermeae*] ..... ***Menispermum***
1 Leaves not peltate, usually cordate (the stem attached at the leaf margin); stamens 6 or 12; petals 6 or 0; fruit red or bluish-black.
  2 Leaves 3-7-lobed, the sinuses usually deep, the lobes acute; stamens 12; petals 0; fruit bluish-black, 13-25 mm long; [tribe *Tinosporeae*] ... ***Calycocarpum***
  2 Leaves entire to 3-lobed, the sinuses always shallow, the lobes (if present) broadly rounded; stamens 6; petals 6; fruit red, 5-8 mm long; [tribe *Menispermeae*] ..... ***Cocculus***

Calycocarpum Nuttall ex Torrey & A. Gray 1838 (Cupseed)

A monotypic genus, a woody vine, of e. North America. References: Kessler in Kubitzki, Rohwer, & Bittrich (1993).

Calycocarpum lyonii (Pursh) A. Gray, Cupseed, Lyonia-vine. Cp (GA, SC), Pd, Mt (GA): floodplain forests; rare. May-June. Ranging from nw. GA, s. IN, and MO, south to se. SC, e. GA, Panhandle FL, and LA; some of the easternmost occurrences may be adventive or introduced. [= C, F, FNA, G, K, S]

Cocculus A.P. de Candolle 1817 (Coralbeads, Snailseed)

A genus of 8 species, woody vines, shrubs, and trees, of tropical, subtropical, and warm temperate regions of North America, Central America, Africa, Madagascar, India, Malaysia, and the Philippines. References: Kessler in Kubitzki, Rohwer, & Bittrich (1993).

Cocculus carolinus (Linnaeus) A.P. deCandolle, Coralbeads, Carolina Moonseed, Snailseed, Red Moonseed. Cp, Pd, Mt (GA, NC, SC, VA): moist to dry forests and thickets; common (rare in VA and in the Mountains of GA, NC, and SC). June-August. VA south to FL, west to TX, north in the interior to s. IN and MO. Its occurrences in VA may be primarily adventive. [= RAB, C, F, FNA, G, K, W; = *Epibaterium carolinum* (Linnaeus) Britton – S]

Menispermum Linnaeus 1753 (Moonseed)

A genus of 2-4 species, vines, of temperate e. North America and temperate e. Asia. References: Kessler in Kubitzki, Rohwer, & Bittrich (1993).

Menispermum canadense Linnaeus, Moonseed, Yellow Parilla. Pd, Cp (GA, NC, SC, VA), Mt (GA, NC, VA): moist nutrient-rich forests, especially on floodplains or lower slopes; common. June-August. Québec west to Manitoba, south to GA and OK. [= RAB, C, F, FNA, G, K, S, W]

MENYANTHACEAE Dumortier 1829 (Buckbean Family)

A family of about 5 genera and 40 species, wetland herbs, of cosmopolitan distribution. References: Wood (1983b)=Z.

1 Leaves trifoliate; inflorescence a raceme ..... ***Menyanthes***
1 Leaves simple; inflorescence an umbel ..... ***Nymphoides***

Menyanthes Linnaeus 1753 (Buckbean, Bogbean)

The genus is monotypic, an herb, circumboreal. References: Wood (1983a)=Z

Menyanthes trifoliata Linnaeus, Buckbean, Bogbean. Mt (MD, NC, VA, WV), {DE}: mountain bogs at high elevations over amphibolite (in the Blue Ridge), boggy marshes over calcareous rocks (in the Ridge and Valley), {}; rare. May-June. This circumboreal species is widespread in n. North America and n. Eurasia, ranging south in North America to NJ, DE, w. VA, IN, MO, and CA, and disjunct to Long Hope Valley, Watauga County, NC. The NC populations are disjunct about 400 km from the next nearest populations in VA. McDowell (1984) reported the first documentation of the species for NC. [= C, G, K, W, Z; > *M. trifoliata* var. *minor* Rafinesque – F]

Nymphoides Séquier 1754 (Floating Heart)

A genus of about 20 species, aquatic herbs, cosmopolitan. References: Wood (1983a)=Z; Burks (2002).

Identification notes: As the scientific name indicates, the leaves of *Nymphoides* bear a superficial resemblance to those of *Nymphaea*. The leaves of *Nymphoides* are more cordate, the two basal lobes more rounded, rather than having a rather sharp corner or angle. *Nymphoides cordata* has much smaller leaves than *Nymphaea*, while the thickly pebbled texturing of *Nymphoides aquatica* is very unlike the glossy smoothness of *Nymphaea*.

1 Flowers yellow; floating stems usually with multiple leaves; capsules 12-25 mm long ..... ***N. peltata***
1 Flowers white; floating stems with single leaves; capsules 3-14 mm long.
  2 Adaxial petal surface bearing a ruffled crest down its length in the middle ..... ***N. cristata***
  2 Adaxial petal surface not crested.
    3 Leaves 5-15 cm wide, roughly pebbled below, thick in texture; stems 1.3-2.5 mm in diameter a few cm below the inflorescence, with conspicuous red spots; tuberous roots of floating clusters stout, blunt-tipped; seeds conspicuously papillate; capsule 10-14 mm long ..... ***N. aquatica***
    3 Leaves 3-7 cm wide, smooth below, thin in texture; stems 0.6-0.9 mm in diameter a few cm below the inflorescence, rarely spotted with red; tuberous roots of floating clusters slender, with pointed tips; seeds smooth (rarely papillate); capsule 4-5 mm long ..... ***N. cordata***

Nymphoides aquatica (Walter ex J.F. Gmelin) Kuntze, Big Floating Heart, Banana Floating Heart. Cp (FL, GA, NC, SC, VA) {AL, DE, LA, MD, MS}: limesink ponds (dolines), other acidic and nutrient-poor water-filled depressions, sluggish streams, beaverponds, primarily in the Outer and Middle Coastal Plain; uncommon (rare in VA). Late April-September. A Southeastern Coastal Plain endemic: NJ south to FL and west to TX. [= RAB, C, F, GW, K, S, Z; = *N. aquaticum* – G, orthographic variant]

Nymphoides cordata (Elliott) Fernald, Little Floating Heart. Cp (FL, GA, NC, SC) {AL, DE, LA, MD, MS}: upland depression ponds, sluggish streams, beaverponds, primarily in the fall-line Sandhills; uncommon. Widespread (though in many parts of its range local) in e. North America, from Newfoundland and Ontario south to FL and LA. [= RAB, C, F, GW, K, Z; = *N. cordatum* – G, orthographic variant; *N. lacunosa* (Ventenat) Kuntze – S, misapplied]

* ***Nymphoides cristata*** (Roxburgh) Kuntze, Crested Floating Heart, Water Snowflake. Cp (FL, SC): ponds and lakes; rare, native of China and India. Apparently first naturalizing in North America in FL in 2000; introduced for water gardens and aquariums.

* ***Nymphoides peltata*** (S.G. Gmelin) Kuntze, Yellow Floating Heart. Pd (NC, VA) {KY, MD, MS, TN}: ponds; rare, native of Europe. This European native is sparingly naturalized in e. North America; it is sold for cultivation in water gardens, and will likely become more widely naturalized. [= C, F, K; = *N. peltatum* – G, orthographic variant]

MOLLUGINACEAE Hutchinson 1926 (Carpetweed Family)

A family of about 13-14 genera and 120-125 species, herbs, of tropical and warm temperate areas. References: Vincent in FNA (2003b); Boetsch (2002)=Z; Endress & Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

Mollugo Linnaeus 1753 (Carpetweed)

A genus of about 35 species, annual herbs, of tropical and subtropical regions of both hemispheres, introduced in temperate regions. References: Endress & Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Mollugo verticillata*** Linnaeus, Carpetweed, Indian-chickweed. Cp, Pd, Mt (GA, NC, SC, VA): fields, disturbed areas, drawdown zones on river- and pond-shores; common, native of tropical America. May-November. [= RAB, C, F, FNA, G, GW, K, S, W, Z]

MORACEAE Lindley 1847 (Mulberry Family)

A family of about 38 genera and 1100 species, trees, shrubs, vines, and herbs, of tropical, subtropical, and (few) warm temperate areas. References: Wunderlin in FNA (1997); Rohwer & Berg in Kubitzki, Rohwer, & Bittrich (1993).

1 Herb, 0.3-1.0 m tall; stem without latex; [tribe *Moreae*] ..... ***Fatoua***
1 Shrub or tree, at maturity over 1 m tall, or woody vine growing appressed to masonry; stem bearing translucent to milky-white latex.
  2 Stipules connate, the stipule scar encircling the twig; inflorescence a syconium (the flowers borne on the inner walls of the fleshy receptacle); [tribe *Ficeae*] ..... ***Ficus***
  2 Stipules free, the stipule scar not encircling the twig; inflorescence a spike, head, or catkin (the flowers borne exposed on a contracted or elongated axis or receptacle); [tribe *Moreae*].
    3 Leaves entire, unlobed or shallowly 3-lobed; stems usually thorny.
      4 Fruit 2-3 cm in diameter; petioles 5-20 mm long; leaves 3-7 (-10) cm long ..... ***Cudrania***
      4 Fruit 10-15 cm in diameter; petioles 30-50 mm long; leaves 6-20 cm long ..... ***Maclura***

3 Leaves serrate, often also 3-15-lobed (the lobes sometimes deep); stems not thorny.
5 Stems and leaves hirsute; leaves alternate, opposite, and whorled..... ***Broussonetia***
5 Stems and leaves glabrous to pubescent; leaves alternate..... ***Morus***

Broussonetia L'Héritier ex Ventenat 1799 (Paper Mulberry)

A genus of about 8 species, trees, shrubs, and vines, of tropical and subtropical Asia and Madagascar. References: Endress & Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Broussonetia papyrifera*** (Linnaeus) L'Héritier ex Ventenat, Paper Mulberry. Pd, Cp, Mt (GA, NC, SC, VA): urban lots, disturbed areas, roadsides; common (uncommon in VA Mountains), native of e. Asia. April. [= RAB, C, F, FNA, G, K, W; = *Papyrius papyriferus* (Linnaeus) Kuntze – S]

Cudrania Trécul 1847 (Cudrania)

A genus of 1-several species, shrubs, of Asia. References: Endress & Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Cudrania tricuspidata*** (Carrière) Bureau ex Lavallée, Cudrania. Pd (NC), Cp (GA): escaped and naturalized from plantings; rare, native of China and Korea, where cultivated as a food for silkworms. July. Naturalized in Orange County, NC, in McIntosh Co. GA (Jones & Coile 1988), and perhaps elsewhere in our area, where recommended as a hedge plant since at least 1940 (Rehder 1940). [= FNA, K]

Fatoua Gaudichaud-Beaupré 1830 (Crabweed)

A genus of 2-3 species, herbs or weak shrubs, of Asia, Madagascar, and Australia. References: Vincent (2004)=Y; Massey (1975)=Z; Miller & Wood (2003); Kral (1981b); Endress & Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Fatoua villosa*** (Thunberg) Nakai, Crabweed, Mulberry-weed, Foolish-weed. Pd (GA, NC, SC, VA), Cp (GA, SC), Mt (NC): disturbed areas, vegetable and flower gardens; rare, native of Asia (apparently se. Asian islands). July-November. As reported by Massey (1975) and Vincent (2004), *Fatoua* was first reported in the United States (Louisiana) in the early 1960's. As of 2004, its distribution in North America had spread to include 28 states and the District of Columbia, including most states except the Great Plains and Rocky Mountains had spread (Vincent 2004, Sundell et al. 1999, Miller & Wood 2003. Since all early collections seem to be in and around greenhouses and nurseries, it is likely that it has been introduced in horticultural material, perhaps repeatedly (Kral 1981b). *Fatoua* appears to have become a fairly aggressive weed in eastern North America. It can be expected to continue to spread, and has the potential to become noxious. It has alternate, ovate leaves with cordate bases, borne on long petioles (about as long as the leaf blade), the inflorescences are dense cymes borne on peduncles in the axils of leaves. Pubescence of the stem and foliage is uncinulate, giving the plant a "tacky" feel. An excellent illustration appears in Correll & Correll (1982). [= FNA, K, Y, Z]

Ficus Linnaeus 1753 (Fig)

A genus of about 750 species, trees, shrubs, and vines, of tropical, subtropical, and warm temperate areas. References: Endress & Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves lobed, 7-30 cm long; [shrub to small tree]..... ***F. carica***
1 Leaves unlobed, 1-5 cm long; [vine, climbing appressed to walls]..... ***F. pumila***

* ***Ficus carica*** Linnaeus, Edible Fig, Garden Fig. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): grown for its fruits, persistent from plantings, persisting and naturalizing particularly on barrier islands, where it sometimes forms thickets on dunes, or otherwise in the outer Coastal Plain, where proximity to the ocean ameliorates cold winter temperatures; rare, native of w. Asia. May-August; July-October. This is the common cultivated fig, grown for its fruit in the Mid-east for millenia. [= RAB, F, FNA, K, S, WH]

* ***Ficus pumila*** Linnaeus, Climbing Fig. Cp (AL, FL, GA, LA, SC): walls, disturbed urban areas; rare, native of s. Asia. Locally common in Charleston, Savannah, Pensacola, Mobile, New Orleans, and other old seaports, where grown on walls as an ornamental and certainly persisting. [= FNA, K, WH]

Maclura Nuttall 1818 (Osage-orange)

A monotypic genus (or sometimes broadened to include *Cudrania* and other genera), a tree, of sc. North America. References: Endress & Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* ***Maclura pomifera*** (Rafinesque) C.K. Schneider, Osage-orange, Bow-wood, Bois-d'arc, Hedge-apple. Cp, Pd, Mt (GA, NC, SC, VA): fields, hedgerows, forests; common, naturalized from extensive planting in the eighteenth and nineteenth centuries, native of TX, OK, AR, and LA. April-May; October. The large fruits are unmistakable: yellowish-green, grapefruit-sized, and wrinkled, reminiscent of a giant, spherical mulberry fruit. The wood is extremely heavy, fine-grained, a bright yellow-orange when fresh, but darkening with age, famous for making bows and rarely used in cabinetry. [= RAB, C, F, FNA, G, K, W; = *Toxylon pomiferum* Rafinesque ex Sargent – S]

Morus Linnaeus 1753 (Mulberry)

A genus of about 10-15 species, trees, of warm temperate, subtropical, and tropical areas. References: Endress & Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

1 Upper leaf surface glossy, glabrous or slightly scabrous; lower leaf surface glabrous, or slightly pubescent on the veins and in the vein axils only; ripe fruits black, purple, red, pink, or white ..... ***M. alba***
1 Upper leaf surface dull, scabrous; lower leaf surface pubescent on the veins, veinlets, and the surface between the veins; ripe fruits black or purple ..... ***M. rubra***

* ***Morus alba*** Linnaeus, White Mulberry, Silkworm Mulberry, Russian Mulberry. Cp, Pd, Mt (GA, NC, SC, VA): disturbed areas, vacant lots, roadsides, moist forests; uncommon, native of e. Asia. March-May; May-June. [= RAB, C, F, FNA, G, GW, K, S, W; > *M. nigra* Linnaeus – S, misapplied as to our material; > *M. alba* var. *tatarica* (Linnaeus) Seringe]

Morus rubra Linnaeus, Red Mulberry. Cp, Pd, Mt (GA, NC, SC, VA): bottomland forests, mesic slopes, disturbed areas, suburban woodlands; common. April-May; May-June. MA, VT, NY, MI, WI, and se. SD south to s. FL and w. TX, and into Mexico. The fruits are very variable in quality from tree to tree. *M. rubra* is the only member of the Moraceae native to our area. [= RAB, C, F, G, GW, K, S, W; > *M. rubra* var. *rubra* – K]

MYRICACEAE Blume 1829 (Bayberry Family)

A family of about 3-5 genera and 55 species, trees and shrubs, nearly cosmopolitan. See *Morella* for discussion of our 3 genera. References: Bornstein in FNA (1997); Wilbur (1994)=Z; Elias (1971b)=Y; Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves oblong or linear-lanceolate, pinnatifid, stipulate; fruit in a bristly involucre formed by 8 bractlets ..... ***Comptonia***
1 Leaves mostly obovate or oblanceolate, entire or toothed (especially apically), estipulate; fruit either exposed and densely waxy (*Morella*), or partially enclosed in 2 wing-like bractlets (*Myrica*).
  2 Fruit spherical, densely waxy, exposed (the 4-6 bractlets small and inconspicuous); terminal buds present; aments inserted on old wood mainly below the leaves; [in our area, common and in the Coastal Plain, Mountains, and Piedmont] ..... ***Morella***
  2 Fruit flattened, not waxy, partially enclosed in 2 wing-like bractlets; terminal buds lacking; aments inserted at the summit of the branchlets of the preceding year; [in our area, very rare and restricted to bogs in the Mountains] ..... ***Myrica***

Comptonia L'Heritier ex Aiton 1789 (Sweet-fern)

A monotypic genus, a shrub, of e. North America, known as fossils from a much broader area. References: Bornstein in FNA (1997); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Comptonia peregrina (Linnaeus) J.M. Coulter, Sweet-fern. Mt (GA, NC, SC, VA), Pd, Cp (NC, VA): in the mountains on xeric ridges at low to medium elevations, usually in fire-maintained habitats, also in xeric and fire-maintained habitats on monadnocks in the upper Piedmont and in dry, sandy sites in the lower Piedmont and fall-line sandhills; common (uncommon in VA Piedmont, rare in Piedmont south of VA, rare in Coastal Plain, rare in GA and SC). April; August-September. Widespread in ne. North America, south to sc. and w. NC, w. SC, ne. GA, and nc. TN; much more common in the northern parts of its range. [= RAB, C, FNA, K, S, W; > *Comptonia peregrina* var. *asplenifolia* (Linnaeus) Fernald – F, Y; > *Comptonia peregrina* var. *peregrina* – F, Y; > *Myrica asplenifolia* Linnaeus var. *asplenifolia* – G; > *Myrica asplenifolia* var. *tomentosa* (Chevallier) Gleason – G]

Morella Loureiro 1790 (Bayberry, Wax-myrtle, Candleberry)

Wilbur (1994) makes a compelling case for the recognition of three genera among eastern North American Myricaceae, and for application of the name *Myrica* to *Myrica gale*. The typification of the genus *Myrica* with *Myrica gale* Linnaeus has been confirmed (Brummitt 1999); thus, the familiar southeastern species placed by many authors in *Myrica* must take another name. Wilbur (1994) prefers to treat our species as subgenus *Cerothamnus* (Tidestrom) Wilbur of genus *Morella* Loureiro; subgenus *Morella* is restricted to e. Asia, the Philippines, and Malaysia, and differs in a number of ways from subgenus *Cerothamnus*, including its fleshy and succulent, rather than waxy and hard, berries. Small maintained *Cerothamnus* at the generic level. Wilbur's inclusion of *Cerothamnus* in *Morella* may well be warranted (and is followed here), but I disagree with his provisional decision to include the taxon treated below as *Morella pumila* in *Morella cerifera*, and the taxon treated below as *Morella*

pensylvanica in *Morella caroliniensis*, though their appropriate rank may be questioned. References: Bornstein in FNA (1997); Wilbur (1994)=Z; Wilbur (2002); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

1 Fresh leaves odorless when crushed; flowers staminate flowers with 6-10 stamens (or as few as 3 in distal flowers); leaves usually entire; [of s. GA south and west]; [subgenus *Cerothamnus*, series *Faya*] ..... ***Morella inodora***
1 Fresh leaves aromatic when crushed; staminate flowers with 3-5 (-7) stamens; leaves usually serrate, at least near the tip; [collectively widespread in our area]; [subgenus *Cerothamnus*, series *Cerothamnus*].
2 Leaves oblanceolate (generally narrowly so), most of them 0.5-1.5 cm wide, 4-6× as long as wide, evergreen; mature fruits 2.0-3.5 mm in diameter.
3 Medium shrub to small tree (usually 2-10 m tall), not stoloniferous; leaves of fertile branches 4-9 cm long, 8-20 mm wide; [of a wide range of wetland habitats, including wet Coastal Plain pinelands; also planted and naturalized in upland sites] ..... ***Morella cerifera***
3 Small shrub (usually < 1 m tall), strongly stoloniferous; leaves of fertile branches 1.5-4 cm long, 3-8 mm wide; [restricted to Coastal Plain pinelands (or areas formerly so)] ..... ***Morella pumila***
2 Leaves elliptic to broadly oblanceolate, most of them 1.5-4 cm wide, 2-4× as long as wide, evergreen to deciduous; mature fruits 3.0-7.0 mm in diameter.
4 Leaves subcoriaceous and more or less evergreen, not revolute (or slightly so if sun-grown), the larger ones usually about 9 cm long and 3.5 cm wide, with punctate glands dense on the lower surface and nearly or entirely absent on the upper surface; fruits 3-4.5 mm in diameter, the fruit wall glabrous or sparsely glandular, the warty protuberances glandular; twigs densely hairy to rarely glabrous; older branches blackish; [of various boggy habitats, widespread in our area] ..... ***Morella caroliniensis***
4 Leaves coriaceous, tardily deciduous, often revolute, the larger ones about 6 cm long and 2 cm wide, with punctate glands fairly dense on both surfaces; fruits 4-6 (-7) mm in diameter, the fruit wall and warty protuberances densely hirsute when young; twigs glabrous to sparsely hairy; older branches whitish gray; [usually of dunes, from Dare County, NC northward] ..... ***Morella pensylvanica***

Morella caroliniensis (P. Miller) Small, Pocosin Bayberry, Evergreen Bayberry. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): pocosins, wet savannas and pine flatwoods, sandhill seepage bogs, and other peaty or sandy-peaty wetlands; common. April; August-October. Primarily limited to the Southeastern Coastal Plain, from NJ south to FL and west to TX and AR. [= K; = *Myrica heterophylla* Rafinesque – RAB, C, FNA, W, Y; > *Myrica heterophylla* var. *heterophylla* – F; > *Myrica heterophylla* var. *curtissii* (Chevallier) Fernald – F; < *Myrica pensylvanica* – G; < *Cerothamnus carolinensis* – S (also see *Morella pensylvanica*); < *Morella caroliniensis* (P. Miller) Small – Z (also see *Morella pensylvanica*)]

Morella cerifera (Linnaeus) Small, Common Wax-myrtle, Southern Bayberry. Cp (GA, NC, SC, VA): interdune swales (where often dominant), pocosins, brackish marshes, other wet to moist habitats, now also widely planted (including in the Piedmont) as an ornamental or landscaping shrub; common. April; August-October. Widespread in the Coastal Plain of Southeastern United States: NJ south to FL and west to TX. Our most common *Morella*, and also the largest, sometimes becoming a small tree, to at least 10 m tall and 20 cm DBH. See *Morella pumila* for a discussion of the controversial taxonomy of *Morella cerifera* and *Morella pumila*. [= *Myrica cerifera* Linnaeus var. *cerifera* – RAB, Y; < *Myrica cerifera* – C, FNA, GW (also see *C. pumilus*); = *Myrica cerifera* – F, G; = *Cerothamnus ceriferus* (Linnaeus) Small – S; < *Morella cerifera* (Linnaeus) Small – K, Z (also see *Morella pumila*)]

Morella inodora (Bartram) Small, Odorless Bayberry. Cp (GA): acid wetlands, especially in wooded, acid, streamhead "bogs" and bayheads, often associated with *Magnolia virginiana, Persea palustris, Cyrilla racemiflora, Cliftonia monophylla*, and *Woodwardia areolata*; rare (GA Special Concern). A Southeastern Coastal Plain endemic: se. GA west to s. MS. [= K, Z; = *Myrica inodora* Bartram – FNA, GW, Y; = *Cerothamnus inodorus* (Bartram) Small – S]

Morella pensylvanica (Mirbel) Kartesz, Northern Bayberry. Cp (NC, VA): dunes, sometimes even on the foredune and stoloniferously colonizing the upper beach, more typically behind the foredune on secondary dunes and sandy flats, often growing intermixed with *Morella cerifera*, but able to occupy drier sites higher on the dunes, from VA north, also ranging inland in sandy situations; common (uncommon in NC, where restricted to barrier islands of Dare and Currituck counties, but locally abundant there). April; August-October. This species reaches its southern limit at Avon (Kinnakeet), Dare County, NC. On interdune flats, it often grows intermixed with *Morella cerifera*, but is readily distinguished (even at a distance) by its stoloniferous growth (appearing as dome-shaped clones 3-20 m in diameter), stouter twigs, and tardily deciduous leaves. The twigs of this species are noticeably stouter than those of *Morella cerifera*; measured at 10 cm from the twig tips, they are (2-) 3-5 mm in diameter, those of *Morella cerifera* ca. 1.5-2.5 mm. [= K; = *Myrica pensylvanica* Loiseleur – RAB, C, F, FNA, GW, Y; < *Myrica pensylvanica* – G (also see *Morella heterophylla*); < *Cerothamnus carolinensis* – S (also see *Morella pensylvanica)*; < *Morella caroliniensis* (P. Miller) Small – Z; = *Cerothamnus pensylvanicus* (Mirbel) Moldenke]

Morella pumila (Michaux) Small, Dwarf Bayberry, Dwarf Wax-myrtle. Cp (GA, NC, SC, VA): savannas, pine flatwoods, relatively moist to extremely dry sites in sandhills (under *Quercus laevis* and *Q. geminata*); common (VA Rare). April; August-October. A Southeastern Coastal Plain endemic: se. VA south to FL and west to LA (or TX). Some authors dismiss the distinction between this taxon and *Morella cerifera* as merely environmental, while others treat the two as distinct at the varietal or specific level. In our area at least, they appear to be genetically distinct. They often occur in close proximity (though their typical habitats differ, they can be seen side by side in wet spodosolic pine savannas, sometimes also intermixed with *Morella caroliniensis*), and maintain their distinctiveness. There are some observations that there is a phenologic difference, with *Morella pumila* peak flowering 3 weeks later than *Morella cerifera* (J. Townsend, pers. comm. 2002). Though the issue remains unresolved, the stoloniferous growth of *Morella pumila* is not merely a fire response; I here maintain the two as distinct, pending further research. [= *Myrica cerifera* Linnaeus var. *pumila* Michaux – RAB, Y; < *Myrica cerifera* – C, FNA, GW; = *Myrica pusilla* Rafinesque – F, G; = *Cerothamnus pumilus* (Michaux) Small – S; < *Morella cerifera* (Linnaeus) Small – K, Z]

A genus of two species, shrubs, of temperate and subarctic regions of North America and Eurasia. References: Bornstein in FNA (1997); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Myrica gale Linnaeus, Sweet Gale. Mt (NC): peaty bogs; rare. April; August-September. A circumboreal species, south in North America to NJ, PA, MI, MN, and OR, disjunct from PA and NJ to Henderson County, NC, where considered extirpated at one time, as a result of the destruction of the famous East Flat Rock Bog. This shrub has been relocated at a single site, where it is abundant in a small area (less than 0.25 hectare). [= C, FNA, G, GW, K, S, W, Y; = *Gale palustris* Chevallier – RAB; > *Myrica gale* var. *gale* – F]

MYRSINACEAE R. Brown 1810 (Myrsine Family)

The traditional families Primulaceae, Myrsinaceae, and Theophrastaceae have been repartitioned by Källersjö, Bergqvist, & Anderberg (2000) in order to create monophyletic groups. References: Källersjö, Bergqvist, and Anderberg (2000); Ståhl & Anderberg in Kubitzki (2004).

1 Shrub or tree; [of FL, LA, and southward].
  2 Flowers in axillary cymes of many flowers; leaf margins crenulate ..... ***Ardisia***
  2 Flowers in fascicles of 5-9, on short stalks directly on the stem; leaf margins entire ..... ***Myrsine***
1 Herb; [collectively widespread].
  3 Leaves alternate (or with some opposite or subopposite); flowers white.
    4 Flowers axillary, nearly sessile; leaves 3-10 mm long ..... ***Anagallis***
    4 Flowers in a terminal raceme, pedicellate, the flowers closely spaced, touching, the inflorescence thus appearing cylindrical, and generally drooping at the tip (reminiscent of *Saururus cernuus*); leaves longer; [introduced, rarely naturalized in upland situations] ..... ***Lysimachia clethroides***
  3 Leaves opposite or whorled; flowers yellow, white, pink, red, or blue.
    5 Leaves in a single terminal whorl; petals 7 ..... ***Trientalis***
    5 Leaves opposite or whorled (if whorled, with several to many whorls); petals 0 or 5.
      6 Leaves > 2 cm long (sometimes less in *L. nummularia*, and then orbicular, about as wide as long); flowers yellow ..... ***Lysimachia***
      6 Leaves < 2 cm long (and distinctly longer than wide); flowers red, blue, white, or pink.
        7 Flowers on long pedicels; corolla present ..... ***Anagallis***
        7 Flowers nearly sessile; corolla absent ..... ***Glaux***

Anagallis Linnaeus 1753 (Pimpernel)

A genus of 20-28 species, herbs, mostly Old World. References: Ståhl & Anderberg in Kubitzki (2004).

1 Leaves alternate; flowers subsessile, on thick pedicels 0.3-1.0 mm long; leaf blades 3-10 mm long ..... ***A. minima***
1 Leaves opposite (occasionally in whorls of 3); flowers pedicellate, on slender pedicels 10-25 mm long; leaf blades 5-30 mm long.
  2 Flowers red (rarely white); pedicels usually longer than the leaves ..... ***A. arvensis*** *var.* ***arvensis***
  2 Flowers blue; pedicels usually shorter than the leaves ..... ***[A. arvensis*** *var.* ***caerulea]***

* ***Anagallis arvensis*** Linnaeus *var.* ***arvensis***, Scarlet Pimpernel, Common Pimpernel. Cp (GA, NC, SC, VA), Pd (GA, NC, VA), Mt (VA): lawns, fields, disturbed areas; common, native of Europe. April-November. [= C, G; < *A. arvensis* – RAB, F, GW, W; = *A. arvensis* ssp. *arvensis* – K, in the narrow sense; = *A. arvensis* ssp. *arvensis* – S]

Anagallis minima (Linnaeus) E.H. Krause, Chaffweed, False-pimpernel. Cp, Mt (GA, SC), Pd (GA, VA): ditches, wet disturbed areas, savannas, pond margins; uncommon (rare in Mountains, rare in VA). March-June. This species occurs in widely scattered areas, nearly cosmopolitan. [= GW, K; = *Centunculus minimus* Linnaeus – RAB, C, F, G, S, W]

* *Anagallis arvensis* Linnaeus var. *caerulea* (Schreber) Grenier & Godron, Blue Pimpernel, is reported as introduced in PA, KY, OH, and other scattered states north and west of our area (Kartesz 1999). [= C, G; < *A. arvensis* – RAB, F, GW, W; = *A. arvensis* Linnaeus ssp. *foemina* (P. Miller) Schinz & Thellung – K; = *A. arvensis* ssp. *coerulea* Hartman – S]

* *Anagallis monellii* Linnaeus. Reported as a waif for Fairfax County, VA by Harvill et al. (1992) and Shetler & Orli (2000). Not keyed. [= K] {not keyed}

Ardisia Swartz 1788 (Marlberry)

A genus of 400-500, trees and shrubs, of tropical America, Asia, and Australia. References: Pipoly & Ricketson in FNA (in prep.); Ståhl & Anderberg in Kubitzki (2004).

* ***Ardisia crenata*** Sims, Coral Ardisia, Coralberry. Cp (GA): suburban woodlands; rarely naturalized, native of Asia. Naturalized from horticultural use in s. GA (Lowndes County, per R. Carter), FL Panhandle, and FL peninsula. [= FNA, K, WH]

Glaux Linnaeus 1753 (Sea-milkwort)

A monotypic genus, of north temperate coasts of the Old and New Worlds. *Glaux* appears to be embedded within *Lysimachia* and should be merged into that genus (Hao et al. 2004). References: Hao et al. (2004); Ståhl & Anderberg in Kubitzki (2004).

Glaux maritima Linnaeus, Sea-milkwort. Cp (VA): saline coastal habitats; rare. June-July. The species is interruptedly circumboreal, in North America from Québec south to VA on the east coast, and from British Columbia south to OR on the west coast, also inland in w. North America, from Saskatchewan south to NM. G suggests that *G. maritima* is introduced near its southern limit in the east. [= C, K; > *G. maritima* var. *maritima* – F, G; ***Lysimachia***]

Lysimachia Linnaeus 1753 (Loosestrife)

A genus of about 150 species, herbs (rarely shrubs), cosmopolitan. Hao et al. (2004) showed that the traditional subgeneric classification of *Lysimachia* is highly artificial, and that *Glaux* is embedded within *Lysimachia*. References: Coffey & Jones (1980)=Z; Hao et al. (2004); Ståhl & Anderberg in Kubitzki (2004). Key partly adapted from Z.

1 Leaves alternate; flowers white, in a terminal raceme, the tip often lax ..... ***L. clethroides***
1 Leaves opposite or whorled; flowers yellow, borne variously.
2 Leaves nearly round; plant trailing, rooting at nodes ..... ***L. nummularia***
2 Leaves linear, lanceolate, elliptic, or ovate; plant erect (or trailing and rooting at the nodes in *L. radicans*, which has lanceolate leaves).
3 Flowers in a terminal raceme or panicle, subtended by bracts much smaller than the stem leaves.
4 Inflorescence a terminal panicle ..... ***L. fraseri***
4 Inflorescence a terminal raceme.
5 Leaves narrowly ovate, broadest near the base, with 3 prominent veins ..... ***L. asperulifolia***
5 Leaves linear to lanceolate, broadest near the middle, with 1 prominent vein.
6 Leaves linear to narrowly lanceolate, (1-) 2-4 (-8) mm wide; sepals stipitate-glandular ..... ***L. loomisii***
6 Leaves lanceolate to elliptic, 7-20 mm wide; sepals glabrous.
7 Flowers in part (the lower) in the axils of well-developed leaves ..... ***L. ×producta***
7 Flowers all in the axils of much reduced linear bracts ..... ***L. terrestris***
3 Flowers axillary, all or most of them subtended by leaves similar in shape to (though often somewhat smaller than) stem leaves not subtending flowers (or with flowers in axillary, peduncled, densely-flowered racemes in *L. thyrsiflora*).
8 Flowers in peduncled axillary racemes in the axils of midstem leaves; petals linear to lanceolate, ca. 5 mm long and ca. 1 mm wide, much surpassed by the stamens ..... ***[L. thyrsiflora]***
8 Flowers solitary, all or most of them subtended by leaves similar in shape to (though often somewhat smaller than) normal stem leaves; petals lanceolate to ovate, as long or longer than the stamens.
9 Stem leaves whorled (in adult plants); leaves "punctate" with sinuous, elongate markings (visible with the naked eye, but more readily observed with 10 × magnification).
10 Petals yellow, marked with black lines; sepals 2.5-5 mm long ..... ***L. quadrifolia***
10 Petals plain yellow, not marked with black lines; sepals 5.5-9 mm long ..... ***L. punctata***
9 Stem leaves opposite; leaves not "punctate."
11 Mid-cauline leaves with petioles ciliate their entire length.
12 Mid-cauline leaves 1-2 mm wide; flowers 7-14 mm across; [of ne. AL] ..... ***[L. gramineal]***
12 Mid-cauline leaves 4-60 mm wide; flowers 11-26 mm across; [collectively widespread].
13 Mid-cauline leaves ovate to lanceolate, 17-60 mm wide; sepals with 3 (or 6) usually reddish-brown veins ..... ***L. ciliata***
13 Mid-cauline leaves lanceolate to linear, 4-23 mm wide; sepals without reddish-brown veins.
14 Cilia of the petiole not extending onto the leaf blade; leaf blade lanceolate to ovate, typically 2-4× as long as wide, rounded to cuneate at the base; sepal venation conspicuous; capsules 4-6.5 mm in diameter ..... ***L. hybrida***
14 Cilia of the petiole extending onto the base of the leaf blade; leaf blade lanceolate to linear, typically about 8-12× as long as wide, cuneate at the base; sepal venation inconspicuous or apparently absent; capsules 2-4.5 mm in diameter ..... ***L. lanceolata***
11 Mid-cauline leaves with petioles pubescent only along basal portion.
15 Rhizomes absent, new shoots arising from crown of rootstock ..... ***L. tonsa***
15 Rhizomes present, new shoots arising from the rhizome.
16 Plant reclining or trailing, rooting at the nodes ..... ***L. radicans***
16 Plant erect, not rooting at the nodes.
17 Leaf blades ovate to lanceolate, typically 2-4× as long as wide, rounded to cuneate at the base, with the midrib not prominent; sepals conspicuously veined, 0.5-4 mm wide ..... ***L. hybrida***
17 Leaf blades linear to narrowly lanceolate, typically 8-14× as long as wide, cuneate to tapering at the base, with a prominent midrib; sepals not conspicuously veined, 1-2 mm wide ..... ***L. quadriflora***

Lysimachia asperulifolia Poiret, Pocosin Loosestrife, "Roughleaf Loosestrife". Cp (NC, SC): low pocosins, high pocosins, streamhead pocosins, savanna-pocosin ecotones, sandhill-pocosin ecotones; rare (US Endangered, NC Endangered, SC Rare). May-June; August-October. Endemic to the Coastal Plain of NC and SC. *L. asperulifolia* is a very distinctive species, easily recognized vegetatively by its whorls of sessile, rounded-based, acuminate, bluish-green (to yellowish-green when shaded or otherwise stressed) leaves. The leaves of *L. asperulifolia* are not rough; the common name "roughleaf loosestrife" is a misnomer, apparently based on a mistranslation of the specific epithet, the translator assuming that "*asperulifolia*" meant "rough-leaved." The epithet actually refers to the perceived similarity of the leaves to those of the European *Asperula odorata* (treated in this work as *Galium odoratum*), Sweet Woodruff, a plant with which Poiret would have been very familiar. The leaves of *G. odoratum* are similar to those of *L. asperulifolia* in their whorled disposition. Franklin (2001) studied the biology of this rare species. [= K; = *L. asperulaefolia* – RAB, GW, S (an orthographic variant)]

Lysimachia ciliata Linnaeus, Fringed Loosestrife. Pd, Mt, Cp (GA, NC, SC, VA): mesic forests, especially bottomlands and coves dominated by hardwoods; common. June-August; August-October. Newfoundland west to AK, south to GA, AL, MS, AR, KS, NE, CO, NM, UT, ID, and OR. [= RAB, C, F, GW, K, W, Z; = *Steironema ciliatum* (Linnaeus) Baudo – G, S]

* ***Lysimachia clethroides*** Duby. Mt (NC): roadsides (cultivated and rarely persistent or escaped); rare, native of Japan. July-August. Collected in the Mountains of NC (Macon County), escaped from cultivation; it is also reported as naturalized in Grundy County, TN (Chester, Wofford, & Kral 1997, Kral 1981). It differs from our other species in its white flowers, in a dense terminal spike (often with secund tip) and alternate leaves. [= C, G, K]

Lysimachia fraseri Duby, Fraser's Loosestrife. Mt (GA, NC, SC): hardwood forests, forest edges and roadbanks, thin soils around rock outcrops, usually flowering only when exposed to extra sunlight by a tree-fall light gap or other canopy opening; rare. June-August; September-October. W. NC and e. TN south to n. SC, n. GA, and AL; disjunct in s. IL and nw. TN (Stewart County) (Chester, Wofford, & Kral 1997). This rare species is limited in NC to the mountains south of the Asheville Basin, especially in the escarpment gorges of Macon and Jackson counties. Potentially the largest and coarsest of our *Lysimachia* (up to 2 meters tall), *L. fraseri* usually occurs as much smaller seedlings and non-flowering individuals. When a tree-fall light gap occurs, individuals flower and fruit. Even seedlings can be separated from the more common and widespread *L. quadrifolia* by the following characteristics (all best observed at 10×): leaves with a narrow, translucent red border, upper internodes of the stem glandular-puberulent, and backlighted leaf without sinuous, translucent lineations (*L. quadrifolia*: leaves without red border, upper internodes sparsely pubescent with longer, nonglandular hairs, or rarely a few of the hairs with slightly bulbous tips, and backlighted leaf with numerous sinuous, translucent lineations). [= RAB, GW, K, S, W]

Lysimachia hybrida Michaux, Lowland Loosestrife. Cp (NC, SC, VA), Mt, Pd (NC, VA): mesic hardwood forests, wet areas; rare. June-August; September-October. ME and s. Québec west to Alberta and WA, south irregularly to n. FL, AR, NE, and AZ. [= C, F, K, W, Z; = *L. lanceolata* var. *hybrida* (Michaux) A. Gray – RAB, GW; = *Steironema hybridum* (Michaux) Rafinesque ex B.D. Jackson – G, S]

Lysimachia lanceolata Walter, Lanceleaf Loosestrife. Mt, Pd, Cp (GA, NC, SC, VA): mesic to relatively dry forests, forest edges, roadbanks, primarily on circumneutral soils; uncommon. June-August; September-October. NJ, PA, OH, MI, and WI south to GA, panhandle FL, AL, MS, LA, and ne. TX. [= C, F, K, W, Z; = *L. lanceolata* var. *lanceolata* – RAB, GW; = *Steironema lanceolatum* (Walter) Gray – G, S; = *Steironema heterophyllum* (Michaux) Baudo – S]

Lysimachia loomisii Torrey, Carolina Loosestrife. Cp (GA, NC, SC): moist to wet savannas, pocosin ecotones; uncommon (rare in GA). May-June; August-October. Endemic to the outer and middle Coastal plain of NC, SC, and e. GA. [= RAB, GW, K, S]

* ***Lysimachia nummularia*** Linnaeus, Creeping Charlie, Creeping Jenny, Moneywort. Pd (GA, NC, SC, VA), Mt, Cp (NC, SC, VA): lawns, pastures, seepages, other moist, disturbed places; common (uncommon south of VA), native of Europe. May-July; August-September. The leaves have many minute, maroon dots. [= RAB, C, F, G, GW, K, S, W]

Lysimachia ×producta (A. Gray) Fernald (pro sp.). Mt (NC, VA), Pd (VA), Cp (NC): moist areas; rare. May-July; August-October. This is a fertile hybrid of *L. quadrifolia* and *L. terrestris*, sometimes occurring in the apparent absence of one or both parents. [= RAB, C, K; = *L. producta* (A. Gray) Fernald – G, S]

* ***Lysimachia punctata*** Linnaeus, Large Loosestrife, Spotted Loosestrife. Mt (NC): disturbed areas; rare, native of Eurasia. June-July; August? First found in NC in 1985 (Weakley *in prep.*). [= C, F, G, K]

Lysimachia quadriflora Sims, Smooth Loosestrife, Four-flowered Loosestrife. Mt (GA, VA), Pd? (NC?): wet meadows and calcareous fens, stream banks; rare. July-September. MA, s. Ontario, MI, and ND south to w. VA, WV, nw. GA, AL, and AR; mainly north and west of the Ohio River, very rare and scattered in or east of the Appalachians. Reported for c. NC by Coffey & Jones (1980). [= C, F, K, W, Z; = *Steironema quadriflora* (Sims) Hitchcock – G]

Lysimachia quadrifolia Linnaeus, Whorled Loosestrife. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): a wide variety of forests and openings, including pine savannas of the outer Coastal Plain, ranging from moist to very dry; common (uncommon in Coastal Plain south of VA). May-August; August-October. ME west to WI and MN, south to SC, c. GA, AL, and TN. Although the species normally has whorled leaves, immature and small plants often have opposite leaves only. See *L. fraseri* for discussion of vegetative features useful in distinguishing the two species. [= RAB, C, F, G, GW, K, S, W]

Lysimachia radicans Hooker, Trailing Loosestrife. Mt, Cp (VA): moist forests, swamps; rare (VA Rare). June-August. The main distribution of this species is in the Mississippi Embayment, from MO and w. TN south to s. AL, MS, AR, LA, and e. TX; disjunct occurrences in VA and (allegedly) e. NC are curious. The report for NC is from a species list for Nags Head Woods, Dare County; it is unpublished, apparently not documented by an herbarium specimen, and rejected unless additional documentation is found. [= C, F, K, W, Z; = *Steironema radicans* (Hooker) A. Gray – G, S]

Lysimachia terrestris (Linnaeus) Britton, Sterns, & Poggenburg, Bog-candles, Swamp-candles. Mt (GA, NC, SC, VA), Pd, Cp (NC, SC, VA): bogs, wet meadows, and swamp forests; uncommon. May-July; August-October. Newfoundland west to MN and Saskatchewan, south to SC, GA, e. TN, and sc. TN. [= RAB, C, G, GW, K, S, W; *L. terrestris* var. *terrestris* – F]

Lysimachia tonsa (Wood) Wood ex Pax & R. Knuth, Southern Loosestrife, Appalachian Loosestrife. Pd (GA, NC, SC, VA), Mt (GA, VA): upland forests, especially over calcareous or mafic rocks; rare (NC Watch List, VA Watch List). May-July; August-October. Sc. VA and KY south to SC, wc. GA, and e. TN. The range is centered on the Southern Appalachians, but the species is essentially absent from the higher mountains – a "doughnut range." [= RAB, C, F, K, W, Z; =*? Steironema intermedium* Kearney – G; = *Steironema tonsum* (Wood) Bicknell ex Britton – S]

* ***Lysimachia barystachys*** Bunge. Reported from a single county in nc. GA (Jones & Coile 1988). [= K] {investigate; not yet keyed}

Lysimachia graminea (Greene) Handel-Mazzetti, Grassleaf Yellow-loosestrife. Endemic to ne. AL (Little River Canyon area). [= K, Z; = *Steironema gramineum* Greene – S]

* *Lysimachia japonica* Thunberg, native of Japan and China. Reported for WV (Kartesz 1999). [= K] {investigate; not yet keyed}

Lysimachia thyrsiflora Linnaeus, Tufted Loosestrife, ranges south to NJ, PA, OH, and MO (Kartesz 1999), and MD (from Big Marsh, Kent County) (Steury, Tyndall, & Cooley (1996). [= C, K; = *Naumburgia thyrsiflora* (Linnaeus) Duby] {not yet keyed; synonymy incomplete}

MYRSINACEAE

* ***Lysimachia vulgaris*** Linnaeus, Garden Loosestrife. Pd (VA): disturbed bottomland, native of Europe. Introduced and naturalized south at least to se. and sc. PA (Rhoads & Klein 1993), WV, KY, MD, and NJ (Kartesz 1999). [= C, K] {not yet keyed; synonymy incomplete}

Another hybrid has been reported: *L.* ×*radfordii* Ahles, a hybrid of *L. loomisii* × *quadrifolia*. It is intermediate between its parents.

Myrsine Linnaeus 1753 (Colicwood)

A genus of about 300 species (if circumscribed to include *Rapanea*), shrubs and trees, pantropical. References: Pipoly & Ricketson in FNA (in prep.); Ståhl & Anderberg in Kubitzki (2004).

Myrsine cubana A. de Candolle, Myrsine, Colicwood. Cp (FL): hammocks; rare. Dixie, Levy, and Volusia counties FL, south to West Indies and Central America. [= FNA; ? *M. guianensis* (Aublet) Kuntze – GW; > *M. floridana* A. de Candolle – K; ? *M. guayanensis* – S, orthographic variant; ? *Rapanea punctata* (Lamarck) Lundell – WH]

Trientalis Linnaeus 1753 (Starflower)

A genus of 2 species, herbs, north temperate. References: Ståhl & Anderberg in Kubitzki (2004).

Identification notes: *Trientalis* can be recognized by its terminal whorl of leaves (4-10 cm long), the one to several white flowers borne on terminal, slender pedicels, each flower typically with 7 petals (inconspicuously united at the bases), each petal acuminate. The plant is reminiscent of a white-flowered *Lysimachia* with only one whorl of leaves.

Trientalis borealis Rafinesque *ssp.* ***borealis***, Starflower. Mt (GA, NC, VA): northern hardwood forests, rich slope forests, often in second-growth areas; uncommon in VA, rare farther south (rare in GA and NC). May-June. This northern species, widespread in the mountains of VA, and known from a few locations in n. GA and ne. TN (Chester, Wofford, & Kral 1997), was first located in NC only in 1988 (Dellinger 1989). "The attractive white corollas, usually with 7 petals united only at the very base, are open in the late spring and they drop intact – like fallen stars" (Voss 1996). [= K; < *T. borealis* – C, F, G, W]

NELUMBONACEAE Dumortier 1829 (Lotus-lily Family)

A family of 1 genus and 2 species, aquatic herbs, of temperate and subtropical e. North America and e. Asia. References: Wiersema in FNA (1997); Williamson & Schneider in Kubitzki, Rohwer, & Bittrich (1993).

Nelumbo Adanson 1763 (Lotus-lily, Lotus, Sacred-lotus, Sacred-bean)

A genus of 2 species, aquatic herbs, of temperate and subtropical e. North America and e. Asia. References: Williamson & Schneider in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: *Nelumbo* can be immediately distinguished in vegetative condition from the other "pads" (*Nymphaea*, *Nuphar,* and *Nymphoides*) by its peltate leaves, and from the peltate *Brasenia* by the much larger size and roundness of the leaves.

1 Petals yellow; mature fruits ("nuts") usually < 1.25× as long as wide ..... ***N. lutea***
1 Petals pink or white; mature fruits ("nuts") usually > 1.5× as long as wide ..... ***N. nucifera***

Nelumbo lutea Willdenow, Yonkapin, American Lotus-lily, Yellow Lotus, Yockernut, Water-chinquapin, Pond-nuts. Cp (GA, NC, SC, VA), Pd (VA), Mt (GA, VA): ponds, natural lakes; uncommon. June-September. NY and s. Ontario west to MN and IA, south to s. FL and e. TX, and south into the West Indies and Mexico. [= RAB, C, F, FNA, G, GW, K, S, W; *N. pentapetala* (Walter) Fernald]

* ***Nelumbo nucifera*** Gaertner, Sacred-lotus, Oriental Lotus-lily, Pink Lotus. Cp (NC, SC), Pd (NC), Mt (GA): ponds and lakes; rare, native of Asia. June-September. [= RAB, C, F, FNA, G, GW, K]

NYCTAGINACEAE A.L. de Jussieu 1789 (Four-o'clock Family)

A family of about 31 genera and 400 species, trees, shrubs, vines, and herbs, of tropical, subtropical, and (less commonly) warm temperate regions, especially diverse in the New World. References: Bogle (1974)=Z; Spellenberg in FNA (2003b); Bittrich & Kühn in Kubitzki, Rohwer, & Bittrich (1993).

1 Flowers < 3 mm long, lacking involucral bracts subtending the petaloid calyx ..... ***Boerhavia***
1 Flowers > 10 mm long, with involucral bracts (simulating a calyx) subtending the petaloid calyx ..... ***Mirabilis***

Boerhavia Linnaeus 1753 (Spiderling)

A genus of about 20-40 species, annual and perennial herbs, of tropical, subtropical, and warm temperate regions of the Old and New World. References: Spellenberg in FNA (2003b); Bogle (1974)=Z; Bittrich & Kühn in Kubitzki, Rohwer, & Bittrich (1993).

1 Fruit rounded at apex, stipitate-glandular; perennial ..... ***B. coccinea***
1 Fruit flat at the apex, glabrous; annual ..... ***B. erecta***

* ***Boerhavia coccinea*** P. Miller, Wineflower. Cp (NC, SC, VA): disturbed areas, adventive on ballast; rare, native of tropical America. June-September. Contrary to the statement in RAB that this species is "apparently not established," it is well established on the Wilmington (New Hanover County, NC) waterfront. [= RAB, FNA, K; = *Boerhaavia coccinea* – S, orthographic variant]

Boerhavia diffusa Linnaeus, Red Spiderling, Spreading Hogweed. Cp (SC): [= FNA, K, Z] {not yet keyed} {disentangle *coccinea* and *diffusa*; rewrite key}

Boerhavia erecta Linnaeus, Erect Spiderling. Cp, Pd (GA, NC, SC): sandy fields, roadsides, disturbed areas; uncommon. May-October. NC south to FL, west to TX and AZ, perhaps only introduced in our area. [= RAB, FNA, K, Z; = *Boerhaavia erecta* – G, S, orthographic variant]

Mirabilis Linnaeus 1753 (Umbrella-wort, Four-o'clock)

A genus of about 55-60 species, annual and perennial herbs, of warm temperate America and s. Asia. References: Spellenberg in FNA (2003b); Le Duc (1995); Bittrich & Kühn in Kubitzki, Rohwer, & Bittrich (1993).

1 Petaloid calyx with a narrow tube 3-4 cm long, the spreading portion to 5 cm in diameter; involucre with 1 flower, not expanding in fruit; [section *Mirabilis*] ..... ***M. jalapa***
1 Petaloid calyx with a broad tube < 0.5 cm long, the spreading portion < 1.5 cm in diameter; involucre with 3-5 flowers, expanding in fruit; [section *Oxybaphus*].
2 Leaves cuneate at the base, 2.5-6× as long as wide; [native, of dry sandy habitats in s. SC southward] ..... ***M. albida***
2 Leaves cordate at the base, 1-2× as long as wide; [introduced, of disturbed habitats] ..... ***M. nyctaginea***

Mirabilis albida (Walter) Heimerl, Wild Four-o'clock, Pale Umbrella-wort. Cp (GA, SC): sandhills, adjacent disturbed sandy soils; rare (GA Special Concern). May-August. S. SC south to GA, west to TX, north in the interior to c. TN, IA, and KS. [= RAB, C, F, K, Z; = *Oxybaphus albidus* (Walter) Sweet – G; = *Allionia albida* Walter – S]

* ***Mirabilis jalapa*** Linnaeus, Garden Four-o'clock, Marvel-of-Peru. Cp (GA, NC, SC, VA), Pd (NC, SC, VA): disturbed areas, or persistent at former garden sites; uncommon, native of tropical America. June-November. [= RAB, C, F, G, K, S, Z]

* ***Mirabilis nyctaginea*** (Michaux) MacMillan, Heart-leaved Umbrella-wort, Wild Four-o'clock. Mt, Pd (NC, VA), Cp (VA): railroad embankments, other disturbed areas; rare, native of c. North America. June-October. [= RAB, C, F, K, W, Z; = *Oxybaphus nyctagineus* (Michaux) Sweet – G; = *Allionia nyctaginea* Michaux – S]

Mirabilis linearis (Pursh) Heimerl var. *linearis*. Manitoba and Alberta, south to TN, MS, and CA; scattered elsewhere in e. North America by introduction. [= FNA; < *M. linearis* – C, F, K; < *Oxybaphus linearis* (Pursh) B.L. Robinson – G] {not yet keyed}

NYMPHAEACEAE R.A. Salisbury 1805 (Water-lily Family)

A family of 6 genera and about 75 species, aquatic herbs, cosmopolitan. References: Wiersema & Hellquist in FNA (1997); Schneider & Williamson in Kubitzki, Rohwer, & Bittrich (1993); Les et al. (1999).

1 Flowers nearly spherical, 2-5 cm in diameter; sepals 6 (in our species), petaloid, green to yellow, incurved; petals many, inconspicuous, scalelike or staminodial; leaves often of 2 types, the submersed leaves (when present) thinner in texture than the floating or emersed leaves; floating or emersed leaves having 60-90% of their surface area with vasculature derived from the midrib; rhizome with triangular or winged leaf scars; [subfamily *Nupharoideae*] ..... ***Nuphar***
1 Flowers hemispheric, 4-20 cm across; sepals 4, greenish, inconspicuous; petals spreading and ascending, white or yellow, showy; leaves of 1 type, floating; floating leaves having 25-40 % of their surface area with vasculature derived from the midrib; rhizome with circular leaf scars; [subfamily *Nymphaeoideae*] ..... ***Nymphaea***

Nuphar J.E. Smith 1809 (Spatterdock, Yellow Pondlily)

A genus of about 16 species, aquatic herbs, of north temperate areas. Beal (1956) recognized 8 taxa of *Nuphar* in North America, which he treated as subspecies of the European *N. lutea*. Voss's (1985) statement (about the genus in Michigan) "our plants are quite easily distinguished ... and they are treated here as closely related species" applies equally (or better!) in our area. Recent treatments (see references) recognize multiple species. References: Beal (1956)=Z; Wiersema & Hellquist in FNA (1997); Padgett (1999)=Y; Padgett (2007)=X; Schneider & Williamson in Kubitzki, Rohwer, & Bittrich (1993). Key based in large part on FNA.

1 Sepals 5 (or 5-6 in *N. rubrodisca*); stigmatic disc red; fruit deeply contricted below the stigmatic disc; leaf blades 3.5-25 cm long; [section *Nuphar*].
  2 Anthers 1-3 mm long; stigmatic disc with 6-10 deep crenations; stigmatic rays terminating 0-0.2 mm from the margin of the disc; constriction below disc 1.5-5 mm in diameter; leaf sinus 2/3 or more the length of the midrib; leaf blades 3.5-10 (-13) cm long ..... ***[N. microphylla]***
  2 Anthers (2-) 3-6 mm long; stigmatic disc with 8-15 shallow crenations; stigmatic rays terminating 0-1.6 mm from the margin of the disc; constriction below disc 5-10 mm in diameter; leaf sinus ca. 1/2 the length of the midrib; leaf blades 5-25 cm long ..... ***[N. rubrodisca]***
1 Sepals 6-9 (-12); stigmatic disc yellow, green, or sometimes reddish; fruit slightly or not at all constricted below the stigmatic disc; leaf blades 7-50 cm long; [section *Astylus*].
  3 Floating leaf blades 2-6× as long as wide, the sinus < ¼ as long as the midrib; thin-textured submersed leaves often more abundant than the floating leaves; [of blackwater or tidal streams, rivers, and lakes of the Coastal Plain, se. VA, e. NC, e. SC, Panhandle FL, s. AL].
    4 Floating leaf blades 3-6× as long as wide; stigmatic rays elliptic, terminating < 1 mm from the edge of the disk; [of blackwater or tidal streams, rivers, and lakes of the Coastal Plain of se. VA to e. SC] ..... ***N. sagittifolia***
    4 Floating leaf blades 2-3× as long as wide; stigmatic rays linear, mostly terminating 1-2 mm from the edge of the disk; [of blackwater streams and rivers, Panhandle FL and s. AL] ..... ***N. ulvacea***
  3 Floating leaf blades 1-2× as long as wide, the sinus > ¼ as long as the midrib; floating or emersed leaves more abundant than submersed leaves; [collectively of various habitats and distributions, but not as above].
    5 Leaf petiole flattened on the upper (adaxial) surface and winged along the margins; fruit usualy purplish; sepals red or maroon at the base adaxially ..... ***[N. variegata]***
    5 Leaf petiole terete or slightly flattened, not winged; fruit usually greenish or yellowish; sepals yellow or red at the base adaxially.
      6 Lower leaf surface glabrous to sparsely pubescent; leaves 7-30 cm wide, (1-) 1.5 (-2)× as long as wide, the lobes acute to broadly rounded; leaves mostly emersed; [widespread in our area] ..... ***N. advena***
      6 Lower leaf surface densely silvery-pubescent; leaves 20-45 cm wide, ca. 1× as long as wide the lobes, broadly rounded; leaves mostly floating; [of AL, FL, and GA Coastal Plain] ..... ***N. orbiculata***

Nuphar advena (Aiton) R. Brown ex Aiton f., Broadleaf Pondlily. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): lakes, ponds, natural depression ponds, old millponds, slow-flowing rivers (blackwater and brownwater); common. April-October. The most widespread and common *Nuphar* in e. North America, ranging from ME west to WI, south to s. FL, Cuba, TX, and n. Mexico. See *N. sagittifolia* for discussion of the two taxa. [= C, FNA; = *Nuphar luteum* (Linnaeus) Sibthorp & J.E. Smith ssp. *macrophyllum* (Small) E.O. Beal – RAB, GW, W, Z; > *Nuphar advena* – F, G; > *Nuphar fluviatile* (R.M. Harper) Standley – F, G; > *Nuphar puteorum* Fernald – F; = *Nuphar lutea* J.E. Smith ssp. *advena* (Aiton) Kartesz & Gandhi – K; > *Nymphaea advena* Aiton – S; > *Nymphaea chartacea* Miller & Standley – S; > *Nymphaea fluviatilis* R.M. Harper – S; = *Nuphar advena* ssp. *advena* – X, Y]

Nuphar orbiculata (Small) Standley. Cp (FL, GA): quiet waters in blackwater swamps; uncommon. May-October. A Southeastern Coastal Plain endemic: e. GA south to Panhandle FL and s. AL. [= FNA; = *Nuphar lutea* ssp. *orbiculata* (Small) E.O. Beal – K; > *Nymphaea orbiculata* Small – S; > *Nymphaea bombycina* (Miller & Standley) Standley – S; = *Nuphar advena* (Aiton) Aiton f. ssp. *orbiculata* (Small) D. Padgett – X, Y; = *Nuphar luteum* ssp. *orbiculatum* (Small) E.O. Beal – Z]

Nuphar sagittifolia (Walter) Pursh, Narrowleaf Pondlily, Bonnets. Cp (NC, SC, VA): blackwater streams, rivers, and lakes, in swift, sluggish, or stagnant water, extending downriver into freshwater tidal areas; uncommon. April-October. Endemic to our area: e. VA south to ne. SC, very conspicuous and locally abundant on shallow bars along rivers such as the Northeast Cape Fear, Black, and Waccamaw, and forming dense colonies in Lake Waccamaw. Apparent hybrids with *N. advena* have been named *Nuphar* ×*interfluitans* Fernald. The submersed leaves have somewhat the texture and appearance of a thin leaf lettuce or the marine alga *Ulva*. This species appears to be closely related to *N. ulvacea* (Miller & Standley) Standley of blackwater rivers of panhandle FL, another phytogeographic connection between se. NC and panhandle FL. DePoe & Beal (1969) and Beal & Southall (1977) argue that this taxon and *N. advena* intergrade clinally, with *N. advena* inland and *N. sagittifolia* in the outer Coastal Plain, and that the two taxa are maintained by water temperatures. This ignores the fact that the two taxa often occur in close proximity to one another in both the inner and outer Coastal Plain. The frequency of so-called intermediates has also been exaggerated; few populations will present any difficulties in identification. I prefer to treat these taxa as species, with rare hybridization or introgression. Molecular data suggest that *N. sagittifolia* is more closely related to the boreal *N. variegata* than to N. advena (Padgett (2007). [= C, FNA, X; = *Nuphar luteum* (Linnaeus) Sibthorp & J.E. Smith ssp. *sagittifolium* (Walter) E.O. Beal – RAB, GW, Z; = *Nuphar sagittifolium* – F, G, an orthographic variant; = *Nuphar lutea* J.E. Smith ssp. *sagittifolia* (Walter) E.O. Beal – K; = *Nymphaea sagittifolia* Walter – S]

Nuphar ulvacea (G.S. Miller & Standley) Standley, Sea-lettuce Pondlily. Cp (AL, FL): blackwater streams; uncommon. Endemic Panhandle FL and s. AL. April-September. [= FNA; = *Nuphar luteum* (Linnaeus) Sibthorp & J.E. Smith ssp. *ulvaceum* (G.S. Miller & Standley) E.O. Beal – GW, K; = *Nymphaea ulvacea* G.S. Miller & Standley – S; = *Nuphar advena* (Aiton) R. Brown ssp. Ulvacea (G.S. Miller & Standley) D. Padgett – X]

Nuphar microphylla (Persoon) Fernald. Lakes and ponds. Nova Scotia, Québec, and Manitoba south to s. NJ, se. PA, MI, IL, and MN. June-September. [= C, FNA, X, Y; = *Nuphar microphyllum* – F, G; < *Nuphar lutea* ssp. *pumila* (Timm) E.O. Beal – K; < *Nuphar pumila* Timm; < *Nuphar luteum* ssp. *pumilum* (Timm) E.O. Beal – Z]

Nuphar rubrodisca Morong. Lakes and ponds. New Brunswick, Québec, and Ontario south to NJ, PA, MI, and MN. June-September. [= FNA; = *Nuphar* ×*rubrodisca* Morong – C, X; = *Nuphar* ×*rubrodiscum* Morong – F; = *Nuphar rubrodiscum* – G; = *Nuphar lutea* J.E. Smith ssp. *rubrodisca* (Morong) Hellquist & Wiersema – K]

Nuphar variegata Durand in G.W. Clinton. Lakes and ponds. Widespread in ne. North America, south to DE, NJ, PA, OH, IN, IL, IA, and NE. May-September. [= C, FNA, X; = *Nuphar variegatum* – F, G; = *Nuphar lutea* ssp. *variegata* (Durand) E.O. Beal – K; = *Nuphar luteum* ssp. *variegatum* (Durand) E.O. Beal – Z]

Nymphaea Linnaeus 1753 (Water-lily)

A genus of about 50 species, aquatic herbs, cosmopolitan. References: Wiersema in FNA (1997); Woods et al. (2005a, 2005b)=Z; Schneider & Williamson in Kubitzki, Rohwer, & Bittrich (1993).

1 Petals yellow; plants producing stolons ..... ***N. mexicana***
1 Petals white (to pink); plants not producing stolons.
2 Petiole solid-colored; leaf length/width ratio (length measured from petiole attachment to tip of leaf, along midvein) (0.44-) avg. 0.56 (-0.71); two leaf lobes with rounded lobe tips; lower leaf surface reddish-purple ..... ***N. odorata ssp. odorata***
2 Petiole striped; leaf length/width ratio (-.55-) 0.63 (-0.73); leaf lobes with pointed tips; lower leaf surface green ..... ***[N. odorata ssp. tuberosa]***

Nymphaea mexicana Zuccarini, Banana Water-lily, Yellow Water-lily. Cp (FL, GA, NC, SC): sluggish or stagnant waters; rare, scattered in occurrence and possibly introduced from further south, but the introduction agents may well be wild ducks, such as canvasbacks. June-September. Ne. NC south to s. FL, west to TX, also in sw. US and the New World tropics. [= RAB, FNA, K, Z; = *Castalia flava* (Leitner) Greene – S]

Nymphaea odorata W.T. Aiton *ssp. **odorata***, White Water-lily. Cp, Pd (FL, GA, NC, SC, VA), Mt (NC, SC, VA): ponds, sluggish waters; common (uncommon in Piedmont and Mountains). June-September. Newfoundland west to Manitoba, south to FL and TX; also scattered in the w. United States. *N. odorata* is polymorphic, leading to the naming of numerous species, subspecies, and varieties (see synonymy for a few of the named entities). Wiersema in FNA (1997) recognize ssp. *odorata* (all of our plants) and ssp. *tuberosa* (Paine) Wiersema & Hellquist, more western and northern, but approaching our area (see below). Other named entities warrant further evaluation. *N. odorata* var. *gigantea* [= *Castalia lekophylla* Small] occurs on the Coastal Plain, and is considered to differ from var. *odorata* in its larger leaves (1.5-6 dm in diameter vs. 0.5-2.5 dm), larger flowers (mostly > 15 cm wide vs. mostly < 10 cm), and leaves upturned at the margins (vs. flat). *N. odorata* var. *minor* [= *Castalia minor* (Sims) Nyar] is considered to differ from var. *odorata* in its generally smaller size, leaves 5-11 cm in diameter, flowers mostly < 8 cm wide (vs. mostly > 9 cm wide); it may be merely a dwarfed form of extremely nutrient-limited waters of the Coastal Plain. [= FNA, K, Z; < *N. odorata* – RAB; >< *N. odorata* var. *odorata* – C; > *N. odorata* var. *odorata* – F, G; > *N. odorata* var. *gigantea* Tricker – C, F, G; > *N. odorata* var. *stenopetala* Fernald – F; > *Castalia odorata* (W.T. Aiton) Wood – S; > *Castalia. minor* (Sims) Nyar – S; > *Castalia lekophylla* Small – S]

Nymphaea odorata W.T. Aiton ssp. *tuberosa* (Paine) Wiersema & Hellquist. South to MD, DE, NJ, PA. [= FNA, K, Z; < *N. odorata* var. *odorata* – C; = *N. tuberosa* Paine – F, G]

NYSSACEAE A.L. de Jussieu ex Dumortier 1829 (Tupelo Family)

A family of 5 genera and 22 species, trees and shrubs, of e. Asia, se. Asia, e. North America, and Central America. The circumscription and recognition of this family has been controversial; Nyssaceae has sometimes been included in a broadly circumscribed Cornaceae, but this appears to be phylogenetically incorrect (Xiang et al. 2002). References: Xiang et al. (2002).

Nyssa Linnaeus (Tupelo, Sour Gum, Black Gum)

A genus of about 8-10 species, trees and shrubs, of e. North America, e. Asia, se. Asia, and Central America. The only other members of the genus are 2-4 e. and se. Asian species and a recently discovered species of Costa Rica (Hammel & Zamora 1990, Wen & Stuessy 1993). References: Burckhalter (1992)=Z; Wen & Stuessy (1993)=Y; Eyde (1966)=X.

Identification notes: *Nyssa sylvatica* is often mistaken (especially as seedlings, saplings, or fire-sprouts) for *Diospyros virginiana*, because of their similar, alternate, glossy-green, acuminate leaves. *Nyssa* can be distinguished by its three vascular bundle scars per leaf scar (vs. one *Diospyros*), leaves often with a few irregular teeth (vs. never toothed), leaves pale to medium green beneath (vs whitish-green beneath), leaves lacking dark glands on the midrib above and the outer petiole (vs. present), and leaves glabrous or nearly so below (vs. glabrate to tomentose with curly hairs) (McKenney 1967).

1 Petioles of mature leaves 3-6 cm long; leaves to 30 cm long and 15 cm wide, at least the larger on a tree normally > 8 cm wide, often with a few irregular teeth, these typically located near the widest part of the blade ..... ***N. aquatica***
1 Petioles of mature leaves 0.5-2.0 (-2.5 cm) long; leaves to 18 cm long and 10 cm wide, the largest leaves on a tree rarely > 7 cm wide, generally entire, rarely with a few irregular teeth, these typically located toward the leaf apex.
2 Fruits 20-40 mm long, yellow, orange, or red when mature, the stone winged; pistillate flowers and fruits 1 per peduncle; trees often multiple-trunked, the trunks crooked; mature leaves densely pubescent beneath ..... ***N. ogeche***
2 Fruits 6-15 mm long, blue-black when mature, the stone slightly ridged to nearly smooth; pistillate flowers (1-) 2-5 per peduncle; trees typically single-trunked, the trunk fairly straight; mature leaves glabrous to pubescent beneath.
3 Pistillate flowers and fruits (2-) 3-5 (-8) per peduncle; leaves with thin texture, pliable, typically widest near the middle, the apex typically acuminate, the margins often with a few irregular teeth near the apex (though sometimes an entire tree with no toothed leaves); trunk not swollen or buttressed at base (even when growing in moist or wet habitats); bark of large trees rough, divided by deep vertical and horizontal furrows into a pattern of squarish checks; [trees of dry to mesic upland forests, less commonly in bottomlands or other wetlands, where flooding occurs at most occasionally and is of short duration; throughout our area] ..... ***N. sylvatica***
3 Pistillate flowers and fruits (1-) 2 (-3) per peduncle; leaves with thick texture, rather stiff, typically widest beyond the middle, the apex typically obtuse, the margins entire (rarely with a few teeth on vigorous sprouts); trunk swollen or buttressed at base; bark of large trees rough, a vertical ridge-furrow pattern most prominent; [trees of swamps with periodic or seasonal flooding; mostly on the Coastal Plain].

4 Tree; leaves 5-14 cm long, 1.5-4 cm wide; fruit ovoid, 7-14 mm long; [widespread in our area]..... ***N. biflora***
4 Shrub or small tree, 1-3 (-5) m tall; leaves 3-6 cm long, 1-2 cm wide; fruit globose, 6-11 mm long; [restricted to c. FL Panhandle (Apalachicola lowlands region)] ..... ***N. ursina***

Nyssa aquatica Linnaeus, WaterTupelo, Tupelo Gum, Cotton Gum. Cp (FL, GA, NC, SC, VA): river swamps, where inundated for substantial periods of time; common. April-May; September-October. Se. VA south to panhandle FL, west to se. TX, north in the Mississippi Embayment to se. MO, s. IL, and e. KY, primarily on the Coastal Plain, but with scattered locations in other physiographic provinces, such as in sc. TN. [= RAB, C, F, GW, K, S, WH, X, Y, Z; = *N. uniflora* Wangenheim – G]

Nyssa biflora Walter, Swamp Tupelo, Water Gum, Swamp Black Gum. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): blackwater river swamps, depressions in pinelands, pocosins, either where inundated for substantial periods of time or in more-or-less permanently saturated organic peaty soils; common (rare in Piedmont). April-June; August-October. NJ south to s. FL, west to e. TX, primarily on the Coastal Plain, but scattered inland to c. NC, w. SC, c. TN, w. KY (Clark et al. 2005), se. MO, and c. AR. [= G, K, S, Z; = *N. sylvatica* Marshall var. *biflora* (Walter) Sargent – RAB, C, F, X, Y; < *N. sylvatica* Marshall var. *biflora* (Walter) Sargent – GW, WH]

Nyssa ogeche Bartram ex Marshall, Ogeechee Lime, Ogeechee Tupelo, Ogeechee Plum. Cp (FL, GA, SC): river swamps and wet forests with peaty soils, also in upland depression ponds; common, rare north of GA. April; August-October. A Southeastern Coastal Plain endemic: se. SC south to c. peninsular FL, west to s. AL. [= RAB, GW, K, WH, X, Y, Z; > *N. acuminata* Small – S; > *N. ogeche* – S]

Nyssa sylvatica Marshall, Sour Gum, Black Gum, Pepperidge. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry or mesic upland forests, less commonly in bottomlands, pine savannas, or upland depressions, where occasionally inundated briefly; common. April-June; August-October. S. ME west to MI and se. WI, south to c. peninsular FL, west to e. TX and e. OK. *N. sylvatica* is quite variable in morphology and ecology, at least some of the morphologic variation correlated with geography and ecology. The status of varieties recognized by previous authors (such as Fernald 1950) needs reassessment. In the Mountains of our area *N. sylvatica* is typically found in dry woodlands, such as pine-oak/heath, with xerophytic species such as *Pinus virginiana* and *Quercus montana*. In the outer Coastal Plain of the Carolinas, *N. sylvatica* often occurs in wet savannas with *Pinus serotina*, where often mistaken (because of the wetland habitat) for *N. biflora*. The leaves turn a brilliant orange-red in fall (often a few on any tree turning prematurely in July or August). [= G, K, S, Z; = *N. sylvatica* var. *sylvatica* – RAB, C, GW, WH, X, Y; > *N. sylvatica* var. *sylvatica* – F; > *N. sylvatica* var. *dilatata* Fernald – F; > *N. sylvatica* var. *caroliniana* (Poiret) Fernald – F]

Nyssa ursina Small, Bear Tupelo, Apalachicola Tupelo. Cp (FL): stringers, flatwoods depressions; rare. Endemic to Panhandle FL. A 2-5 m tall shrub or small tree, intricately branched, related to *N. biflora*. Because of the co-occurrence of this and *N. biflora* in the FL Panhandle, it seems best to recognize this taxon at the species level. [= K, S, Z; < *N. sylvatica* Marshall var. *biflora* (Walter) Sargent – GW, WH, X; = *N. sylvatica* Marshall var. *ursina* (Small) Wen & Stuessy – Y]

OLACACEAE A.L. de Jussieu ex R. Brown in Tuckey 1818 (Olax Family)

A family of about 14 genera and 100 species, trees, shrubs, and woody vines, pantropical in distribution.

Ximenia Linnaeus 1753 (Tallow-wood)

A genus of about 8 species, root-parasitic shrubs, tropical.

Ximenia americana Linnaeus, Tallow-wood, Hog-plum. Cp (FL): hammocks, pine flatwoods, scrub; uncommon. Endemic to FL peninsula, north to Duval County, FL. [= K, S, WH]

OLEACEAE Hoffmansegg & Link 1813 (Olive Family)

A family of about 25 genera and 600-615 species, trees and shrubs, nearly cosmopolitan, but centered in Asia. References: Hardin (1974)=Z; Green in Kadereit (2004).

1 Leaves compound.
2 Leaves pinnately compound with > 5 leaflets; petals absent; fruit a samara; small to large tree; [tribe *Oleeae*, subtribe *Fraxininae*]..... ***Fraxinus***
2 Leaves trifoliolate; petals 6-10, yellow, conspicuous; fruit a deeply 2-lobed dryish berry; [tribe *Jasmineae*] ..... ***[Jasminum]***
1 Leaves simple.
3 Flowers bright yellow, showy; fruit a many-seeded capsule; [tribe *Forsythieae*]..... ***Forsythia***
3 Flowers white, lilac, or purplish; fruit a drupe or 4-seeded capsule.
4 Leaves cordate or truncate at the base; fruit a 4-seeded capsule; corolla lobes shorter than the tube; flowers lilac or white, in terminal panicles; [tribe *Oleeae*, subtribe *Ligustrinae*]..... ***Syringa***
4 Leaves cuneate to rounded at the base; fruit a drupe; corolla lobes either shorter or longer than the tube; flowers white or greenish-white, in terminal or lateral panicles or fascicles.
5 Corolla absent; calyx minute or lacking; flowers in axillary fascicles; [tribe *Oleeae*, subtribe *Oleinae*]..... ***Forestiera***
5 Corolla present (often conspicuous and showy); calyx present; flowers in lateral or terminal panicles or in terminal subumbellate clusters.
6 Corolla lobes 5-12; flowers in terminal subumbellate clusters; [tribe *Jasmineae*] ..... ***[Jasminum]***

6 Corolla lobes 4; flowers in lateral or terminal panicles
7 Corolla lobes elongate, much longer than the corolla tube; [tribe *Oleeae*, subtribe *Oleinae*] ..... ***Chionanthus***
7 Corolla lobes short, no longer than the corolla tube.
8 Inflorescence a many-flowered terminal panicle; leaves generally ovate, elliptic or lanceolate (widest below or at the middle); [tribe *Oleeae*, subtribe *Ligustrinae*] ..... ***Ligustrum***
8 Inflorescence a few-flowered axillary panicle; leaves generally oblanceolate or obovate (widest above the middle); [tribe *Oleeae*, subtribe *Oleinae*] ..... ***Osmanthus***

Chionanthus Linnaeus 1753 (Fringe-tree, Old Man's Beard)

A genus of controversial circumscription, either of only 3 species, limited to se. North America and e. Asia, or (if including *Linociera*) of about 60-100 species, primarily tropical. *Ch. pygmaeus* Small is endemic to scrub in peninsular FL. References: Hardin (1974)=Z.

Chionanthus virginicus Linnaeus, Fringe-tree, Old Man's Beard. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry, mesic, or wet forests and woodlands, granitic flatrocks and domes, glades and barrens over various rocks (including granite, greenstone, etc.), swamp forests in the Coastal Plain, rarely pocosins; common. April-May; July-September. NJ, s. PA, s. OH, and MO south to c. peninsular FL and e. TX. *Ch. virginicus* in our area shows a diversity of morphology and correlated habitat that suggests the possible presence of two taxa. Swamp- and pocosin-inhabiting populations in the outer Coastal Plain have leaves 4-8× as long as wide and seem very different than Piedmont dry woodland populations with leaves 1-2× as long as wide; further and more careful study is needed. *Ch. virginicus* is a traditional southern yard plant, often used as a "specimen plant," very showy in spring, particularly when grown to its full size. [= RAB, C, F, G, GW, K, S, W, WH, Z]

Forestiera Poiret 1812 (Forestiera)

A genus of about 15-20 species, shrubs, of sw. and se. North America, Central America, and the West Indies. References: Anderson (1985)=Y; Godfrey (1988)=X; Hardin (1974)=Z; Johnston (1957)=Q; Green in Kadereit (2004).

1 Leaves (6-) 7-8 (-9) cm long, long-acuminate or acuminate (rarely acute) at the apex, the tip sharply pointed; [of swamp forests, sloughs, and ponds] ..... ***F. acuminata***
1 Leaves 1.5-7 (-8) cm long, obtuse at the apex, or if short-acuminate the ultimate tip blunt; [of shell middens and calcareous bluffs].
2 Leaves evergreen, glabrous above, glabrous and punctate below; leaf margins entire ..... ***F. segregata*** *var.* ***segregata***
2 Leaves deciduous, at least sparsely pubescent on the midrib above, pubescent and non-punctate below.
3 First-year twigs pubescent, the pubescence evenly distributed (not in 2 lines); petioles moderately pubescent; flowering in early spring from buds on twigs of the previous season; leaves 5-7 (-8) cm long ..... ***F. godfreyi***
3 First-year twigs pubescent, the pubescence in 2 lines on either side of the twig; petioles glabrous (or with a very few hairs; flowering in mid-late summer, the flowers in leaf axils; leaves mostly 2-5 cm long ..... ***F. ligustrina***

Forestiera acuminata (Michaux) Poiret, Swamp-privet. Cp (FL, GA, SC): swamp forests, especially over calcareous substrates; uncommon. March; May-June. SC south to n. FL, west to TX, north in the interior to KY, e. and c. TN, IN, IL, MO, and KS. [= RAB, C, F, G, GW, K, S, Q, WH, X, Y, Z]

Forestiera godfreyi L.C. Anderson, Godfrey's Forestiera. Cp (FL, GA, SC): shell middens, maritime forests over shell substrate; rare. Mid January-February; April-May. Se. SC (Beaufort and Charleston counties) to e. GA and n. peninsular and e. Panhandle FL. [= K, WH, X, Y; < *F. pubescens* Nuttall – S, in part (apparently)]

Forestiera ligustrina (Michaux) Poiret in Lamarck, Southern-privet. Cp (FL, GA, SC), Pd (GA, SC): upland forests and slopes along streams, mostly on shell middens or calcareous rocks; uncommon (rare in SC). E. SC south to n. peninsular FL, west to se. TX, north in the interior to c. TN and KY. [= K, S, Q, X, Z]

Forestiera segregata (Jacquin) Krug & Urban *var.* ***segregata***, Florida-privet. Cp (FL, GA, SC): calcareous scrub, shell middens, maritime forests and thickets; rare. Se. SC south to s. FL, and in the West Indies. Var. *pinetorum* (Small) M.C. Johnston is restricted to s. FL. [= K, Q, Z; > *F. porulosa* (Michaux) Poiret – S; > *F. globularis* Small – S; < *F. segregata* – WH, X]

Forsythia Vahl 1804 (Forsythia, Golden-bells)

A genus of about 7-9 species, shrubs, of e. Asia and se. Europe. References: Hardin (1974)=Z; Green in Kadereit (2004).

1 Mature branches hollow or irregularly pith-filled between the nodes; leaves oblong-ovate, toothed or 3-parted; branches arching when well-developed ..... ***F. suspensa***
1 Mature branches cross-septate (chambered) between the nodes; leaves oblong-lanceolate, toothed; branches upright ..... ***F. viridissima***

* ***Forsythia suspensa*** (Thunberg) Vahl, Weeping Forsythia. Pd (GA, NC, VA), Mt (VA): waste places, vacant lots, suburban woodlands; commonly planted and persistent, rarely escaped (native of China). [= C, G, K, Z]

* ***Forsythia viridissima*** Lindley, Greenstem Forsythia. Pd (GA, NC, VA), Cp, Mt (VA): waste places, vacant lots, suburban woodlands; commonly planted and persistent, rarely escaped (native of China). [= C, G, K, W, Z]

Fraxinus Linnaeus 1753 (Ash)

A genus of about 45-65 species, trees, mostly north temperate (Asia, North America, Europe). References: Hardin & Beckmann (1982)=Z; Miller (1955)=Y; Green in Kadereit (2004).

1 Young twigs 4-angled or narrowly 4-winged; [trees of calcareous woodlands in the Mountains of sw. VA and northward and westward] ***F. quadrangulata***
1 Young twigs terete (rounded in cross-section); [trees of various habitats, collectively widespread in our area].
2 Lateral leaflets sessile; calyx absent ..... ***F. nigra***
2 Lateral leaflets with petiolules (1-) 3-20 mm long; calyx present, persisting as a minute cup at the base of the fruits.
3 Leaves minutely papillose beneath (best seen at magnification of 40× or more), and sometimes also pubescent, more-or-less strongly whitened; wing of the samara decurrent only onto the upper 1/3 (or less) of the samara body ..... ***F. americana***
3 Leaves glabrous to pubescent beneath (never papillose), green; wing of the samara decurrent onto 1/2 (or more) of the samara body.
4 Petiolules of the lowermost leaflets 1-9 mm long, all but 1-2 mm narrowly winged; samara mostly < 7 mm wide; calyx 0.5-1.5 mm long ..... ***F. pennsylvanica***
4 Petiolules of the lowermost leaflets 3-20 mm long, not winged (except *F. caroliniana*); samara mostly > 7 mm wide; calyx 1-6 mm long.
5 Body of samara flattened, winged the full length of the samara body; calyx 1 mm long; leaf scars slightly notched; small tree, often multi-trunked ..... ***F. caroliniana***
5 Body of samara terete or subterete, winged about 1/2 the length of the samara body; calyx 2.5-6 mm long; leaf scars deeply notched; medium to large tree, typically single-trunked ..... ***F. profunda***

Fraxinus americana, White Ash, American Ash. Mt, Pd, Cp (GA, NC, SC, VA): mesic slopes, rich cove forests, dryish calcareous or mafic glades and woodlands (with *Juniperus virginiana* var. *virginiana* and *Carya glabra*); common (rare in Coastal Plain of NC, SC, and GA). April-May; August-October. Nova Scotia west to MN, south to n. peninsular FL and TX. A valuable timber tree. The division into 2 taxa, var. *americana* and var. *biltmoreana*, needs further study. [= C, K, W, WH, Z; > *F. americana* Linnaeus var. *americana* – RAB, F, G; > *F. americana* Linnaeus var. *biltmoreana* (Beadle) J. Wright ex Fernald – RAB, F, G; > *F. americana* var. *microcarpa* A. Gray – F; > *F. americana* – S, Y; > *F. biltmoreana* Beadle – S, Y]

Fraxinus caroliniana P. Miller, Water Ash, Pop Ash, Carolina Ash. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): deeply to shallowly flooded swamps; common (rare in Piedmont). May; July-October. Se. VA south to s. FL, west to TX, primarily on the Coastal Plain. A small tree, sometimes very abundant (and nearly the only subcanopy species) as the understory in *Taxodium-Nyssa* swamps. [= RAB, C, G, GW, K, WH, Y, Z; > *F. caroliniana* var. *caroliniana* – F; > *F. caroliniana* var. *oblanceolata* (M.A. Curtis) Fernald & Schubert – F; > *F. caroliniana* var. *cubensis* (Grisebach) Lingelsh. – F; > *F. caroliniana* – S; > *F. pauciflora* Nuttall – S]

Fraxinus nigra Marshall, Black Ash. Mt, Pd (VA): seepage swamps and mountain streambanks; rare (VA Watch List). April-May; August-October. Newfoundland and Québec west to Manitoba, south to DE, VA, IN, and IA. [= C, F, G, K, W, Y, Z]

Fraxinus pennsylvanica Marshall, Green Ash, Red Ash. Cp, Pd, Mt (GA, NC, SC, VA): bottomlands and swamps, especially along brownwater rivers and streams; common. April-May; August-October. Nova Scotia west to Alberta, south to FL and TX. Variation in this species (see synonymy) needs further study. [= C, GW, K, W, Z; > *F. pennsylvanica* var. *subintegerrima* (Vahl) Fernald – RAB, F, G; > *F. pennsylvanica* var. *pennsylvanica* – RAB, F, G; > *F. pennsylvanica* var. *austinii* Fernald – F; > *F. darlingtonii* Britton – S; > *F. pennsylvanica* – S; > *F. smallii* Britton – S; < *F. pennsylvanica* – WH; ? *F. pennsylvanica* ssp. *pennsylvanica* – Y]

Fraxinus profunda (Bush) Bush, Pumpkin Ash. Cp, Pd (GA, NC, SC, VA), Mt (NC): swamps, especially along blackwater rivers and streams and in freshwater tidal wetlands (as along the James, Pamunkey, Mattaponi, and Rappahannock rivers in e. VA), also in brownwater bottomlands; common (rare in Piedmont and Mountains). April-May; August-October. S. NJ south to n. FL, west to LA, mostly on the Coastal Plain, north in the interior to w. NC, sc. TN, e. AR, se. MO, s. IL, IN, OH, sc. MI, ne. PA, and w. NY. This species has a peculiar distribution; see McCormac, Bissell, & Stine (1995) for additional discussion. The nomenclature is controversial. [= C, GW, K, W, Z; = *F. tomentosa* Michaux f. – RAB, F, G, Y; > *F. profunda* – S; > *F. michauxii* Britton – S; < *F. pennsylvanica* – WH]

Fraxinus quadrangulata Michaux, Blue Ash. Mt (GA, VA): mesic to dry calcareous woodlands and forests; rare. April; July-October. S. Ontario west to s. MI and e. KS, south to sw. VA, e. TN, nw. GA, n. AL, and OK. [= C, F, G, K, S, Y, Z]

Jasminum Linnaeus 1753 (Winter Jasmine)

A genus of about 200 species, shrubs and woody vines, of tropical (and rarely temperate) Eurasia. References: Green in Kadereit (2004)

1 Leaves simple; flowers white ..... ***J. multiflorum***
1 Leaves trifoliolate; flowers yellow.
2 Leaflets 2.5-7 cm long; flowers 3.5-5 cm across ..... ***J. mesnyi***
2 Leaflets 1-3 cm long; flowers ca. 2.5 cm across ..... ***[J. nudiflorum]***

* ***Jasminum mesnyi*** Hance, Japanese Jasmine, Primrose Jasmine. Cp (FL, GA?): cultivated and sometimes persistent or spreading; rare, native of w. China. Reported for GA (K). [= K, WH]

* ***Jasminum multiflorum*** (Burmann f.) Andrews, Star Jasmine. Cp (FL): cultivated and sometimes persistent or spreading; rare, native of India and Pakistan. Naturalized at least as far north as Jacksonville, Duval County, FL (Wunderlin & Hansen 2004). [= K, WH]

* *Jasminum nudiflorum* Lindley, Winter Jasmine, native of China, is commonly planted and often persists. It has green stems and yellow flowers. Reported for GA (K). [= K]

Ligustrum Linnaeus 1753 (Privet)

A genus of about 40 species, shrubs and trees, of the Old World. I have here largely followed Hardin (1974), though, as he points out, "the taxonomy and nomenclature of our plants seem uncertain in a few cases" and "it is difficult to determine which are really naturalized in our area." It is possible that not all the species treated below are truly naturalized, and that taxonomic changes will be needed. References: Hardin (1974)=Z; Green in Kadereit (2004). The key is based closely on Hardin (1974).

1 Twigs glabrous.
  2 Corolla tube equalling or shorter than the corolla lobes.
    3 Leaves persistent or tardily deciduous, 6-15 cm long ..... ***L. lucidum***
    3 Leaves deciduous, 3-6 cm long ..... ***L. vulgare***
  2 Corolla tube slightly longer than or up to 3× as long as the corolla lobes.
    4 Leaves persistent and glossy, rounded or broadly cuneate at the base; corolla tube slightly longer than the corolla lobes ..... ***L. japonicum***
    4 Leaves deciduous or semi-evergreen, cuneate at the base; corolla tube ca. 3× as long as the corolla lobes ..... ***L. ovalifolium***
1 Twigs pubescent.
  5 Corolla tube equalling or shorter than the corolla lobes.
    6 Flowers sessile or subsessile ..... ***L. quihoui***
    6 Flowers pedicellate.
      7 Twigs densely pubescent; leaves pubescent on the midrib beneath ..... ***L. sinense***
      7 Twigs minutely puberulent; leaves glabrous ..... ***L. vulgare***
  5 Corolla tube slightly longer than or up to 3× as long as the corolla lobes.
    8 Pedicels pubescent; calyx pubescent ..... ***L. obtusifolium***
    8 Pedicels glabrous; calyx glabrous or slightly pubescent at the base.
      9 Leaves 2-6 cm long; twigs conspicuously pubescent ..... ***L. amurense***
      9 Leaves 4-10 cm long; twigs minutely puberulent ..... ***L. japonicum***

* ***Ligustrum amurense*** Carrière, Amur Privet. Pd (NC, VA), Cp, Mt (VA {SC}: disturbed places; rare, native of n. China. [= RAB, C, F, G, K, Z]

* ***Ligustrum japonicum*** Thunberg, Japanese Privet. Cp (FL, GA, NC, SC, VA), Pd (NC, VA): disturbed places; rare, native of Japan and Korea. [= RAB, K, WH, Z]

* ***Ligustrum lucidum*** Aiton f., Glossy Privet. Pd (NC), Cp (FL, NC): disturbed places; rare, native of China, Japan, and Korea. This species is superficially similar to *L. japonicum*; the lateral leaf veins are translucent in this species. [= K, S, WH, Z]

* ***Ligustrum obtusifolium*** Siebold & Zuccarini. Cp, Pd (NC, VA), Mt (VA): disturbed places; uncommon, native of Japan. [= C, F, G, K, Z]

* ***Ligustrum ovalifolium*** Hasskarl, California Privet. Cp (FL, NC, VA), Pd (NC, VA): disturbed places; rare, native of Japan. [= RAB, C, F, G, K, S, WH, Z]

* ***Ligustrum quihoui*** Carrière, Wax-leaved Privet. Cp (FL, NC, VA): disturbed places; rare, native of China. [= K, WH, Z]

* ***Ligustrum sinense*** Loureiro, Chinese Privet. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): moist forests, especially alluvial bottomlands; common, native of China. This species is one of the most noxious of our weeds, choking out native vegetation in hundreds of square kilometers of land in our area. The rapidity with which it has engulfed southern wetlands is hinted at by Small's (1933) mention of it only as "an escape in southern Louisiana." [= RAB, C, G, GW, K, S, W, WH, Z]

* ***Ligustrum vulgare*** Linnaeus, Common Privet. Cp, Pd (NC, VA): disturbed places; rare, native of Europe and n. Africa. [= C, F, G, K, S, Z]

Osmanthus Loureiro 1790 (Wild Olive, Devilwood)

A genus of about 15-32 species, shrubs and trees, of se. Asia (most species) and se. North America. References: Hardin (1974)=Z; Green in Kadereit (2004).

1 Leaf margins entire; leaves usually >7 cm long; [native tree of Coastal plain forests] ..... ***O. americanus***
1 Leaf margins spiny-toothed; leaves < 10 cm long; [horticulturally planted, rarely naturalizing] ..... ***O. ×fortunei***

Osmanthus americanus (Linnaeus) Bentham & Hooker f. ex A. Gray, Wild Olive, Devilwood. Cp (FL, GA, NC, SC, VA): maritime forests and (in FL, GA, SC, and extreme s. NC) dry, sandy forests well inland, and reported for wet habitats as well further south; uncommon (VA Rare). April-May; August-October. Se. VA south to c. peninsular FL, west to LA; also in Mexico. *O. megacarpus* Small, sometimes treated as a variety, *O. americanus* var. *megacarpus* (Small) P.S. Greene, is endemic to pine scrub in peninsular FL and differs primarily in having a larger fruit. The very hard, tough, and unsplittable wood is the inspiration for the common name "Devilwood." *O. americanus* is a conspicuous element of maritime forests in most of our area, readily recognizable by the flattened twigs characteristic of the family, and the opposite (or typically actually subopposite),

glossy, oblanceolate to obovate, evergreen leaves. [= RAB, F, G, GW, WH; = *O. americanus* var. *americanus* – C, K, Z; = *Amarolea americana* (Linnaeus) Small – S]

* ***Osmanthus ×fortunei*** Carrière [= *O. fragrans* × *heterophyllus*], Fortune's Sweet Olive. Pd (NC): suburban woodlands, escaped from horticultural plantings; rare, hybrid originating in Japan of two species native to Japan.

Syringa Linnaeus 1753 (Lilac)

A genus of about 20-23 species, shrubs, from s. Europe to se. Asia. References: Hardin (1974)=Z; Green in Kadereit (2004).

* ***Syringa vulgaris*** Linnaeus, Lilac. Mt (NC, VA): commonly planted, persistent and naturalizing around old farms; rare, native of se. Europe. [= C, F, G, K, Z]

ONAGRACEAE A.L. de Jussieu 1789 (Evening-primrose Family)

A family of about 18 genera and 650 species, herbs, shrubs, and rarely trees, cosmopolitan (especially of temperate and subtropical America). References: Munz (1965)=X; Crisci et al. (1990).

1 Flowers 2-merous, the petals white; fruits with uncinate trichomes; leaves opposite, decussate, borne spreading at right angles to the stem, mostly ovate, on petioles mostly 0.5-8 cm long ..... ***Circaea***
1 Flowers (3-) 4 (-7)-merous, the petals yellow, pink, or white (or absent); fruits lacking uncinate trichomes; leaves alternate (rarely opposite). not decussate, usually ascending or appressed (rarely spreading at right angles to the stem), mostly lanceolate, mostly sessile or subsessile.
  2 Fruit indehiscent; seeds 1-6 per capsule, 1.5-3.5 mm long ..... ***Gaura***
  2 Fruit dehiscent; seeds (10-) 50-many per capsule, 0.3-2 mm long.
    3 Seeds with an elongate coma at one end (wind-dispersed); petals pink or white.
      4 Leaves all alternate; flowers numerous in a terminal raceme (with small bracts); flower buds reflexed, the flowers held horizontally or ascending; petals 10-20 mm long; stigma 4-lobed; plants 10-30 dm tall ..... ***Chamerion***
      4 Leaves all or at least the lowermost opposite; flowers few, axillary, or in poorly developed, leafy racemes; flower buds not reflexed, the flowers ascending; petals 2-8 mm long (except 10-15 mm long in *E. hirsutum*); stigma capitate (except 4-lobed in *E. hirsutum*); plants 1-20 dm tall ..... ***Epilobium***
    3 Seeds not comose (gravity-dispersed); petals yellow or absent (rarely white or pink).
      5 Calyx tube not extended beyond the summit of the ovary; sepals persistent on the capsule (rarely deciduous); stamens 4, 8, or 10-14; petals yellow or absent; [primarily of wetlands] ..... ***Ludwigia***
      5 Calyx tube extended beyond the summit of the ovary; sepals deciduous; stamens 8; petals yellow (rarely pink or white); [primarily of uplands] ..... ***Oenothera***

Calylophus Spach 1835

A genus of 6 species, of North America.

Calylophus serrulatus (Nuttall) Raven, east to w. KY. [= K; = *Oenothera serrulata* Nuttall] {not yet keyed; synonymy incomplete}

Chamerion Rafinesque ex Holub 1972 (Fireweed)

There is increasingly strong evidence for the recognition of this group of plants as a genus separate from *Epilobium*. References: Mosquin (1966)=Z; Holub (1972)=Y; Munz (1965)=X.

Chamerion platyphyllum (Daniels) Löve & Löve, Great Willow-herb, Fireweed. Mt (NC, VA): grassy balds, roadsides, disturbed areas; uncommon (rare in NC). July-September. *Chamerion platyphyllum* has a circumboreal distribution; it is a member of a circumboreal complex, consisting of several related taxa that differ in chromosome number, a variety of morphological characters, and distribution. The tetraploid *Chamerion platyphyllum* is generally more southern, extending south in North America to NJ, montane w. NC and ne. TN, n. IN, MN, SD, AZ, NM, and CA; it may be more appropriately treated as a variety or subspecies of *Ch. angustifolium*. The diploid *Chamerion angustifolium* (Linnaeus) Holub is arctic and boreal, extending south in North America to New Brunswick, Québec, Ontario, alpine WY, and British Columbia. The hexaploid is *Chamerion danielsii* D. Löve. [< *Epilobium angustifolium* – RAB, G, GW, W; = *E. angustifolium* var. *canescens* A. Wood – C; >< *E. angustifolium* var. *angustifolium* – F, X; > *E. angustifolium* var. *platyphyllum* (Daniels) Fernald – F; = *Chamerion angustifolium* (Linnaeus) Holub ssp. *circumvagum* (Mosquin) Kartesz – K; < *Chamaenerion angustifolium* (Linnaeus) Scopoli – S; < *Chamerion angustifolium* (Linnaeus) Holub – Y; = *E. angustifolium* Linnaeus ssp. *circumvagum* Mosquin – Z]

Circaea Linnaeus 1753 (Enchanter's-nightshade)

A genus of 7-8 species, herbs, of temperate and boreal regions of the Northern Hemisphere. References: Boufford (1983)=Z; Boufford (2005)=Y; Munz (1965)=X; Averett & Boufford (1985); Skvortsov (1979). Key based on Z.

ONAGRACEAE

Identification notes: Sometimes confused in vegetative condition with *Phryma.*; the leaf teeth are quite different.

1 Flowers opening before elongation of the raceme axis, therefore clustered and corymbiform at the apex of the raceme, borne on erect or ascending pedicels; plant 5-25 (-30) cm tall; fruits clavate, 2.0-2.5 mm long, 0.7-1.2 mm thick, 1-locular..... ***C. alpina ssp. alpina***
1 Flowers opening after elongation of the raceme axis, more or less loosely spaced, borne on spreading pedicels; plants (12-) 20-100 cm tall; fruits obovoid to pyriform, 2.8-3.9 (-4.5) mm long, 1.5-3.6 mm thick, 2-locular, or the fruits sterile and aborting shortly after anthesis, 1-2-locular when present.
2 All, or nearly all, ovaries developing to maturity; fruit with corky-thickened ribs separated by deep grooves ..... ***C. canadensis ssp. canadensis***
2 All ovaries aborting shortly after anthesis (very rarely a few persistent after anthesis); fruit (when somewhat persistent) with low ribs and shallow grooves ..... ***C. ×sterilis***

Circaea alpina Linnaeus *ssp.* ***alpina***, Alpine Enchanter's-nightshade. Mt (GA?, KY, NC, VA), Ip (KY): moist organic soil at high elevations (especially in spruce-fir and northern hardwood forests), rocky seepages, in spray behind waterfalls, at dripping cliff bases; uncommon (rare in KY Interior low Plateau). June-September. *C. alpina* is treated by Z as a circumboreal complex of six subspecies. Ssp. *alpina* is itself circumboreal, in North America ranging from Newfoundland and Labrador, west to AK, south to MD, w. NC, e. TN, n. GA (?), KY, n. IL, MN, MT, and WA, disjunct in montane sites southward in the w. United States, such as the Black Hills of SD, and isolated montane sites in CO, AZ, and NM. Another subspecies occurs in w. North America, and four subspecies occur in humid and montane parts of Asia. [= K, X, Z; < *C. alpina* – RAB, F, G, GW, S, W; = *C. alpina* var. *alpina* – C]

Circaea canadensis (Linnaeus) Hill *ssp.* ***canadensis***, Canada Enchanter's-nightshade. Mt (GA, KY, NC, VA), Pd (GA, NC, SC, VA), Cp (GA, KY, NC, VA), Ip (KY): mesic, nutrient-rich forests; common (rare in SC). June-August. Nova Scotia and New Brunswick west to se. Manitoba and ND, south to e. NC, c. SC, s. GA, LA, OK, and NE. The systematics of this taxon is controversial, and the best treatment is still unclear. Most recently, Boufford (2005) has treated the complex as 2 species, C. canadensis and C. lutetiana, the former with 2 subspecies, ssp. *canadensis* of eastern North America and ssp. *quadrisulcata* of Asia. Previously, Boufford (1983) treated the complex as a circumboreal complex of 3 subspecies of *C. lutetiana*, including the North American ssp. *canadensis* (Linnaeus) Ascherson & Magnus, the primarily Asian ssp. *quadrisulcata* (Maximowicz) Ascherson & Magnus, and the European ssp. *lutetiana*. Other authors have preferred varietal status for the 3 entities, full species status, no formal status at all (*C. lutetiana* as a polymorphic complex), or associating the more similar pair (North American and Asian) as 2 subspecies separate from the European at specific rank. Boufford (1983) and Averett & Boufford (1985) show convincingly that separate taxonomic status for the three entities is warranted, and that ssp. *canadensis* is more closely related to ssp. *quadrisulcata*. The question of the appropriate taxonomic level remains. Boufford (1983) states that "although subspp. *canadensis* and *quadrisulcata* are placed in *C. lutetiana*, this might not ultimately prove to be the best treatment." Later, flavonoid data showed strong differences between the three taxa, stronger than the differences between many of the other species in the genus (Averett & Boufford 1985). Morphologic differences between the three taxa are fairly subtle but appear to be consistent. The complicated synonymy is perhaps an example of a too-zealous attempt to have nomenclature reflect subtleties of relationship and evolutionary divergence, our understanding of which is unclear and changeable. [=Y; = *C. lutetiana* Linnaeus ssp. *canadensis* (Linnaeus) Ascherson & Magnus – RAB, K, W, X, Z; = *C. lutetiana* var. *canadensis* Linnaeus – C; = *C. quadrisulcata* (Maximowicz) Franchet & Savatier var. *canadensis* (Linnaeus) Hara – G; > *C. canadensis* var. *canadensis* – F; > *C. canadensis* var. *virginiana* Fernald – F; *C. latifolia* Hill – S; = *C. quadrisulcata* ssp. *canadensis* (Linnaeus) Löve & Löve]

Circaea ×sterilis Boufford, Hybrid Enchanter's-nightshade. Mt (NC, VA): mesic, nutrient-rich forests; rare. June-August. *C. ×sterilis* is reported to occur frequently in the absence of one or both of its parents (Z, Skvortsov 1979), and is therefore treated separately and keyed here. It ranges from Newfoundland west to Ontario and MN, south to w. NC, OH, and WI. It appears to be rare in our area, but should be sought more carefully. Recognition of *C. canadensis* (Linnaeus) Hill as distinct from *C. lutetiana* renders the hybrid binomial name *C. ×intermedia* inappropriate for North American plants, since it is the hybrid of *C. alpina* ssp. *alpina* and the European *C. lutetiana*. [= *C. ×sterilis* Boufford – Y; = *C. ×intermedia* Ehrhart (pro sp.) – RAB, C, K, W, X, Z (but misapplied as to our material if *C. canadensis* is accepted as a species); > *C. canadensis* var. *canadensis* – F, misapplied; > *C. canadensis* var. *virginiana* Fernald – F; = *C. canadensis* (Linnaeus) Hill – G, misapplied]

Epilobium Linnaeus 1753 (Willow-herb) [also see *Chamerion*]

Epilobium is a large genus (ca. 200 species), distributed primarily in boreal and alpine latitudes and elevations. All five of the species in our area reach or approach their southern limits in eastern North America here. There is increasing opinion that *E. angustifolium* and its relatives should be distinguished at the generic level from *Epilobium*, as *Chamerion*. References: Munz (1965)=Z.

1 Leaves all alternate; flowers numerous in a terminal raceme (with small bracts); flower buds reflexed, the flowers held horizontally or ascending; petals 10-20 mm long; stigma 4-lobed; plants 10-30 dm tall ..... [see ***Chamerion***]
1 Leaves all or at least the lowermost opposite; flowers few, axillary, or in poorly developed, leafy racemes; flower buds not reflexed, the flowers ascending; petals 2-8 mm long (except 10-15 mm long in *E. hirsutum*); stigma capitate (except 4-lobed in *E. hirsutum*); plants 1-20 dm tall; [section *Lysimachion*].
2 Stigma 4-cleft; petals 10-15 mm long ..... ***[E. hirsutum]***
2 Stigma capitate; petals 2-8 mm long.
3 Leaves lanceolate, distinctly broader below the middle, flat, the larger generally at least 10 mm wide, toothed.
4 Principal leaves 3-7 cm long, with obscure marginal teeth, the apices merely acute; internodes (below the inflorescence) glabrous, glabrescent, or with pubescence scattered over the surface; mature coma (attached to plump seeds) nearly white; plants often strict or sparingly branched; seeds striate (with well-developed papillae arranged conspicuously in lines) ..... ***E. ciliatum ssp. ciliatum***

4 Principal leaves 5-15 cm long, with conspicuous and often irregular marginal teeth, the apices acuminate to attenuate; internodes (below the inflorescence) with lines of pubescence (some internodes on a given plant sometimes with scattered pubescence or glabrous); mature coma cinnamon (attached to plump seeds) brown (pale when immature); plants generally well-branched, with a bushy habit; seeds papillose (the papillae sometimes forming weak lines)..... ***E. coloratum***

3 Leaves linear to narrowly lanceolate, broadest near the middle, revolute, the larger generally < 10 mm wide, not toothed.

5 Pubescence spreading..... ***[E. strictum]***

5 Pubescence appressed.

6 Upper leaf surface finely and rather densely pubescent..... ***E. leptophyllum***

6 Upper leaf surface glabrous or with a few scattered hairs near the midrib..... ***[E. palustre]***

Epilobium ciliatum Rafinesque *ssp.* ***ciliatum***, American Willow-herb. Mt (NC, VA), Pd (VA): bogs, seeps, disturbed wet places (such as moist edges of logging roads); uncommon (rare in NC). June-September. Newfoundland and Labrador west to AK, south to VA, w. NC, ne. TN, IN, IA, CA, TX, Mexico, Central America; disjunct in Chile and Argentina. [= K; < *E. ciliatum* – RAB, W; = *E. ciliatum* var. *ciliatum* – C; > *E. ciliatum* – F, X, in a narrower sense; > *E. glandulosum* Lehm. var. *adenocaulon* (Hausskn.) Fernald – F; > *E. adenocaulon* Hausskn. var. *adenocaulon* – G, Z]

Epilobium coloratum Biehler, Bronze Willow-herb, Eastern Willow-herb. Mt (GA, KY, NC, SC, VA), Pd (NC, VA), Cp (NC, VA), Ip (KY): seepages, moist open places; common (uncommon in KY Interior Low Plateau, rare in NC Coastal Plain). June-September. ME west to MN, south to NC, n. GA, AL, AR, and TX. There are some difficulties in distinguishing this species and *E. ciliatum* in our area. [= RAB, C, F, G, GW, K, S, W, Z]

Epilobium leptophyllum Rafinesque, Narrowleaf Willow-herb, American Marsh Willow-herb. Mt (NC, VA): bogs, seepages, and boggy meadows; rare. July-October. Newfoundland and Mackenzie west to British Columbia, south to w. NC, ne. TN, KS, and CA. [= RAB, C, F, G, GW, K, W, Z]

* *Epilobium hirsutum* Linnaeus, Hairy Willow-herb, native of Eurasia, ranges south to s. PA (Rhoads & Klein 1993) and WV (Kartesz 1999). [= C, F, G, K, Z]

Epilobium palustre Linnaeus, Marsh Willow-herb, ranges south to DE and ne. PA (Rhoads & Klein 1993). [= C, K; > *E. palustre* var. *palustre* – F, G, Z]

Epilobium strictum Muhlenberg ex Sprengel, Northeastern Willow-herb, Downy Willow-herb, Soft Willow-herb. Reported for Arlington County, VA; the basis unknown. Québec west to MN, south to n. VA (?), OH, and n. IL. The single record is regarded as questionable. [= C, F, G, K, Z]

Gaura Linnaeus 1753 (Gaura)

A genus of about 21 species, herbs, of North America. The flowers of all our species open about sunset and wither early the following morning. The genus is rather weedy; other western species may be expected to turn up in our area as adventive weeds. References: Raven & Gregory (1972)=Z; Munz (1965)=X.

1 Pedicels 2-4 mm long; fruit with a stipe at maturity; clumped or matted perennials from woody rhizomes or rootstocks; [of sandy habitats of SC and GA southward].

2 Clumped perennial; petals 4-10 mm long; body of the fruit 5-10 mm long; stipe of the fruit 0.5-4.5 mm long..... ***G. filipes***

2 Mat-forming perennial; petals 7-15 mm long; body of the fruit 8-15 mm long; stipe of the fruit 2-8 mm long..... ***G. sinuata***

1 Pedicels 0-1 mm long; fruit without a stipe; annual, winter annual, or biennial; [collectively of various habitats and more widespread in our area.

3 Sepals 2-3.5 mm long; petals 1.5-3 mm long..... ***G. parviflora***

3 Sepals 2.5-12 mm long; petals 2.5-9 mm long.

4 Sepals 2.5-8 mm long; leaves 0.1-1.3 cm wide, the widest rarely over 1 cm wide; flowers 3-4-merous (often mixed on a plant); fruits 3-4-angled (often mixed on a plant); [of the outer Coastal Plain of GA, NC, and SC]..... ***G. angustifolia***

4 Sepals 8-13 mm long; leaves 0.3-2.5 cm wide, the larger nearly always > 1 cm wide; flowers 4-merous; fruits 4-angled; [primarily of the Mountains and Piedmont of NC, SC, and VA, extending to the Coastal Plain of GA and SC]..... ***G. biennis***

Gaura angustifolia Michaux, Southeastern Gaura. Cp (GA, NC, SC): open woodlands, sandy fields, roadsides, primarily in the outer Coastal Plain; common. May-September. E. NC (Dare County) south to s. FL, west to e. TX, endemic to the Coastal Plain. [= RAB, K, S, Z; > *G. angustifolia* var. *angustifolia* – X]

Gaura biennis Linnaeus, Biennial Gaura, Northeastern Gaura. Mt (NC, SC, VA), Pd (GA, NC, VA), Cp (GA, SC, VA): roadsides, woodlands, streambanks, disturbed areas; common (uncommon in VA Coastal Plain). June-October. MA and NY west to WI, se. MN, and IA, south to sw. NC, c. GA (Jones & Coile 1988), sc. TN, and c. IL. [= RAB, K, S, W, Z; *G. biennis* var. *biennis* – C, F, G, X]

Gaura filipes Spach, Threadstalk Gaura. Cp (GA, SC), Pd, Mt (GA): sandy fields, disturbed areas, and clearings; common. April-July. SC west to n. TN and s. IN, south to ne. FL and e. LA. [= RAB, C, G, K, W, Z; > *G. filipes* var. *filipes* – F, X; > *G. filipes* var. *major* Torrey & A. Gray – F, X; = *G. michauxii* Spach – S]

* ***Gaura parviflora*** Douglas ex Lehmann, Small-flowered Gaura. Cp (GA, SC, VA), Pd (GA): sandy fields, disturbed areas, and clearings; rare, native of c. and w. North America. May-July. IN and IL west to WA, south to MS, and Mexico; apparently introduced eastward to MA, TN, GA, and SC. Kartesz's (1999) adoption of *G. mollis* as the name for this taxon has been rejected (Wagner & Hoch 2000, Brummitt 2001). [= RAB, F, G, S, Z; = *G. mollis* James – K; > *G. parviflora* var. *parviflora* – X; > *G. parviflora* var. *lachnocarpa* Weatherby – X]

* ***Gaura sinuata*** Nuttall ex Seringe, Texas Gaura. Cp (GA, SC), Pd (GA): sandy fields, disturbed areas, and clearings; uncommon, native of further west. April-June. AR and OK south to s. TX, introduced eastward to SC and FL. [= RAB, K, X, Z]

Gaura drummondii (Spach) Torrey & A. Gray. Disjunct eastward in GA (Kartesz 1999). [= K] {not yet keyed}
Gaura longiflora Spach. East to MD, PA, KY, TN, and AL (Kartesz 1999). [= K; = *G. biennis* Linnaeus var. *pitcheri* Torrey & A. Gray – C, F, G, X; > *G. filiformis* Small – S; > *G. longiflora* – S] {not yet keyed}

Ludwigia Linnaeus 1753 (Seedbox, Water-primrose, Water-purslane)

A genus of about 82 species, herbs and shrubs, cosmopolitan. References: Peng (1989)=Z; Munz (1965)=X; Nesom & Kartesz (2000)=Q; Zardini, Gu, & Raven (1991)=V; Peng (1984, 1986, 1988); Peng & Tobe (1987); Raven (1963); Munz (1938, 1944); Eyde (1977, 1978, 1981); Raven & Tai (1979); Duke (1955). Key based in part on GW, Z, and Q.

1 Leaves opposite; plants creeping (rooting at the nodes); [section *Dantia*] ..... **Key A**
1 Leaves alternate; plants erect or ascending (not rooting at the nodes), or creeping (rooting at the nodes).
2 Stamens 8-14; sepals 4-7; petals 4-7; [of various habits, including annual and perennial herbs and shrubs, variously erect, ascending, creeping, or forming floating mats] ..... **Key B**
2 Stamens 4; sepals 4; petals 0-4; [perennial herbs, with erect ascending flowering stems] ..... **Key C**

Key A – *Ludwigia* with opposite leaves

1 Pedicels of flowers and fruits 5-35 mm long.
2 Petals 7-11 mm long; pedicels of capsules 15-35 mm long, longer than the leaves ..... ***L. arcuata***
2 Petals 4-5 mm long; pedicels of capsules 5-16 mm long, shorter than to equalling the leaves ..... ***L. brevipes***
1 Pedicels of flowers and fruits 0-3 mm long.
3 Stems, leaves, capsules, and calyx densely hirsute; seeds dark reddish-brown, 0.3-0.4 mm long ..... ***L. spathulata***
3 Stems, leaves, capsules, and calyx glabrous to sparsely puberulent; seeds tan, 0.4-0.8 mm long.
4 Petals 0; floral tubes and capsules with 4 longitudinal dark green bands; bractlets (borne at or near base of floral tube) absent or present, if present then 0-1 mm long ..... ***L. palustris***
4 Petals 4; floral tubes and capsules lacking green banding; bractlets (borne at or near base of floral tube) present, 2-4 mm long ..... ***L. repens***

Key B – *Ludwigia* with alternate leaves, 8-14 stamens, 4-7sepals, and 4-7 petals

1 Sepals 4; stamens 8; seeds in 2-several vertical series in each locule, free of endocarp tissue.
2 Internodes of the stem conspicuously winged on the angles by 2 decurrent wings running down from each leaf base; petals 0.6-1.2 cm long; capsule 1.0-2.0 cm long, 4-angled or 4-winged; [section *Myrtocarpus*] ..... ***L. decurrens***
2 Internodes of the stem not winged on the angles (or very faintly so); petals 1.0-5.0 cm long; capsule (1.5-) 2-5 cm long, obtusely 4-angled; [section *Macrocarpon*].
3 Petals (1.5-) 3-5 cm long; sepals ca. 10 mm wide at base ..... ***L. bonariensis***
3 Petals 1-2 cm long; sepals 3-5 mm wide at base ..... ***L. octovalvis***
1 Sepals 5 (-7); stamens 10 (-14); seeds in 1 vertical series in each locule, loosely embraced or embedded in endocarp tissue.
4 Stems erect; floral tube much longer than the pedicel; seeds loosely embraced by a corky, horseshoe-shaped segment of endocarp; [section *Seminuda*] ..... ***L. leptocarpa***
4 Stems (at least the lower portions) decumbent, creeping, or floating in mats (the flowering stems more-or-less erect in *L. grandiflora* and *L. hexapetala*); floral tube much shorter than the pedicel; seeds embedded in the woody endocarp; [section *Oligospermum*].
5 Flowering stems decumbent, floating, or creeping; stem and leaves glabrous or glabrescent; petals mostly 1-1.5 cm long; anthers 1-1.7 mm long ..... ***L. peploides var. glabrescens***
5 Flowering stems more-or-less erect; stem and leaves sparsely to densely pubescent with long soft hairs; petals (1.2-) 1.6-3 cm long; anthers 2.5-3.5 mm long.
6 Sepals (6-) 8-11 (-14) mm long; primary leaves 5-8.5 cm long, 7-11 mm wide, usually linear-lanceolate, usually widest below the middle; petals (1.2-) 1.6-2.0 (-2.6) cm long; style 4.7-6.7 (-8.2) mm long; stems densely villous ..... ***L. grandiflora ssp. grandiflora***
6 Sepals (8-) 12-19 mm long; primary leaves 5.5-13 cm long, 9-18 mm wide, usually narrowly elliptic to oblanceolate, usually widest above the middle; petals (1.5-) 2.0-2.9 (-3) cm long; style (5.8-) 6-10 mm long; stems sparsely to densely villous (rarely glabrous) ..... ***L. grandiflora ssp. hexapetala***

Key C – *Ludwigia* with alternate leaves, 4 stamens, 4 sepals, and 0-4 petals

1 Pedicels 2-15 mm long; capsules subglobose to spheric or cubic, about as long as wide, box-like, 4-angled, dehiscence by an apical pore (later sometimes also irregularly loculicidal); petals present, 4-15 mm long, persistent or caducous; roots fascicled, fusiform, tuberous; plants lacking basal, stoloniform shoots; [section *Ludwigia*].
2 Leaves cuneate at base; pedicels 2-5 mm long; nectary discs at base of style flattish, inconspicuous; [widespread in our area, in a wide variety of habitats] ..... ***L. alternifolia***
2 Leaves rounded or truncate at base; pedicels 4-15 mm long; nectary discs at base of style domed, prominent; [nearly restricted to the Coastal Plain, primarily of pinelands].
3 Styles 6-10 mm long; plants glabrous, glabrescent, or pubescent with very short hairs; sepals strongly reflexed in fruit ..... ***L. virgata***
3 Styles 1.5-3 mm long; plants glabrescent or pubescent with short to long, spreading to shaggy hairs; sepals strongly reflexed, spreading, or ascending in fruit.

4 Sepals narrowly deltoid, broadest at or near the base, 3-4× as long as wide, ascending or spreading in fruit; plants glabrescent to hirtellous with long spreading hairs ..... ***L. hirtella***

4 Sepals ovate, broadest near the middle, ca. 2× as long as wide, strongly reflexed in fruit; plants pubescent with relatively short, appressed to spreading hairs ..... ***L. maritima***

1 Pedicels 0-1 (-5) mm long; capsules subglobose, obconic, or obpyramidal, about as long as wide or longer than wide, circular to quadrangular in cross-section, dehiscence irregularly loculicidal; petals absent or present, if present (*L. linearis*, *L. linifolia*) then 0-6 mm long and caducous; roots fibrous or rhizomatous; plants frequently with basal, stoloniform shoots; [section *Microcarpium*].

5 Capsules cylindrical, narrowly obconical, or narrowly obpyramidal, at least 2.5-5× as long as broad; petals present or absent.

6 Primary leaves of the flowering stems narrowly elliptical, 6-12 (-20) mm wide; petals absent ..... ***L. glandulosa***

6 Primary leaves of the flowering stems linear, 1.5-5 mm wide; petals present.

7 Sepals (3.3-) 4-7 mm long; lateral and marginal veins obscure on lower leaf surface; seeds reddish brown; capsules cylindric, parallel-sided through most of their length, not grooved; anthers 0.5-1.1 mm long ..... ***L. linifolia***

7 Sepals 2.3-5 (-5.6) mm long; lateral and marginal veins distinct on lower leaf surface; seeds yellowish; capsules elongate obpyramidal, tapering through most or all of their length, with a shallow longitudinal groove on each face; anthers 1.1-2 mm long.

8 Sepals 2.3-4 mm long, acuminate, the surfaces densely and minutely papillose, the papillae 0.02-0.05 mm long and appressed; capsules 5-8.5 (-10) mm long, 2-4 (-5) mm in diameter; pedicels 0-0.4 mm long; seed surface cells elongate parallel to the seed length (as seen at 20× or more); anthers 1.1-1.6 mm long ..... ***L. linearis var. linearis***

8 Sepals 3-5 (-5.6) mm long, elongate-acuminate to cuspidate, the surfaces densely minutely strigillose, the hairs 0.06-0.10 mm long and appressed to ascending; capsules 5-10 (-12) mm long, 3-5.5 mm in diameter; pedicels 0-3.5 (-5) mm long; seed surface cells elongate transverse to the seed length, or irregular (as seen at 20× or more); anthers (1.1-) 1.3-2 mm long ..... ***L. linearis var. puberula***

5 Capsules subglobose, obovoid, or broadly obpyramidal, 1-1.5 × as long as broad; petals absent.

9 Flowers in compact, headlike or elongate spikes, the inflorescence lacking well-developed leaves; stems rarely branched; rhizomes often present ..... ***L. suffruticosa***

9 Flowers axillary in the axils of well-developed leaves; stems usually much branched; rhizomes absent.

10 Plants densely pubescent throughout.

11 Sepal apex elongate-acuminate or subcuspidate, reflexed; pubescence of stems and leaves hirtellous (the hairs spreading); seed surface cells suborbicular (as seen at 20× or more); anthers 0.6-0.9 (-1.3 mm long; style 1-2 mm long ..... ***L. pilosa***

11 Sepal apex acuminate, ascending; pubescence of stems and leaves strigillose (the hairs appressed) or hirtellous (the hairs spreading); seed surface cells elongate; anthers 0.3-0.8 mm long; style 0.25-1 (-1.25) mm long.

12 Plants hirtellous; capsules oblong-obovoid; sepals greenish on the upper surface; bracteoles (1.5-) 2-4.3 mm long, borne at or near the base of the capsule; seed surface cells elongate transverse to the seed length; anthers 0.3-0.35 mm long; style 0.25-0.5 mm long ..... ***L. ravenii***

12 Plants strigillose; capsules subglobose; sepals yellowish on the upper surface; bracteoles 0.5-1.5 mm long, usually borne on the short pedicel; seed surface cells in patches, some patches with cells elongate parallel to seed length, others with cells transverse to seed length, others with cells diagonal (rather resembling a badly laid-out parque floor); anthers 0.5-0.8 mm long; style 0.55-1 (-1.25) mm long ..... ***L. sphaerocarpa***

10 Plants glabrous or subglabrous throughout.

13 Primary leaves of the flowering stems 4-17 mm long, 1.5-10 mm wide, mostly obovate-spatulate and 1.5-3× as long as wide; capsules 1-1.5 (-2) mm long, containing 10-20 dark reddish-brown seeds; plants typically 1-4 dm tall ..... ***L. microcarpa***

13 Primary leaves of the flowering stems (18-) 30-110 mm long, 2-10 (-20) mm wide, mostly elliptic, lanceolate, oblanceolate, or linear and 4-20× as long as wide; capsules 1.8- 2-7 mm long, containing 40-500 light brown, yellowish, or tan seeds; plants typically 3-10 dm tall.

14 Capsules obpyramidal, the corners narrowly winged with wings 0.3-0.9 mm wide; bracteoles 1.5-4.7 mm long.

15 Stems often distinctly ridged or winged; sepals creamy-white, nearly as long as the capsule; capsule wall bulging out longitudinally between the wings; seed surface cells elongate parallel to the seed length ..... ***L. alata***

15 Stems nearly smooth or slightly ridged; sepals greenish, about 1/2 as long as the capsule; capsule wall flat between the wings; seed surface cells suborbicular ..... ***L. lanceolata***

14 Capsules oblong-ovoid or subglobose, the corners not winged; bracteoles either 0.5-1.5 mm or 3.5-6.5 (-8) mm long.

16 Bracteoles 3.5-6.5 (-8) mm long; sepals green, the apex long-acuminate, reflexed; capsules oblong-obovoid; seed surface cells elongate parallel to the seed length; [known from our area only in the Piedmont of VA] ..... ***L. polycarpa***

16 Bracteoles 0.5-1.5 mm long; sepals yellowish, the apex acuminate, ascending capsules subglobose; seed surface cells in patches, some patches with cells elongate parallel to seed length, others with cells transverse to seed length, others with cells diagonal (rather resembling a badly laid-out parque floor); [of the Coastal Plain of GA, NC, SC, and VA in our area] ..... ***L. sphaerocarpa***

Ludwigia alata Elliott, Winged Seedbox. Cp (GA, NC, SC, VA): interdune ponds, freshwater to slightly brackish (oligohaline) marshes; rare. June-September. Se. VA south to s. FL, west to se. LA; disjunct in Jamaica. This species is a hexaploid (n = 24). One third of the genome of *L. alata* is apparently derived from *L. microcarpa* or its ancestor (Peng 1988). [= RAB, C, F, G, K, Z; > *L. alata* – GW (also see *L. lanceolata*); > *L. alata* – S; > *L. simulata* Small – S]

Ludwigia alternifolia Linnaeus, Alternate-leaf Seedbox. Mt, Pd, Cp (GA, NC, SC, VA): ditches, marshes, open wet places, disturbed wet places; common. May-October. MA west to s. Ontario, s. MI, IA, and KS, south to n. FL and e. TX. [= RAB, G, GW, K, S, W; > *L. alternifolia* var. *alternifolia* – C, F; > *L. alternifolia* var. *pubescens* E.J. Palmer & Steyermark – C, F]

Ludwigia arcuata Walter. Cp (GA, SC): marshes or submerged in water of natural Coastal Plain ponds; rare. June-September. SC south to s. FL, west to panhandle FL and s. AL. [= RAB, GW, K; = *Ludwigiantha arcuata* (Walter) Small – S]

* ***Ludwigia bonariensis*** (M. Micheli) Hara. Cp (NC, SC, VA): freshwater tidal marshes and adjacent disturbed areas; rare, apparently native of tropical America. June-September. Locally abundant in disturbed edges of freshwater tidal marshes near Wilmington, NC, perhaps introduced on ship's ballast. Material from Wilmington apparently has larger flowers than material of *L. bonariensis* elsewhere; its source and appropriate taxonomic treatment uncertain and needing further study. First reported for SC by Leonard (1971b). [= RAB, GW, K; = *Jussiaea neglecta* Small – S]

Ludwigia brevipes (B.H. Long ex Britton, A. Braun, & Small) Eames, Long Beach Seedbox, Coastal Plain Water-purslane. Cp (GA, NC, SC, VA): pondshores, blackwater rivers, interdunal swales, borrow ponds, ditches, impoundments, marshes; rare. July-October. NJ south to e. GA (Jones & Coile 1988), in the Coastal Plain. [= RAB, C, F, G, GW, K]

Ludwigia decurrens Walter, Wingstem Water-primrose. Cp, Pd, Mt (GA, NC, SC, VA): swamp forests, ditches; common (rare in VA Mountains). June-October. MD, w. VA, WV, s. IN, s. IL, and MO, south to s. FL and TX; also in tropical America. [= RAB, C, GW, K, W; = *Jussiaea decurrens* (Walter) A.P. de Candolle – F, G, S]

Ludwigia glandulosa Walter, Small-flowered Seedbox. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA): low forests, marshes, ditches; common (rare in VA). June-September. E. MD south to n. FL, west to e. TX, north in the interior to c. TN, w. KY, s. IN, s. IL, se. MO, c. AR, and se. OK, primarily on the Southeastern Coastal Plain. A related species, treated by Peng as *L. glandulosa* ssp. *brachycarpa* (Torrey & A. Gray) Peng, ranges from sw. LA north and west to s. OK and c. TX. This species is tetraploid (n = 16). [< *L. glandulosa* – RAB, C, F, G, GW, S, in a broader sense; = *L. glandulosa* ssp. *glandulosa* – K, Z]

* ***Ludwigia grandiflora*** (Michaux) Greuter & Burdet *ssp.* ***grandiflora***, Showy Water-primrose. Cp (GA, SC): ponds, lakes, sluggish waters of ditches or streams; rare. May-September. Se. SC south to FL, west to TX; disjunct in MO, Guatemala, and in s. South America. This taxon is hexaploid (n= 24). See Zardini, Gu, and Raven (1991) and Nesom & Kartesz (2000) for additional information. [= Q; < *L. uruguayensis* (Cambessedes) Hara – RAB, C, GW, K (also see *L. hexapetala*); = *L. grandiflora* (Michaux) Zardini, Gu, & Raven – V]

Ludwigia grandiflora (Michaux) Greuter & Burdet *ssp.* ***hexapetala*** (Hooker & Arnott) Nesom & Kartesz, Common Water-primrose. Cp (NC, SC), Pd (GA, NC), Mt* (VA*): ponds, lakes, sluggish waters of ditches or streams; uncommon (but often locally abundant) (rare in VA). May-September. NC south to FL, west to OK and TX; also in CA, Europe, South America, Mexico; also introduced farther north in North America. This taxon is decaploid (n = 40). See Zardini, Gu, and Raven (1991) and Nesom & Kartesz (2000) for additional information. [= Q; < *L. uruguayensis* (Cambessedes) Hara – RAB, C, GW, K, W, in part (also see *L. grandiflora*); < *Jussiaea uruguayensis* Cambessedes – F, G; ? *Jussiaea michauxiana* Fernald – F; = *L. hexapetala* (Hooker & Arnott) Zardini, Gu, & Raven – V]

Ludwigia hirtella Rafinesque, Rafinesque's Seedbox. Cp (GA, NC, SC, VA), Pd (GA), Mt (GA, NC): savannas, rarely in mountain bogs; common (rare in VA). June-September. S. NJ south to panhandle FL, west to e. TX, north in the interior to KY, c. TN, AR, and se. OK. [= RAB, C, F, G, GW, K, S, W]

Ludwigia lanceolata Elliott, Lanceleaf Seedbox. Cp (GA, NC, SC): interdune ponds, open wet areas; rare (NC Rare). August-September. Se. NC south to c. peninsular FL, west to panhandle FL. This species is tetraploid (n = 16). [= RAB, K, S, Z; < *L. alata* – GW, in part]

Ludwigia leptocarpa (Nuttall) Hara, Water-willow. Cp (GA, NC, SC, VA), Pd (GA, VA), Mt (GA): riverbanks, marshes, and ditches; common (uncommon in VA). June-September. VA south to c. peninsular FL, west to e. TX, north in the interior to se. MO and s. IL; and in tropical America. [= RAB, C, GW, K, W; = *Jussiaea leptocarpa* Nuttall – F, G, S]

Ludwigia linearis Walter *var.* ***linearis***, Eastern Narrowleaf Seedbox. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): savannas; common. June-September. Var. *linearis* ranges from s. NJ south to c. peninsular FL, west to se. LA, extending inland to the Cumberland Plateau of nc. AL and c. TN. Var. *linearis* is here interpreted to be equivalent to Peng's subglabrous morph. Peng (1989) declines to recognize infraspecific taxa in *L. linearis*, but his discussion makes clear that 2 distinctive entities are present, as characterized by orientation of seed surface cells and characters of leaves, bracteoles, pedicels, sepals, stigmas, and styles (see key). The orientation of seed surface cells, recognized as a distinctive character in other difficult species pairs (such as *L. alata* and *L. lanceolata*) is the most reliable character separating the 2 varieties. This species is diploid (n = 8). [< *L. linearis* – RAB, C, F, G, GW, K, S, W, Z]

Ludwigia linearis Walter *var.* ***puberula*** Engelmann & A. Gray, Western Narrowleaf Seedbox. Cp (GA, NC, SC), Pd (GA, SC): savannas, interdunal swales; uncommon. June-September. Var. *puberula* ranges primarily from c. AL west to c. AR, south to e. TX, with intergradational material extending as far north and east as n. FL and e. NC. Var. *puberula* is here interpreted to include Peng's intermediate morph, densely strigillose morph, and completely glabrous morph (Peng 1989). As pointed out by Peng (1989), the glabrous morph is exactly like the densely strigillose morph except for the absence of pubescence. They often grow together, have essentially the same distribution, and may differ only at a single allele. Peng's intermediate morph is heterogeneous; some likely being truly intermediate between (and possibly hybrid derivatives of) the two varieties here recognized, while others clearly belong to var. *puberula* (based on surface cell orientation and floral characteristics) and merely have an amount of pubescence intermediate between the densely strigillose and completely glabrous morphs. [< *L. linearis* – RAB, C, F, G, GW, K, S, W, Z]

Ludwigia linifolia Poiret in Lamarck, Flaxleaf Seedbox. Cp (GA, NC, SC), Pd (NC): limesink ponds (dolines) and *Taxodium ascendens* savannas; rare (NC Rare). June-September. Nc. NC south to s. FL, west to s. MS; disjunct in Tabasco, Mexico. This species is diploid (n = 8). [= RAB, GW, K, S, Z]

Ludwigia maritima R.M. Harper, Harper's Seedbox. Cp (GA, NC, SC): savannas; common. June-September. E. NC south to s. peninsular FL, west to e. LA. [= RAB, GW, K, S]

Ludwigia microcarpa Michaux, Small-fruited Seedbox. Cp (GA, NC, SC), Pd (GA, NC), Mt (GA): in circumneutral or alkaline soils of moist places, over calcareous rock, mafic rock, shell hash, or brackish sands, such as in maritime wet grasslands, savannas and adjacent ditches over coquina limestone ("marl"), and wet clay flats over diabase, often in roadside ditches; uncommon. July-October. Ne. NC south to s. FL, west to se. TX (Brown & Marcus 1998); disjunct inland on calcareous or mafic rocks in nc. NC, n. GA, n. AL, c. TN, and sc. MO; also in the Bahamas, Cuba, and Jamaica. This species is diploid (n = 8). [= RAB, F, GW, K, S, W, Z]

Ludwigia octovalvis (Jacquin) Raven. Cp (GA, NC, SC): marshes, disturbed areas; rare. May-September. Se. NC south to s. FL, west to TX; and widespread in tropical America. [= GW; > *L. octovalvis* spp. *octovalvis* – K; > *L. octovalvis* ssp. *sessiliflora* (M. Micheli) Raven – K; > *Jussiaea angustifolia* Lamarck – S; > *Jussiaea scabra* Willdenow – S]

Ludwigia palustris (Linnaeus) Elliott, Common Water-purslane. Cp, Pd, Mt (GA, NC, SC, VA): moist to wet disturbed areas; common. May-October. Widespread in North America, Eurasia, and Africa. [= RAB, C, GW, K, W; > *L. palustris* var.

americana (A.P. de Candolle) Fernald & Griscom – F, G; > *L. palustris* var. *nana* Fernald & Griscom – F; = *Isnardia palustris* Linnaeus – S]

*? ***Ludwigia peploides*** (Humboldt, Bompland, & Kunth) Raven *var.* ***glabrescens*** (Kuntze) Shinners. Cp (GA, NC, VA), Mt (VA), Pd (GA, SC, VA): pools, ditches, disturbed places; rare. May-September. PA, VA and NC south and west to FL and AZ, widespread in the West Indies, Central and South America. Doubtfully native in all or part of our area. [= RAB, C; *L. peploides* ssp. *peploides* – GW; *Jussiaea diffusa* Forskl. – S; *Jussiaea grandiflora* Michaux – S; = *Jussiaea repens* Linnaeus var. *glabrescens* Kuntze – F, misapplied; *Jussiaea repens* – G, misapplied; = *L. peploides* ssp. *glabrescens* (Kuntze) Raven – K; < *L. peploides* – W, infraspecific taxa not distinguished]

Ludwigia pilosa Walter, Hairy Seedbox. Cp (GA, NC, SC, VA), Pd (NC): ditches, wet places; common (rare in VA). June-October. Se. VA south to n. FL, west to se. TX, restricted to the Coastal Plain except for disjunct occurrences inland in NC, VA, and n. AL. This species is tetraploid (n= 16). [= K, W, Z; < *L. pilosa* – RAB, C, F, G, GW, S (also see *L. ravenii*)]

Ludwigia polycarpa Short & Peter. Pd (VA): {habitat}; rare. June-September; July-October. MA, CT, and w. VT west to s. Ontario, MI, WI, MN, and c. NE, south to c. VA, KY, s. IL, s. MO, and e. KS. This species is tetraploid (n = 16). [= C, F, G, GW, K, S, Z]

Ludwigia ravenii Peng, Raven's Seedbox. Cp (NC, SC, VA): savannas, swamps, marshes, wet open places; rare. June-October. Se. VA south to ne. FL (no known records for GA), restricted to the Coastal Plain. For further information, see Peng (1984, 1988, 1989). This species is tetraploid (n = 16). [= K, Z; < *L. pilosa* – RAB, C, F, G, GW, S (included within concept of *L. pilosa* by most earlier authors)]

Ludwigia repens Forster, Creeping Seedbox. Cp (GA, NC, SC, VA), Pd (GA), Mt (VA): ditches, pools, and streams; uncommon (rare in VA). June-September. Se. VA south to s. FL, west to TX and n. Mexico, north in the interior to TN, MO, and OK; also in CA, Bermuda, and the West Indies. Reveal et al. (2003) propose the name *L. repens* for nomenclatural conservation with a conserved type; if this proposal is not accepted, *L. natans* Elliott will become the name of this species. [= RAB, GW, K; *Ludwigia natans* Elliott – F, G; = *Isnardia repens* – S]

Ludwigia spathulata Torrey & A. Gray, Southern Water-purslane. Cp (GA, SC), Pd (GA): sinkhole ponds, cypress-gum ponds, depression meadows, boggy shores; rare. June-October. SC south to panhandle FL and s. AL. [= RAB, GW, K; *Isnardia spathulata* (Torrey & A. Gray) Small – S]

Ludwigia sphaerocarpa Elliott, Globe-fruited Seedbox. Cp (GA, NC, SC, VA): boggy areas, pools, ditches, river marshes, interdune swales, river and pondshores; rare. June-September. E. MA south to n. FL, west to e. TX, primarily on the Coastal Plain, spottily distributed in that range, and also disjunct in w. NY, sc. TN, s. IN, and nw. IN and ne. IL. This species is tetraploid (n = 16). Peng (1989) considers it likely that *L. sphaerocarpa* is of allopolyploid origin, one or both of its parents now extinct. [= RAB, C, GW, K, S, Z; > *L. sphaerocarpa* var. *sphaerocarpa* – F, G; > *L. sphaerocarpa* var. *jungens* Fernald & Griscom – F, G]

Ludwigia suffruticosa Walter, Shrubby Seedbox. Cp (GA, NC, SC): periodically to seasonally flooded portions of limesink ponds (dolines) and clay-based Carolina bays; rare north of SC (NC Rare). June-October. Se. NC south to s. peninsular FL, west to panhandle FL and se AL. This species is tetraploid (n = 16). Peng (1989) reports that "with its whitish creamy sepals, which are very showy in the dense flower aggregates, the cross-pollinating *L. suffruticosa* successfully attracts many insects, mostly bumblebees, honeybees, and wasps." [= RAB, GW, K, S, Z; = *L. capitata* Michaux]

Ludwigia virgata Michaux, Savanna Seedbox. Cp (GA, NC, SC, VA): wet savannas; common (rare in VA). June-September. Se. VA south to s. peninsular FL, west to panhandle FL and se. AL. [= RAB, C, F, GW, K, S]

*? ***Ludwigia peruviana*** (Linnaeus) Hara, Primrose-willow. In s. GA (Jones & Coile 1988). Reported for NC (Kartesz 1999). All or part of the Southeastern distribution is as an alien species. {investigate} [= GW, K; = *Jussiaea peruviana* Linnaeus – S]

The following natural hybrids are known, not necessarily in our area. Hybrids are generally recognizable from their intermediate morphology and usual association with their two parents. However some hybrids resemble one parent much more than the other, and some hybrids are found in populations independent (and even disjunct) from one or both parents. Allopolyploidy may have had a major role in the evolution of this genus, especially section *Microcarpium*, which has a majority of polyploid species.

L. alata × *pilosa*. Pentaploid, sterile.
L. alata × *suffruticosa*. Pentaploid, sterile.
L. arcuata × *pilosa*.
L. glandulosa × *linearis*. Triploid, sterile.
L. glandulosa × *palustris*. Triploid, sterile.
L. glandulosa × *pilosa*. Tetraploid, fertile.
L. glandulosa × *sphaerocarpa*. Tetraploid, fertile.
L. lanceolata × *pilosa* [= *L.* ×*simulata* Small (pro sp.)]. Tetraploid, fertile.
L. lanceolata × *suffruticosa*. Tetraploid, fertile. Frequent south of our area.
L. linearis × *sphaerocarpa*. Triploid, sterile.
L. microcarpa × *palustris*.
L. pilosa × *ravenii*. Tetraploid, fertile.
L. pilosa × *sphaerocarpa*. Tetraploid, fertile. Frequent.
L. pilosa × *suffruticosa*. Tetraploid, fertile.
L. polycarpa × *sphaerocarpa*. Tetraploid, fertile.

Oenothera Linnaeus 1753 (Evening-primrose)

ONAGRACEAE

A genus of about 124 species, herbs, of America (especially temperate regions). This treatment provisional, with further revision likely, especially in the *Oe. fruticosa-Oe. tetragona-Oe. pilosella* complex. References: Dietrich, Wagner, & Raven (1997)=Z; Dietrich & Wagner (1988)=Y; Munz (1965)=X; Straley (1977)=V. Keys adapted in part from those references. [also see *Calylophus*]

1 Ovary essentially terete; fruit terete or with 4 rounded ridges; stamens equal in length (except in *Oe. speciosa*).
  2 Flowers white or pink; flower buds nodding; [section *Hartmannia*] ***Oe. speciosa***
  2 Flowers yellow; flower buds erect; [section *Oenothera*]
    3 Fruit linear, nearly isodiametric through its length; seeds borne ascending in the locules, rounded or fusiform, more or less regularly pitted; [section *Oenothera*, subsection *Raimannia*].
      4 Petals acute to rounded at the apex.
        5 Inflorescence dense, with > 2 flowers per spike opening each day; leaves gray-green ***[Oe. clelandii]***
        5 Inflorescence lax, 1-2 flowers per spike opening on each day; leaves green ***Oe. curtissii***
      4 Petals truncate to emarginate at the apex.
        6 Nonflowering portion of stems stiff, densely strigillose or sometimes also villous; leaves gray-green, densely strigillose, usually subentire to shallowly dentate (rarely lyrate); [in maritime situations].
          7 Sepals 2.0-3.3 cm long; petals 2.5-4.5 cm long; stigma elevated above the anthers at anthesis; capsule 2.5-5.5 cm long; rosette leaves 5-14 cm long, 1-2 cm wide ***Oe. drummondii ssp. drummondii***
          7 Sepals 0.3-1.1 cm long; petals 0.45-1.6 cm long; stigma surrounded by the anthers at anthesis; capsule 1.5-4.5 cm long; rosette leaves 4-8 cm long, 0.7-1.0 cm wide ***Oe. humifusa***
        6 Nonflowering portion of stem not stiff, moderately to sparsely strigillose to sometimes densely villous, and also more orless glandular puberulent; leaves green, sparsely to moderately strigillose and usually villous, deeply lobed to dentate (rarely some of them subentire); [in inland disturbed situations].
          8 Petals 2.5-4 cm long; style 4-7.5 cm long; stigma lobes well elevated above the anthers at anthesis ***Oe. grandis***
          8 Petals 0.5-2.2 cm long; style 2-5 cm long; stigma lobes surrounded by the anthers at anthesis ***Oe. laciniata***
    3 Fruit thickest near the base, tapering to the apex; seeds borne horizontally in the locules, angled-prismatic, not regularly pitted; [section *Oenothera*, subsection *Oenothera*].
      9 Stigma elevated above the anthers at anthesis; petals 2.5-5 cm long.
        10 Cauline leaves 0.4-1.0 cm wide; apex of the inflorescence curved; free sepal tips subterminal, usually spreading; capsules spreading at nearly right angles to the stem, long-attenuate toward apex, usually conspicuously arcuate ***Oe. argillicola***
        10 Cauline leaves 1.5-6 cm wide; apex of the inflorescence erect; free sepal tips terminal, erect; capsules erect or slightly spreading, gradually attenuate toward the apex.
          11 Upper stem, ovary, floral tube, and sepals always conspicuously pubescent, usually with at least some red-pustulate hairs; bracts green, persistent; sepals often flushed with red, or red-striped ***Oe. glazioviana***
          11 Upper stem, ovary, floral tube, and sepals often apparently glabrous without magnification; pustulate hairs absent, or if present not red (in fresh material); bracts often pale-green and deciduous; sepals yellowish green, or flushed with some red ***Oe. grandiflora***
      9 Stigma surrounded by or below the anthers at anthesis; petals 0.7-2.5 (-3) cm long.
        12 Plant appearing exclusively appressed-pubescent (as seen without magnification).
          13 Apex of the inflorescence curved; free sepal tips subterminal in bud, erect to spreadin; dry capsules usually rusty brown ***Oe. oakesiana***
          13 Apex of the inflorescence erect; free sepal tips erect in bud; dry capsules gray-green or dull green.
            14 Leaves green to pale green; stems, ovary, floral tube, and sepals sparsely appressed-pubescent ***Oe. biennis***
            14 Leaves dull green to gray-green; stems, ovary, floral tube, and sepals densely appressed-pubescent ***Oe. villosa ssp. villosa***
        12 Plant appearing **either** glabrous **or** with a mixture of long pustular hairs and appressed pubescence (as seen without magnification).
          15 Apex of inflorescence curved; free sepal tips subterminal in bud.
            16 Plant (at least the lower portions) predominantly strigillose; leaves dull green to gray-green; dry capsules rusty brown ***Oe. oakesiana***
            16 Plant predominantly erect-pubescent or appearing glabrous (as seen without magnification); leaves usually bright green; dry capsules usually dark green or black ***Oe. parviflora***
          15 Apex of inflorescence erect; free sepal tips terminal or subterminal in bud.
            17 Inflorescence conspicuously pubescent ***Oe. biennis***
            17 Inflorescence glabrous (or appearing so without magnification).
              18 Free sepal tips terminal in bud; petals 1.4-2.5 (-3) cm long; bracts caducous, pale green; capsules dull green when dry; petals fading yellowish-white to translucent ***Oe. nutans***
              18 Free sepal tips subterminal in bud; petals 0.8-1.5 (-2) cm long; bracts persistent, green; capsules usually black or dark green when dry; petals fading pale yellow, usually opaque ***Oe. parviflora***

1 Ovary 4-angled or 4-winged (at least near its tip); fruit sharply 4-angled or 4-winged; stamens of two lengths (except *Oe. triloba* and *Oe. macrocarpa* ssp. *macrocarpa*).
  19 Leaves all basal, pinnatifid; [section *Lavauxia*] ***Oe. triloba***
  19 Leaves in part cauline, entire or toothed.
    20 Petals 50-70 mm long; flowers opening in the evening; wings of the fruit 10-25 mm wide; [section *Megapterium*] ***[Oe. macrocarpa ssp. macrocarpa]***
    20 Petals 3-30 mm long; flowers opening in the day; wings of the fruit <3 mm wide; [section *Kneiffia*]
      21 Cauline leaves linear, < 1 mm wide; petals 3-5 (-7) mm long; floral bracts shorter than the subtended ovaries; mature fruits ellipsoid-rhomboid, 4-6 mm long; annual; [section *Kneiffia*, subsection *Peniophyllum*] ***Oe. linifolia***
      21 Cauline leaves lanceolate to ovate, > 1 mm wide; petals 5-30 mm long; floral bracts longer than the subtended ovaries; mature fruits clavate to oblong-elliptic, 8-20 mm long; perennial; [section *Kneiffia*, subsection *Kneiffia*].
        22 Petals 5-10 mm long; inflorescence usually nodding ***Oe. perennis***
        22 Petals 15-30 mm long; inflorescence usually erect.
          23 Plant conspicuously pilose-hirsute with hairs 1-3 mm long; free sepal tips 1-4 mm long, divergent ***Oe. pilosella***

23 Plant either with shorter or appressed pubescence, of glandular or nonglandular hairs; free sepal tips 0-2 (-6) mm long, divergent or not.
24 Capsules oblong, widest near the middle, usually abruptly tapered to a stipe 0.1-3 (-7) mm long; hairs of the ovary and capsule predominantly glandular (or the ovary glabrous); leaves subglabrous or sparsely pubescent, more or less dentate.
25 Petals (20-) 25-35 mm long; cauline leaves lanceolate to ovate, 2-7 cm long, 1-3 cm wide, often glaucous beneath..... ***Oe. tetragona* var. *fraseri***
25 Petals 12-20 (-25) mm long; cauline leaves linear to lanceolate, 2-7 cm long, 0.5-1.0 (-1.5) cm wide ..... ***Oe. tetragona* var. *tetragona***
24 Capsules clavate, widest above the middle, gradually tapered to a stipe 3-10 mm long; hairs of the ovary and capsule nonglandular (or with a mixture of glandular and nonglandular hairs); leaves generally pubescent, subentire.
26 Petals 15-30 mm long; stems 7-12 dm tall, freely branched, slightly pubescent; cauline leaves lanceolate, 5-12 cm long, 0.5-1.5 cm wide; [of tidal marshes, usually with spongy lower stems and adventitious roots where regularly submerged]... ***Oe. riparia***
26 Petals (8-) 15-22 mm long; stems 1-8 dm tall, less branched (unless mowed, grazed, or otherwise damaged), more pubescent; cauline leaves 2-6 (-8) cm long, 0.2-1.0 (-1.2) cm wide.
27 Capsule vestiture a mixture of glandular and nonglandular hairs.
28 Cauline leaves not velutinous, 5-10× as long as wide ..... ***Oe. tetragona* var. *brevistipata***
28 Cauline leaves velutinous, 2-4× as long as wide.
29 Petals 7-12 mm long; leaves lance-oblong, obtuse; [of barrens of TN, KY, and AL] ... ***[Oe. tetragona* var. *sharpii]***
29 Petals 15-20 mm long; leaves lanceolate, acute; [of the Atlantic Coastal Plain]..... ***Oe. tetragona* var. *velutina***
27 Capsule vestiture strictly nonglandular.
30 Free sepal tips 1-3 mm long, often arching; calyx strigose ..... ***Oe. fruticosa* var. *unguiculata***
30 Free sepal tips < 1 mm long; calyx various.
31 Capsule body 6-11 mm long, the pubescence rather coarse..... ***Oe. fruticosa* var. *fruticosa***
31 Capsule body 3-5 mm long, the pubescence very fine.
32 Capsule body 3.5-4 mm long, strigose-pilose; [of Coastal Plain bogs] ..... ***Oe. fruticosa* var. *microcarpa***
32 Capsule body 4-5 mm long; very finely strigillose; [of Piedmont rock outcrops]..... ***Oe. fruticosa* var. *subglobosa***
33 .....

Oenothera argillicola Mackenzie, Shale-barren Evening-primrose. Mt (VA): shale barrens and woodlands; uncommon. Sc. PA south through MD to e. WN and w. VA (south to Montgomery County). [= C, F, G, H, K, W, Z; > *Oe. argillicola* var. *argillicola* – X; > *Oe. argillicola* var. *pubescens* Core & Davis – X]

Oenothera biennis Linnaeus, Common Evening-primrose. Mt, Pd, Cp (GA, NC, SC, VA): fields, pastures, roadsides, disturbed areas; common. June-October. Ranging widely in e. North America and Europe, and scattered in w. North America. [= H, K, W, Z; < *Oe. biennis* – RAB, G, S (also see *Oe. nutans*); = *Oe. biennis* var. *biennis* – C; > *Oe. biennis* var. *biennis* – F; > *Oe. biennis* var. *pycnocarpa* (Atkinson & Bartlett) Wiegand – F; > *Oe. biennis* ssp. *caeciarum* Munz – X; > *Oe. biennis* ssp. *centralis* Munz – X]

Oenothera curtissii Small. Cp (GA, SC): sandhills, sandy fields; rare. May-September. Se. SC south to n. peninsular FL, west to s. AL. Closely related to *Oe. rhombipetala*, which is restricted to the Great Plains, with scattered occurrences east to AR, IL, and MI. [= K, Y; < *Oenothera rhombipetala* Nuttall ex Torrey & A. Gray – RAB, F, X, misapplied; = *Raimannia curtissii* Rose – S]

?* ***Oenothera drummondii* Hooker *ssp.* ***drummondii,*** Drummond's Evening-primrose. Cp (NC, SC): sandy ocean beaches; rare, perhaps only introduced or adventive from the Gulf Coast. April-October. Ssp. *drummondii* ranges from se. NC south to s. FL, west to se. TX, and south to Tamaulipas and Vera Cruz. Ssp. *thalassiphila* (Brandegee) W. Dietrich & W.L. Wagner is restricted to the southern tip of Baja California. [= Y; < *Oe. drummondii* – RAB, K; < *Raimannia drummondii* (Hooker) Rose ex Sprague & Riley – S; = *Oe. drummondii* var. *drummondii* – X]

Oenothera fruticosa Linnaeus *var.* ***fruticosa***, Southern Sundrops. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, VA): dry forests and woodlands, glades, and rock outcrops; common. April-August. MA west to IN, south to FL and LA. [= F, G, X; < *Oe. fruticosa* – RAB, C; < *Oe. fruticosa* ssp. *fruticosa* – H, K, V, W; > *Oe. fruticosa* var. *linearis* (Michaux) S. Watson – F; > *Oe. fruticosa* var. *humifusa* Allen – F, G, X; > *Kneiffia fruticosa* (Linnaeus) Raimann – S; > *Kneiffia arenicola* Small – S; > *Kneiffia semiglandulosa* Pennell – S]

Oenothera fruticosa Linnaeus *var.* ***microcarpa*** Fernald, Small-fruited Sundrops. Cp (NC, SC, VA): boggy depressions. April-August. E. MD south to e. SC. [= F, X; < *Oe. fruticosa* – RAB, C; < *Oe. fruticosa* ssp. *fruticosa* – H, K, V]

Oenothera fruticosa Linnaeus *var.* ***subglobosa*** (Small) Munz, Flatrock Sundrops. Pd (GA): granite flatrocks and domes; rare. GA to AL. [= X; < *Oe. fruticosa* – RAB, C; < *Oe. fruticosa* ssp. *fruticosa* – H, K, V; = *Kneiffia subglobosa* Small – S]

Oenothera fruticosa Linnaeus *var.* ***unguiculata*** Fernald, Southern Sundrops. Cp (NC, SC, VA): sandhills, moist to wet loamy savannas; uncommon. April-August. Se. VA south to e. SC. [= F, X; < *Oe. fruticosa* – RAB, C; < *Oe. fruticosa* ssp. *fruticosa* – H, K, V]

* ***Oenothera glazioviana*** Micheli in Martius, Garden Evening-primrose. Cp, Pd, Mt (GA, NC, SC, VA): disturbed areas; uncommon. This species apparently arose as a garden hybrid, and has been widely cultivated and naturalized nearly worldwide. [= K, Z; = *Oe. erythrosepala* Borbás – X]

Oenothera grandiflora L'Héritier ex Aiton. Cp, Pd, Mt (GA?, NC, SC): disturbed areas; uncommon. June-October. VT west to KY, south to c. peninsular FL and s. MS. [= F, K, X, S, Z]

* ***Oenothera grandis*** (Britton) Smyth. Cp (NC): roadsides; rare, introduced from further west. March-July. The native range of this species is centered in KS, OK, and TX. [= K, X, Y; = *Oe. laciniata* Hill var. *grandiflora* (S. Watson) B.L. Robinson – RAB, F, G]

Oenothera humifusa Nuttall, Seabeach Evening-primrose, Spreading Evening-primrose. Cp (GA, NC, SC, VA): coastal sand dunes; common. Early May-October. S. NJ south to s. FL, west to s. LA, along the coast. [= RAB, C, F, G, H, K, X, Y; = *Raimannia humifusa* (Nuttall) Rose – S]

Oenothera laciniata Hill, Cutleaf Evening-primrose. Cp, Pd, Mt (GA, NC, SC, VA): disturbed areas; common. February-October. ME west to ND, south to s. FL and TX; also in CA. [= K, W; = *Oe. laciniata* var. *laciniata* – RAB, C, F, G; = *Raimannia laciniata* (Hill) Rose – S; = *Oe. laciniata* ssp. *laciniata* – X]

Oenothera linifolia Nuttall, Threadleaf Sundrops, Flaxleaf Sundrops. Pd (GA, NC, SC, VA*), Cp (GA, SC), Mt (GA): dry openings and fields; rare (SC Rare, VA Watch List). C. VA west to s. IL and se. KS, south to panhandle FL and se. TX. Occurrences east of the Mississippi River may be mainly or entirely adventive. Belden et al. (2004) discuss the Virginia occurrence. [= RAB, C, F, G, K, W, V, X; = *Peniophyllum linifolium* (Nuttall) Pennell – S]

Oenothera nutans Atkinson & Bartlett. Mt (GA?, NC, SC?, VA), Pd (GA?, NC, SC?): roadsides, openings, forest edges, pastures; common (rare in VA). July-October. ME west to MI, south to n. FL, s. AL, and s. MO. [= K, Z; < *Oe. biennis* – RAB, G, S; = *Oe. biennis* Linnaeus var. *austromontana* (Munz) Cronquist – C; = *Oe. biennis* var. *nutans* (Atkinson & Bartlett) Wiegand – F; = *Oe. austromontana* (Munz) Raven, Dietrich, & Stubbe – H, W; = *Oe. biennis* ssp. *austromontana* Munz – X]

Oenothera oakesiana (A. Gray) Robbins ex S. Watson & Coulter. Cp (NC, VA), Pd, Mt (VA): disturbed areas, roadsides; uncommon (rare in VA). Nova Scotia west to Manitoba, south to e. NC, sc. VA, PA, n. IN, n. IL, and s. MN. [= G, K, Z; = *Oe. parviflora* Linnaeus var. *oakesiana* (A. Gray) Fernald – C, F; = *Oe. parviflora* ssp. *parviflora* var. *oakesiana* (A. Gray) Fernald – X]

Oenothera parviflora Linnaeus, Small-flowered Evening-primrose. Mt, Pd (NC, VA), Cp (NC, SC, VA), {GA}: fields, disturbed areas; uncommon (rare in VA Coastal Plain). May-September. Nova Scotia west to Manitoba, south to NC, TN, KY, and MO. Reported for GA (GANHP). [= RAB, G, K, W, Z; > *Oe. parviflora* var. *parviflora* – C, F; > *Oe. parviflora* var. *angustissima* (R.R. Gates) Wiegand – F; > *Oe. parviflora* ssp. *parviflora* var. *parviflora* – X; > *Oe. parviflora* ssp. *angustissima* (R.R. Gates) Munz – X]

Oenothera perennis Linnaeus, Little Sundrops. Mt (NC, SC, VA), Pd (NC, VA), Cp (VA): bogs, sphagnous seeps; uncommon (rare in NC and SC, rare in VA Coastal Plain). May-August. Nova Scotia west to Manitoba, south to w. NC, nw. SC, KY, and MO. [= RAB, C, G, K, W, X; > *Oe. perennis* var. *perennis* – F; = *Kneiffia perennis* (Linnaeus) Pennell – S]

Oenothera pilosella Rafinesque, Midwestern Evening-primrose. Mt, Pd, Cp (VA): disturbed areas; rare. NH west to Ontario, south to s. VA, KY, n. AL, c. MS, and c. LA. *Oe. sessilis* (Pennell) Munz, treated by Straley (1977) as *Oe. pilosella* ssp. *sessilis* (Pennell) Straley, seems sufficiently distinct to be recognized as a species; it is restricted to West Gulf Coastal Plain. [= F, G, X; = *Oe. pilosella* ssp. *pilosella* – C, K, V; > *Kneiffia pratensis* Small – S; = *Oe. fruticosa* Linnaeus var. *hirsuta* Nuttall ex Torrey & A. Gray]

Oenothera riparia Nuttall, Riverbank Evening-primrose. Cp (NC, SC, VA?): tidal marshes; rare (NC Rare). June-July. Se. VA (?) south to se. NC and e. SC. Distinct from *Oe. fruticosa*. Present in the freshwater tidal portions of the Waccamaw, Northeast Cape Fear, Black, Greater Pee Dee, and Cape Fear (?) rivers. [< *Oe. fruticosa* – RAB; < *Oe. fruticosa* ssp. *fruticosa* – K, V; = *Kneiffia riparia* (Nuttall) Small – S; = *Oe. tetragona* Roth ssp. *glauca* (Michaux) Munz var. *riparia* (Nuttall) Munz – X]

* ***Oenothera speciosa*** Nuttall, White Evening-primrose, Pink-ladies. Cp, Pd, Mt (GA, NC, SC, VA): roadsides and fields, also cultivated as an ornamental; common (rare in Mountains), introduced from further west. May-August. [= RAB, C, F, G, K, W, X; = *Hartmannia speciosa* (Nuttall) Small – S]

Oenothera tetragona Roth *var.* ***brevistipata*** (Pennell) Munz. Mt, Pd (GA, NC, SC, VA), Cp (VA): dry forests and woodlands, roadsides; common. May-August. SC and KY, south to GA and MS. Should perhaps be considered more closely related to *Oe. fruticosa* (where placed in synonymy by Straley), if it is determined to be valid. [= G; < *Oe. tetragona* – RAB, C; < *Oe. fruticosa* Linnaeus ssp. *fruticosa* – H, K, V, W; = *Kneiffia brevistipata* Pennell – S; = *Oe. tetragona* ssp. *tetragona* var. *brevistipata* – X]

Oenothera tetragona Roth *var.* ***fraseri*** (Pursh) Munz, Appalachian Sundrops. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): dry to moist forests and woodlands, roadsides; common. May-August. NY and PA, south to nw. SC and n. GA. This is the more montane and high elevation variant of *Oe. tetragona*. [= F, G, X; < *Oe. tetragona* – RAB, C; > *Oe. tetragona* var. *hybrida* (Michaux) Fernald – F; > *Oe. tetragona* var. *latifolia* (Rydberg) Fernald – F; < *Oe. fruticosa* Linnaeus ssp. *glauca* (Michaux) Straley – H, K, V, W; > *Kneiffia glauca* (Michaux) Spach – S; > *Kneiffia hybrida* (Michaux) Small – S; > *Kneiffia latifolia* Rydberg – S; = *Oe. tetragona* ssp. *glauca* var. *glauca* – X]

Oenothera tetragona Roth *var.* ***tetragona***, Northern Sundrops. Mt, Pd (NC, SC, VA), Cp (VA): dry forests and woodlands, roadsides; common. May-August. Newfoundland west to MI, south to e. VA and MO. [= F; < *Oe. tetragona* – RAB, C; < *Oe. tetragona* var. *tetragona* – G; < *Oe. fruticosa* Linnaeus ssp. *glauca* (Michaux) Straley – H, K, V, W; = *Kneiffia tetragona* (Roth) Pennell – S; = *Oe. tetragona* ssp. *tetragona* var. *tetragona* – X]

Oenothera tetragona Roth *var.* ***velutina*** (Pennell) Munz. Cp (VA): dry sandy soils. Se. NY (Long Island) south to se. VA. Should perhaps be considered more closely related to *Oe. fruticosa* (where placed in synonymy by Straley), if it is determined to be valid. [= F, G; < *Oe. tetragona* – RAB, C; < *Oe. fruticosa* Linnaeus ssp. *fruticosa* – H, K, V, W; = *Kneiffia velutina* Pennell – S; = *Oe. tetragona* ssp. *tetragona* var. *velutina* – X]

Oenothera triloba Nuttall, Stemless Evening-primrose. Mt (GA, VA*): limestone glades (in GA), disturbed areas (in VA); rare, perhaps only introduced, though native into eastern KY and TN (GA Watch List). [= C, F, G, H, K, X; = *Lavauxia triloba* (Nuttall) Spach – S]

* ***Oenothera villosa*** Thunberg *ssp.* ***villosa***. Mt, Pd (VA): disturbed areas; uncommon, apparently naturalized in our area from an original distribution in the Great Plains. [= K, Z; *? Oe. strigosa* (Rydberg) Mackenzie & Bush – G; *? Oe. biennis* var. *canescens* Torrey & A. Gray – C, F; *? Oe. strigosa* (Rydberg) Mackenzie & Bush ssp. *canovirens* (Steele) Munz – X]

* *Oenothera clelandii* W. Dietrich, Raven, & W.L. Wagner. Reported for SC (Kartesz 1999). {investigate} Centered in IL and WI, ranging east, probably mostly as introductions, to NJ, WV, KY. [= C, K, Y; < *Oe. rhombipetala*, misapplied]

Oenothera macrocarpa Nuttall ssp. *macrocarpa*, Wingfruit Evening-primrose, occurs as a disjunct in c. TN. [= K; < *Oe. missouriensis* Sims – F; < *Oe. macrocarpa* Nuttall – C, G; = *Oe. missouriensis* Sims var. *missouriensis* – X; *? Megapterium missouriense* (Sims) Spach]

Oenothera tetragona Roth var. *sharpii* Munz. Known from the Eastern Highland Rim of TN, AL, and KY. [< *Oe. tetragona* – RAB, C; < *Oe. tetragona* var. *tetragona* – G; < *Oe. fruticosa* Linnaeus ssp. *fruticosa* – H, K, V, W; = *Oe. tetragona* ssp. *tetragona* var. *sharpii* – X]

Many hybrids are known.

OROBANCHACEAE Ventenat 1799 (Broomrape Family)

A family of about 96 genera and 2060 species, root-parasitic herbs lacking chlorophyll (Orobanchaceae sensu stricto) and chlorophyllose hemi-parasites (formerly placed in the Scrophulariaceae), of temperate and subtropical regions of the Northern Hemisphere (Manen et al. 2004). References: Thieret (1971); Olmstead et al. (2001); Fischer in Kadereit (2004).

tribe Gerardieae: *Agalinis, Aureolaria, Dasistoma, Macranthera, Seymeria.*
tribe Orobancheae: *Epifagus, Orobanche.*
tribe Buchnereae, "subtribe Buchneriinae": *Buchnera, Striga.*
tribe Cymbarieae: *Schwalbea.*
"tribe Castillejeae": *Castilleja.*
tribe Rhinantheae: *Conopholis, Melampyrum, Pedicularis.*

1 Plants lacking chlorophyll (parasitic), variously pink, purple, brown, or white.
  2 Stem paniculately branched; flowers dimorphic, those low in the inflorescences small, pistillate, and fertile, those high in the inflorescence larger, apparently perfect but functionally staminate ..... ***Epifagus***
  2 Stem simple (rarely few-branched); flowers all alike.
    3 Calyx deeply cleft on the lower side; stamens exserted ..... ***Conopholis***
    3 Calyx either nearly regular, or deeply cleft above and below into 2 lateral halves; stamens included ..... ***Orobanche***
1 Plants with chlorophyll (hemiparasitic), with foliage and stems normally green.
  4.....

Agalinis Rafinesque 1836 (Agalinis, Purple-foxglove)

A genus of about 40 species, hemiparasitic herbs, of tropical and warm temperate regions of America. References: Canne (1979); Hays (1998b); Pennell (1935)=P.

1 Perennial, from horizontal rootstalk bearing slender, scaly rhizomes; corollas 3-4 cm long; [of Carolina bays, cypress savannas, limesink ponds] ..... ***A. linifolia***
1 Annual, with 1-several fibrous roots from the stem base; corollas < 3 cm long (except sometimes *A. fasciculata* and *A. purpurea*).
  2 Stem retrorse-hispid; leaves lanceolate to ovate, usually lobed at the base; [of mafic glades and woodlands] ..... ***A. auriculata***
  2 Stem ascending scabridulous or glabrous; leaves linear or filiform, entire.
    3 Leaves reduced to scales < 2.5 mm long, plant thus appearing leafless ..... ***A. aphylla***
    3 Leaves not scale-like, > 8 mm long.
      4 Pedicels less than 1.5× as long as the calyx, mostly 1-5 mm long at anthesis, mostly < 8 mm long in fruit.
        5 Plants fleshy; [of saline or brackish marshes and salt flats].
          6 Pedicels usually longer than or equalling the leaflike bracts; corollas 15-20 mm long; anther cells 1.8-2.3 mm long, usually long-lanose; [of Princess Anne County, VA, southward] ..... ***A. maritima var. grandiflora***
          6 Pedicels usually less than or equalling the leaflike bracts; corollas 12-17 mm long; anther cells 1.3-1.8 mm long, glabrous or somewhat pubescent; [of the Delmarva Peninsula northward] ..... ***A. maritima var. maritima***
        5 Plants not fleshy; [not inhabiting saline habitats, though some species may be found in freshwater interdune swales].
          7 Stems appearing copiously leafy because of the well-developed fascicles of axillary leaves; [inhabiting dry to moist, often ruderal, habitats] ..... ***A. fasciculata***
          7 Stems not copiously leafy, the axillary fascicles absent or poorly developed; [inhabitating moist to wet natural habitats].
            8 Branches spreading or ascending; stems more-or-less scabridulous; corollas 18-38 mm long ..... ***A. purpurea***
            8 Branches virgate; stems glabrous; corollas 20-25 mm long ..... ***A. virgata***
      4 Pedicels > 2.5× as long as the calyx, mostly 5-20 mm long at anthesis, mostly > 10 mm long in fruit.
        9 Living plants dull green, usually suffused with much purplish pigment; leaves > 20 mm long; dried plants dark, sometimes blackish; dried calyx deep purple, the veins obscure (difficult to see even at 10×).
          10 Upper lip of the corolla arched forward over the stamens, greatly reducing the opening of the throat; corolla throat glabrous or glabrate within; [of the Piedmont and Mountains] ..... ***A. tenuifolia***
          10 Upper lip of the corolla erect or reflexed, the throat open; corolla throat densely long-hairy within; [of the Coastal Plain].
            11 Branches widely spreading or laxly ascending; pedicels > 4× as long as the leaflike bracts; anterior filaments 5-5.5 mm long; [of Berkeley and Beaufort counties, SC, southward] ..... ***A. laxa***
            11 Branches ascending to somewhat spreading; pedicels < 3× as long as the leaflike bracts; anterior filaments 7-9 mm long; [widespread] ..... ***A. setacea***
        9 Living plants light green or glaucescent, usually with no purple pigment; leaves < 15 (-20) mm (except *A. decemloba*, with leaves 15-25 mm long); dried plants not dark, but turning pale yellowish green; dried calyx pale yellowish green, the veins distinct and obvious without magnification.
          12 Corolla throat within lacking 2 yellow lines; leaves widen distally to obtuse tips; stem and branches distinctly rough-scabridulous to the touch ..... ***A. obtusifolia***
          12 Corolla throat with 2 prominent yellow lines; leaves taper to acute or acuminate tips; stem and branches not (or very slightly) scabridulous.

13 Corolla 10-15 mm long, its lobes emarginate or retuse; [of the Piedmont and Mountains, and rarely the upper Coastal Plain]. ..... ***A. decemloba***

13 Corolla 15-20 mm long, its lobes entire to slightly emarginate; [of the Coastal Plain, from e. NC southward] ..... ***A. tenella***

Agalinis aphylla (Nuttall) Rafinesque, Scale-leaf Agalinis. Cp (FL, GA, NC, SC): wet pine savannas; uncommon (rare in GA, NC, SC). September-October; October-November. Se. NC south to ne. FL and Panhandle FL, west to e. LA. [= RAB, GW, K, S, WH; = *Gerardia aphylla* Nuttall – P]

Agalinis auriculata (Michaux) S.F. Blake, Earleaf Foxglove. Pd (SC, VA): glades, barrens, and disturbed clearings over mafic rocks, such as diabase and gabbro; rare. August; September. KY and OH west to MN, south to n. AL, AR, and TX; also rarely disjunct east of the Blue Ridge, in NJ, n. VA, and nc. SC. In Lewis County, KY (D. White, pers. comm.). Sometimes treated in the monotypic genus *Tomanthera*. [= C, K; = *Tomanthera auriculata* (Michaux) Rafinesque – G, P, S; = *Gerardia auriculata* Michaux – F]

Agalinis decemloba (Greene) Pennell. Pd (NC, SC, VA), Mt (GA, NC): dry clayey or sandy woodlands; rare (GA Special Concern). [= RAB, S, W; < *A. obtusifolia* – C, K; = *Gerardia decemloba* Greene – F, G, P]

Agalinis fasciculata (Elliott) Rafinesque. Cp (GA, NC, SC, VA), Pd (GA, SC, VA): sandhills, pine savannas, disturbed sandy areas, roadsides; common. S. MD south to s. FL, west to e. TX, northward in the interior to s. IN, s. IL, sw. MO, AR, , e. NE, and nc. TX. [= RAB, C, S, W; = *Gerardia fasciculata* Elliott – F, G; < *A. fasciculata* (Elliott) Rafinesque – GW, K; > *Gerardia fasciculata* ssp. *typica* – P]

Agalinis laxa Pennell. Cp (GA, SC): sandhills; rare. SC south to GA and FL. [= K, S; < *A. divaricata* (Chapman) Pennell – GW; = *Gerardia laxa* (Pennell) Pennell – P]

Agalinis linifolia (Nuttall) Britton. Cp (GA, NC, SC, VA?): Coastal Plain depression ponds, cypress savannas, wet pine savannas; uncommon. August-September; September-October. Se. NC south to s. FL, west to e. LA; disjunct in e. DE (reports for MD are in error). [= RAB, C, GW, K, S; = *Gerardia linifolia* Nuttall – F, G, P]

Agalinis maritima (Rafinesque) Rafinesque *var.* ***grandiflora*** (Bentham) Shinners. Cp (GA, NC, SC, VA): tidal marshes; uncommon. July; August. Se. VA south to s. FL, west to s. TX and Tamaulipas; West Indies. [= K, S; < *A. maritima* – RAB, C, GW; = *Gerardia maritima* Rafinesque var. *grandiflora* Bentham – F; < *Gerardia maritima* – G; = *Gerardia maritima* ssp. *grandiflora* (Bentham) Pennell – P]

Agalinis maritima (Rafinesque) Rafinesque *var.* ***maritima***. Cp (NC, VA): tidal marshes; uncommon. July; August. Nova Scotia and s. ME south to se. VA and e. NC. [= K; < *A. maritima* – RAB, C, GW; = *Gerardia maritima* Rafinesque var. *maritima* – F; < *Gerardia maritima* – G; = *Gerardia maritima* ssp. *typica* – P]

Agalinis obtusifolia Rafinesque. Cp (GA, NC, SC, VA), Pd (GA, NC, VA): pine savannas, wet pine flatwoods, sandhill seeps, disturbed areas; uncommon. September-October; October-November. DE south to s. FL, west to e. LA, in the interior north to KY and TN. [= RAB, GW, W; < *A. obtusifolia* – C, K (also see *A. decemloba* and *A. tenella*); = *Gerardia obtusifolia* (Rafinesque) Pennell – F, G, P]

Agalinis plukenetii (Elliott) Rafinesque. Cp, Pd (GA), Mt (SC): sandhills; uncommon. SC south to FL, west to wc. LA, and northward in the interior to extreme se. TN (Polk County) (Chester, Wofford, & Kral 1997). Scattered in GA (e.g., Baldwin and Laurens counties). [= K, S; = *Gerardia plukenetii* Elliott – P]

Agalinis purpurea (Linnaeus) Pennell. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): woodlands, roadsides, in a wide variety of open habitats; common. August-October; September-November. Nova Scotia west to MN, south to s. FL and e. TX. [= RAB, K, S, W, WH; < *A. purpurea* var. *purpurea* – C; = *Gerardia purpurea* var. *purpurea* – G; = *Gerardia purpurea* Linnaeus – F, P; < *A. purpurea* – GW (also see *A. virgata*)]

Agalinis setacea (J.F. Gmelin) Rafinesque. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): sandhills; common (rare in FL). September-October; October-November. NY (Long Island) south ne. FL, c. peninsular FL, and AL. [= RAB, C, K, S, W, WH; > *Gerardia setacea* J.F. Gmelin – F, G, P; > *G. stenophylla* (Pennell) Pennell – P; > *A. stenophylla* Pennell]

Agalinis tenella Pennell. Cp (GA, NC, SC), Pd (SC): sandhills, other dry woodlands; uncommon (NC Rare). S. NC south to n. FL, west to s. AL. [= RAB, S; < *A. obtusifolia* – K; = *Gerardia tenella* (Pennell) Pennell – P]

Agalinis tenuifolia (Vahl) Rafinesque *var.* ***tenuifolia***. Mt, Pd, Cp (GA, NC, SC, VA): wooded slopes, roadsides; common. August-October; September-November. ME, Ontario, MI, and MO, south to GA and LA. [= K, S; < *A. tenuifolia* – RAB, C, W; = *Gerardia tenuifolia* Vahl var. *tenuifolia* – F, G]

Agalinis virgata Rafinesque. Cp (GA, NC, SC): pine savannas; rare. September-October; October-November. NY south to GA. [= RAB, S; < *A. purpurea* var. *purpurea* – C; = *Gerardia racemulosa* Pennell – F, P; = *Gerardia purpurea* Linnaeus var. *racemulosa* (Pennell) Gleason – G; < *A. fasciculata* (Elliott) Rafinesque – K; < *A. purpurea* (Linnaeus) Pennell – GW]

Agalinis acuta Pennell. Cp {}: coastal sand plains; rare. MA south to Baltimore County, MD. [= C, K; = *Gerardia acuta* Pennell – F, G, P] {not yet keyed}

Agalinis divaricata (Chapman) Pennell, Pineland Agalinis. Cp (FL, GA): sandhills; common (rare in GA). GA (Decatur County) south to c. peninsular FL, west to MS. [= K, S, WH; = *Gerardia divaricata* (Chapman) Pennell – P] {not yet keyed}

Agalinis filicaulis (Bentham) Pennell, Spindly Agalinis. Cp (FL, GA): wet pine savannas, prairies; rare (GA Special Concern). E. GA (Tattnall County) south to c. peninsular FL and Panhandle FL, west to w. LA. [= K, S, WH; = *Gerardia filicaulis* (Bentham) Chapman – P] {not yet keyed}

Agalinis filifolia (Nuttall) Rafinesque, Seminole Agalinis. Cp (FL, GA): dry longleaf pine savannas, scrub; uncommon (rare in GA). S. GA (east to Liberty County) south to s. FL, west to sw. AL. [= K, S, WH; = *Gerardia filifolia* Nuttall – P] {not yet keyed}

Agalinis gattingeri (Small) Small ex Britton. barrens, glades, outcrops, woodlands. Ontario, MN, and NE south to AL, MS, LA, and TX. In c. TN, east to e. TN (Rhea and Scott counties) (Chester, Wofford, & Kral 1997). Reported for NC (Kartesz 1999). {investigate} [= K, S; = *Gerardia gattingeri* Small – G, P]

Agalinis georgiana (C.L. Boynton) Pennell. Cp (FL, GA): pine savannas, bogs; rare. Crisp and Lowndes counties, GA south to w. Panhandle FL. [= S, WH; < *A. fasciculata* – K; = *Gerardia georgiana* C.L. Boynton – P]

Agalinis harperi Pennell in Small. Cp (FL, GA, SC?): wet pinelands, interdune swales; uncommon (rare in GA). GA south to s. FL, west to w. LA. Glynn County, GA and east to McIntosh County, GA as *A. pinetorum*. See Hays (1998a) who has established the nomenclatural priority of *A. harperi*. Reported for SC (Kartesz 1999); {investigate} [= WH; > *A. harperi* Pennell in Small – S; > *A. pinetorum* – S; = *A. pinetorum* Pennell – K; *A. delicatula* Pennell; = *Gerardia harperi* (Pennell in Small) Pennell – P] {not yet keyed}

Agalinis heterophylla (Nuttall) Small ex Britton. GA west to s. MO, AR, e. OK, and e. TX. [= G, K]

Agalinis oligophylla Pennell. Sc. TN (Coffee and Warren counties) (as *A. pseudaphylla*) (Chester, Wofford, & Kral 1997), c. and s. AL, west through s. MS to w. LA. [= K, S; > *Gerardia pseudaphylla* (Pennell) Pennell – P; > *A. pseudaphylla* (Pennell) Shinners; > *A. pseudophylla* (Pennell) Shinners, an orthographic variant]

Agalinis paupercula (A. Gray) Britton var. *paupercula*. South to NJ and PA. Puzzling record for VA in Harvill et al. (1992) is apparently erroneous. {check specimen}. [= K; < *A. purpurea* (Linnaeus) Pennell var. *parviflora* (Bentham) B. Boivin – C; = *Gerardia paupercula* (A. Gray) Britton var. *paupercula* – F; < *Gerardia purpurea* Linnaeus var. *parviflora* Bentham – G; = *Gerardia paupercula* var. *typica* – P]

Agalinis pulchella Pennell, Coffee and Ware counties, GA. {Nomenclatural and typification problems} [= K, S; = *Gerardia pulchella* Pennell – P]

Agalinis skinneriana (A. Wood) Britton. Coffee County, TN (Chester, Wofford, & Kral 1997). [= K; = *Gerardia skinneriana* A. Wood – G, P]

Agalinis tenuifolia (Vahl) Rafinesque *var. **leucanthera*** (Rafinesque) Pennell. Cp (GA): savannas; rare (GA Special Concern). [= K]

Agalinis tenuifolia (Vahl) Rafinesque var. *macrophylla* (Bentham) Blake. [= K, S; = *Gerardia tenuifolia* Vahl ssp. *macrophylla* (Bentham) Pennell – P]

Agalinis tenuifolia (Vahl) Rafinesque *var. **polyphylla*** (Small) Pennell. Pd (GA): granitic flatrocks; uncommon? Endemic to granite flatrocks in GA. [= K, S; = *Gerardia tenuifolia* Vahl ssp. *polyphylla* (Small) Pennell – P; = *Gerardia polyphylla* Small]

Aureolaria Rafinesque 1836 (Oak-leach, False-foxglove)

A genus of about 10 species, hemiparasitic herbs, of e. North America and Mexico. References: Pennell (1935)=P.

1 Plant pubescent (especially on the calyx, corolla, capsule, and lower stem) with glandular hairs; annual; seeds 0.8-1.0 mm long, not winged.
  2 Calyx tube hemispherical, glandular-hirsute to glandular-lanate on the outer surface; capsule ovoid; trichomes of the leaves usually glandular, at least in part; leaf lobes usually acute ..... ***Au. pectinata***
  2 Calyx tube turbinate, glandular-puberulent on the outer surface; capsule ellipsoid; trichomes of the leaves usually nonglandular; leaf lobes usually obtuse.
    3 Pubescence of the upper stem entirely non-glandular; calyx lobes 6-10 mm long ..... ***Au. pedicularia* var. *pedicularia***
    3 Pubescence of the upper stem at least in part glandular (sometimes densely glandular); calyx lobes 6-16 mm long.
      4 Glandular pubescence of the upper stem dense and long; calyx lobes 8-16 mm long ..... ***Au. pedicularia* var. *austromontana***
      4 Glandular pubescence of the upper stem short, scattered among the nonglandular hairs; calyx lobes 6-10 mm long ..... ***Au. pedicularia* var. *intercedens***
1 Plant glabrous or pubescent with nonglandular hairs; perennial; seeds 1.3-2.7 mm long, winged.
  5 Capsule pubescent; inflorescence, pedicels, and/or calyx pubescent with nonglandular hairs; pedicels 1-3 mm at anthesis; flowering May-July ..... ***Au. virginica***
  5 Capsule glabrous; inflorescence, pedicels, and calyx glabrous (or pubescent with nonglandular hairs in *Au. patula*); pedicels 1-25 mm long at anthesis; flowering August-September.
    6 Inflorescence, pedicels, and calyx pubescent (at least sparsely so); pedicels slender, ca. 0.5 m in diameter ..... ***Au. patula***
    6 Inflorescence, pedicels and calyx glabrous; pedicels stout, ca. 1 mm in diameter.
      7 Lower leaves entire to serrate (or with only a few shallow lobes at the base of the leaf); pedicels 1-8 mm long at anthesis, straight; corolla 3.0-4.0 cm long; capsule 10-15 mm long; stem not glaucous ..... ***Au. laevigata***
      7 Lower leaves pinnately lobed, the lobes themselves usually serrate, the sinuses extending over half of the distance to the midrib; pedicels 4-25 mm long at anthesis, upwardly curved; corolla 3.5-6 cm long; capsule 12-20 mm long; stem slightly to strongly glaucous.
        8 Calyx lobes 2-5 mm long; corolla 3.5-4.0 cm long ..... ***Au. flava* var. *flava***
        8 Calyx lobes 5-14 mm long; corolla 3.5-6.0 cm long ..... ***Au. flava* var. *macrantha***

Aureolaria flava (Linnaeus) Farwell *var. **flava***, Eastern Smooth Oak-leach. Pd, Mt, Cp (GA, NC, SC, VA): oak forests and woodlands; common. August-September; September-October. ME west to MN, south to GA, FL, and AL. Var. *reticulata* (Rafinesque) Pennell, of the southeastern Coastal Plain, needs additional study. It is alleged to differ in its lower leaves entire, dentate, or divided < ½ way to the midrib (vs. deeply pinnatifid-divided). [= C, G, K; < *A. flava* – RAB, W; > *Gerardia flava* Linnaeus var. *flava* – F; > *Gerardia flava* var. *reticulata* (Rafinesque) Cory – F; > *A. flava* ssp. *typica* – P; >< *A. flava* ssp. *flava* – S; > *A. flava* ssp. *reticulata* (Rafinesque) Pennell – P, S]

Aureolaria flava (Linnaeus) Farwell *var. **macrantha*** Pennell, Midwestern Smooth Oak-leach. Mt (NC): oak forests and woodlands; rare. S. Ontario and MO south to e. WV, e. TN, w. NC (Fernald 1950), n. AL, and e. LA. August-September; September-October. [= C, G, K; < *A. flava* – RAB, W; = *Gerardia flava* Linnaeus var. *macrantha* (Pennell) Fernald – F; = *A. flava* ssp. *macrantha* Pennell – P; < *A. flava* ssp. *flava* – S]

Aureolaria laevigata (Rafinesque) Rafinesque, Appalachian Oak-leach. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): oak forests and woodlands; common (uncommon in Piedmont, rare in Coastal Plain). August-September; September-October. PA west to s. OH, south to SC and GA, primarily a Central and Southern Appalachian endemic, but extending into adjacent provinces, and, rarely, even the Coastal Plain. [= RAB, C, G, K, P, S, W; = *Gerardia laevigata* Rafinesque – F]

Aureolaria patula (Chapman) Pennell, Cumberland Oak-leach. Mt (GA): rich alluvial forests; rare (GA Special Concern). August-October; September-October. C. KY south through TN to nw. GA, and approaching w. NC and sw. VA. [= C, G, K, P, S]

Aureolaria pectinata (Nuttall) Pennell, Southern Oak-leach. Cp, Pd, Mt (GA, NC, SC): turkey oak sandhills, other dry oak forests and woodlands; common (uncommon in Piedmont and Mountains). May-September; September-October. NC south to