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]

Myrica Linnaeus 1753 (Sweet Gale)

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. graminea]***
            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.

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)

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

FL, west to LA, inland north to AR and MO. Related to *A. pedicularia*, but much more southerly in distribution. [= RAB, K; = *A. pedicularia* (Linnaeus) Rafinesque var. *pectinata* (Nuttall) Gleason – C, G; = *Gerardia pectinata* (Nuttall) Bentham – F; > *A. pectinata* ssp. *eurycarpa* (Pennell) Pennell – P, S; > *A. pectinata* ssp. *transcedens* (Pennell) Pennell – P, S; > *A. pectinata* ssp. *typica* – P; > *A. pectinata* ssp. *pectinata* – S; < *A. pedicularia* – W]

Aureolaria pedicularia (Linnaeus) Rafinesque *var.* ***austromontana*** Pennell, Appalachian Annual Oak-leach. Mt (GA, NC, SC, VA), Pd (NC, SC): oak forests and woodlands; common. September-October; November. Sw. VA and se. KY south to nw. SC, ne. GA, and e. TN. The various varieties recognized need additional study; the variation may be too clinal to be practically recognized taxonomically. [= C, G, K; < *A. pedicularia* – RAB; = *Gerardia pedicularia* Linnaeus var. *austromontana* (Pennell) Fernald – F; = *A. pedicularia* ssp. *austromontana* (Pennell) Pennell – P, S; < *A. pedicularia* – W]

Aureolaria pedicularia (Linnaeus) Rafinesque *var.* ***intercedens*** Pennell. Mt (NC?, VA): oak forests and woodlands; rare. September-October; November. MA west to w. NY, south to w. VA and s. WV. [= C, G, K; < *A. pedicularia* – RAB; = *Gerardia pedicularia* Linnaeus var. *intercedens* (Pennell) Fernald – F; = *A. pedicularia* ssp. *intercedens* (Pennell) Pennell – P; < *A. pedicularia* – W]

Aureolaria pedicularia (Linnaeus) Rafinesque *var.* ***pedicularia***, Northern Annual Oak-leach. Pd, Cp (NC, VA), Mt (VA): oak forests and woodlands; common. September-October; November. ME west to NY and e. MN, south to e. NC, WV, and n. IL. [= C, G, K; < *A. pedicularia* – RAB, W; = *Gerardia pedicularia* Linnaeus var. *pedicularia* – F; > *A. pedicularia* ssp. *caesariensis* Pennell – S; > *A. pedicularia* ssp. *carolinensis* Pennell – P, S]

Aureolaria virginica (Linnaeus) Pennell, Downy Oak-leach, Virginia Oak-leach. Cp, Pd, Mt (GA, NC, SC, VA): oak forests and woodlands; common. May-July; August-September. MA west to MI, south to FL and AL. [= RAB, C, G, K, W; = *Gerardia virginica* (Linnaeus) Britton, Sterns, & Poggenburg – F; > *A. virginica* – P, S; > *A. microcarpa* Pennell – P, S]

Buchnera Linnaeus (Bluehearts)
(contributed by Bruce A. Sorrie)

A genus of about 100 species, hemiparasitic herbs, of tropical and warm temperate regions of the Old and New Worlds. The taxonomy of this genus is poorly understood. The plants are root hemi-parasites, apparently not particular about the host species. References: Pennell (1935)=P.

Identification notes: Lower leaves are broadest, mid and upper leaves narrowest, often markedly so; the key refers to lower leaves. Leaf teeth are usually few in number and vary in development, from crenate to 2-3 mm long and sharply pointed. The former condition is normal for *B. floridana*, the latter for *B. americana*. Calyx length is ca. 0.5 mm longer in fruit than in flower. The foliage turns black on drying.

1 Leaves lanceolate to narrowly ovate, tapering to a point; leaf veins (below) consisting of 3 major and 2 minor ones (narrow leaves may only have 3 total veins); leaf teeth usually well developed, rarely absent; calyx (6.0-) 6.5-8.0 mm long; corolla lobes 5.0-7.0 mm long; [primarily of moderate to high pH soils in southern Great Plains, ranging to southern margin of the Great Lakes and eastward to the mid Atlantic seaboard, especially in mafic or calcareous glades and prairies] ..... ***B. americana***
1 Leaves narrowly oblanceolate to lanceolate, rounded at tip; leaf veins (below) consisting of 1 major and 2 minor ones (narrow leaves may only have 1 vein); leaf teeth usually crenate but may be absent; calyx (4.0-) 4.5-5.5 mm long; corolla lobes 4.0-5.0 mm long; [primarily of low pH soils on the southern Atlantic and Gulf Coastal Plain] ..... ***B. floridana***

Buchnera americana Linnaeus, Prairie Bluehearts, American Bluehearts, Plains Bluehearts. Mt, Pd (GA, NC, VA), Cp (GA?, VA): dry (seasonally moist) rocky, gravelly, or clayey soil of limestone glades, glades over mafic rock (such as diabase, gabbro, etc.), wet meadows, sandy roadsides; rare (GA Special Concern, NC Rare, VA Rare). July-September; August-October. NY and s. Ontario west to MI, IL, MO, and s. KS, south to c. NC, GA, and TX. In addition to the key characters given, *B. americana* is overall a larger and more robust plant than *B. floridana*, though both are quite variable in size, depending on the conditions in which they grow. *B. americana* has apparently declined very greatly in our area, probably owing to fire suppression in its habitats. [= RAB, C, F, G, GW, P, S, W; < *B. americana* – K (also see *B. floridana*)]

Buchnera floridana Gandoger, Savanna Bluehearts, Florida Bluehearts. Cp (GA, NC, SC): pine savannas, flatwoods, seepage bogs, sandy roadsides; uncommon. April-October; May-November. Se. VA (?) south to s. FL, west to TX, and in the West Indies. Previous attributions of *B. longifolia* Kunth (including *B. elongata* Small) to southeastern states (notably FL, AL, GA, and MS) are based on misidentifications of material which is actually *B. floridana*. [= RAB, GW, S; >< *B. americana* – K; > *B. longifolia* Sw. – K, by misattribution; = *B. floridana* – P (also see *B. longifolia*); > *B. floridana* – S; > *B. breviflora* Pennell – S, by misattribution; > *B. elongata* Sw. -- S]

Castilleja Mutis ex Linnaeus f. (Indian Paintbrush)

A genus of about 200 species, hemiparasitic herbs, primarily of w. North America, with a few species also in e. North America, Eurasia, Central America, and Andean South America. References: Pennell (1935)=P. Key based on Allison & Stevens (2001).

1 Bracts deeply lobed, red (rarely yellow), mostly > 2 cm long; [widespread in our area] ..... ***C. coccinea***
1 Bracts mostly entire, yellow, < 2 cm long; [endemic to c. AL] ..... ***C. kraliana***

Castilleja coccinea (Linnaeus) Sprengel, Eastern Indian Paintbrush. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (NC, SC): woodlands, fens, barrens, rock outcrops, meadows, wet pastures, grassy openings, usually over mafic rocks; uncommon,

rare in Coastal Plain (rare in GA and SC). April-May; May-June. Widespread in e. North America. [= RAB, C, F, G, GW, K, P, S, W]

Castilleja kraliana J. Allison, Cahaba Paintbrush. Mt (AL): dolomitic Ketona glades; rare. Endemic to dolomitic Ketona glades in Bibb Co., c. AL (Allison & Stevens 2001).

* ***Castilleja indivisa*** Engelmann. Cp (FL): dry, disturbed areas; rare, introduced from sc. North America. [= K, WH] {not yet keyed; add to synonymy}

Conopholis Wallroth (Squawroot)

A genus of 2 species, parasitic herbs, of e. North America and sw. North America south to Central America. The other species is *C. alpina* Liebmann, ranging from AZ, NM, and TX south to Panama, and divided into two varieties. References: Haynes (1971)=Z; Thieret (1971)=Y.

Conopholis americana (Linnaeus) Wallroth, Squawroot. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): rich, moist forests, under *Quercus* species; common (rare in Coastal Plain, rare in Piedmont south of VA). March-June. Nova Scotia west to WI and south to c. peninsular FL, AL, and TN. Haynes (1971) discusses the nature of the parasitism. *Conopholis* apparently germinates near an oak root, forms a parasitic connection to the root, resulting in the formation of a gall consisting of both *Quercus* and *Conopholis* tissue. The gall can be up to 25 cm in diameter, and lasts for many years, repeatedly sending up flowering shoots. It is believed that the gall exists underground for some years prior to first flowering. [= RAB, C, F, G, K, S, W, WH, Y, Z]

Dasistoma Rafinesque (Mullein Foxglove)

A monotypic genus, a hemiparasitic herb, endemic to se. North America. The genus is sometimes spelled '*Dasystoma*.' References: Pennell (1935)=P.

Dasistoma macrophylla (Nuttall) Rafinesque, Mullein Foxglove. Pd (SC), Mt (GA, VA): xeric to dry-mesic woodlands and bluffs, over limestone or diabase; rare (GA Special Concern, SC Rare, VA Rare). July-September. WV, OH, s. WI, IA, and NE, south to w. VA, nc. SC, nw. GA, c. AL, MS, LA, and nc. TX. First reported for VA by Wieboldt et al. (1998). [= RAB, C, G, K, P, S; = *Seymeria macrophylla* Nuttall – F, GW; = *Dasystoma macrophylla*, an orthographic variant]

Epifagus Nuttall (Beechdrops)

Epifagus is a monotypic genus, parasitic herb on the roots of *Fagus*, of e. North America. References: Thieret (1971)=Z.

Epifagus virginiana (Linnaeus) W. Barton, Beechdrops. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist to rather dry forests under *Fagus grandifolia*; common (rare in FL). September-November. Nova Scotia west to WI, south to ne. FL, Panhandle FL, and LA. [= RAB, C, F, G, K, W, WH, Z; = *Leptamnium virginianum* (Linnaeus) Rafinesque – S]

Macranthera Nuttall ex Bentham (Flameflower)

A monotypic genus, a hemiparasitic herb, of se. North America. References: Pennell (1935)=P.

Macranthera flammea (Bartram) Pennell, Flameflower, Hummingbird-flower. Cp (FL, GA): pitcherplant bogs, bayheads; uncommon (rare in GA). July-September. Nearly restricted to the East Gulf Coastal Plain (e. GA and FL Panhandle west to se. LA), but ranging east to the Atlantic Coastal Plain of e. GA (Bullock County), within a county of the SC border. [= GW, K, P, S, WH]

Melampyrum Linnaeus (Cow-wheat)

A genus of about 35 species, hemiparasitic herbs, of temperate regions of North America and Eurasia. References: Pennell (1935)=P.

1 Lowermost bracteal leaves entire or nearly so, or the uppermost with a few short basal teeth; leaves (2-) 10-30 mm wide, the widest leaves on a plant usually over 10 mm wide; plants usually simple or with 4 (rarely more) branches; internodes of the midstem usually 4-6 cm long ..... ***M. lineare*** *var.* ***latifolium***

1 Lowermost bracteal leaves generally with a few prominent sharp teeth or segments; leaves 2-10 mm wide; plants usually with numerous branches (often 10 or more); internodes of the midstem usually 1-3 cm long.

  2 Teeth of the middle and upper bracts shorter than the width of the undivided portion of the bracts; leaves lanceolate, (2-) 5-10 mm wide; [widespread in our area] ..... ***M. lineare*** *var.* ***americanum***

2 Teeth of the middle and upper bracts commonly about as long as the width of the undivided portion of the bracts; leaves linear to lanceolate, 2-6 (-8) mm wide; [of the Coastal Plain] ..... ***M. lineare** var. **pectinatum***

Melampyrum lineare Desrousseaux *var.* ***americanum*** (Michaux) Beauverd, Common Cow-wheat. Mt (NC, VA), Cp (VA): dry soils; uncommon? May-July; August-September. Québec west to MN, south to VA, NC, and TN. Our 3 varieties are quite distinctive in morphology and have distinctive geographic ranges; they seem worthy of distinction from one another at the varietal level, at least. The fourth variety, var. *lineare*, is more northern, ranging from Labrador west to British Columbia, south to New England, n. MI, and n. MN. It is similar to var. *latifolium* in its entire bracteal leaves, but overall is more like var. *americanum*, differing in the bracteal teeth and in its linear leaves, rarely over 5 mm wide. The distinction between var. *americanum* and var. *lineare* may not be worth making; if combined (as by K), the correct name is var. *lineare*. [= C, F, G; < *M. lineare* – RAB, W; < *M. lineare* var. *lineare* – K; < *M. lineare* var. *typicum* – P; < *M. lineare* – S]

Melampyrum lineare Desrousseaux *var.* ***latifolium*** Barton, Appalachian Cow-wheat. Mt (GA, NC, SC, VA): dry soils in ridgetop woodlands, in thin soils around rock outcrops; common. Late April-July; August-September. MA and NY south to n. GA, mostly in the Appalachians. [= C, F, G, K, P; < *M. lineare* – RAB, W; = *M. latifolium* (Barton) Muhlenberg ex Britton - S]

Melampyrum lineare Desrousseaux *var.* ***pectinatum*** (Pennell) Fernald, Pine-barren Cow-wheat. Cp (VA): dry sandy areas; rare. May-July; August-September. E. MA to se. VA, on the Coastal Plain. [= C, F, G, K, P; < *M. lineare* – RAB, W]

Orobanche Linnaeus (Cancer-root, Broomrape)

A genus of about 150 species, parasitic herbs, of mainly north temperate regions. References: Musselman (1982)=Z; Thieret (1971)=Y; Manen et al. (2004).

1 Flowers solitary on a long pedicel (appearing as a scape, the true stem entirely underground or nearly so); [section *Gymnocaulis*] ..... ***O. uniflora***
1 Flowers several-many, sessile or subsessile in a dense spike.
  2 Calyx 5-lobed, the lobes subequal, all well-developed ..... ***O. ludoviciana***
  2 Calyx 2-4-lobed, rarely 5-lobed, but then the fifth lobe minute and much smaller than the other lobes; [section *Orobanche*].
    3 Calyx divided to the base into 2 lateral halves, these usually 2-lobed, the 4 lobes long-attenuate or caudate ..... ***O. minor***
    3 Calyx tubular, with 4 (-5) lobes about the length of the calyx tube ..... ***O. ramosa***

*? ***Orobanche ludoviciana*** Nuttall, Prairie Broomrape. Pd, Mt (VA): pastures, parasitic on composites, often with clovers; rare, uncertain whether native or introduced from farther west (VA Watch List). OH, IN, Saskatchewan, and CA, south to TX and n. Mexico. [= F, G, Z; > *O. ludoviciana* var. *ludoviciana* – C; > *O. ludoviciana* ssp. *ludoviciana* – K]

* ***Orobanche minor*** J.E. Smith, Lesser Broomrape. Cp (GA, NC, VA), Pd, Mt (NC, VA): cultivated fields, parasitic on various hosts, especially *Trifolium*; rare, native of Eurasia. [= RAB, C, F, G, K, S, Z]

* ***Orobanche ramosa*** Linnaeus, Branching Broomrape. Cp (VA), Mt (NC): disturbed areas; rare, native of Asia. As discussed by Musselman (1984), the identity of the sole NC record (collected in 1884) is somewhat presumptive, and the precise location uncertain. [= C, F, G, K]

Orobanche uniflora Linnaeus, Cancer-root. Mt, Pd, Cp (GA, NC, SC, VA): sandy streambanks and riverbanks, rich forests; uncommon (SC Rare). April-May. Nearly throughout s. Canada and the United States. [= RAB, F, G, K, W, Z; > *O. uniflora* var. *uniflora* – C; = *Thalesia uniflora* (Linnaeus) Britton – S]

Pedicularis (Wood-betony, Lousewort)

A genus of about 350 species, hemiparasitic herbs, of temperate regions of c. and e. Asia, Europe, w. North America, e. North America, and Andean South America. References: Pennell (1935)=P.

1 Inflorescence 1-4 dm tall; stem leaves alternate; stem pubescent, at least near the inflorescence; flowering April-May ..... ***P. canadensis***
1 Inflorescence 4-10 dm tall; stem leaves opposite; stem glabrous; flowering August-October ..... ***P. lanceolata***

Pedicularis canadensis Linnaeus, Eastern Lousewort, Wood-betony. Mt, Pd, Cp (NC, SC, VA): moist to dry forests and woodlands, streambanks; common (rare in the Coastal Plain). April-May; May-July. ME, Québec, and Manitoba south to FL, TX, and n. Mexico. Var. *dobbsii* Fernald, alleged to differ in having nearly solitary flowering stems and stoloniform basal offsets, needs additional study. [= RAB, C, G, GW, P, S, W; > *P. canadensis* var. *canadensis* – F; > *P. canadensis* var. *dobbsii* Fernald – F; > *P. canadensis* ssp. *canadensis* – K]

Pedicularis lanceolata Michaux, Swamp Lousewort. Mt (NC, VA), Pd, Cp (VA): springheads and swampy areas, over calcareous or mafic rocks; rare (NC Rare, VA Watch List). August-October; September-October. Widespread in ne. North America, south to NC, e. TN, w. TN, and MO. [= RAB, C, F, G, GW, K, P, S, W]

Schwalbea Linnaeus (Chaffseed)

The genus is monotypic, a hemiparasitic herb, of se. North America. References: Pennell (1935)=P.

Schwalbea americana Linnaeus, Chaffseed. Cp (GA, NC, SC, VA): savannas, sandhill-pocosin ecotones (in the uphill portions), mesic loamy-soil slopes or swales in sandhill longleaf pine woodlands; rare (US Endangered, GA Endangered, NC Endangered, SC Rare, VA Rare). May-June; August. Formerly rather widespread in e. North America, primarily in the Coastal Plain, from e. MA, south to FL and west to TX, and disjunct in the Cumberland Mountains of KY and TN. The species is now limited to a few scattered sites in NJ, NC, SC, and FL. It appears to require high fire frequency, especially during the growing season, perhaps related to its establishment ecology. The tiny seeds are hyaline-winged. [= RAB, C, F, G, GW, K, P; > *S. americana* – P; > *S. australis* Pennell – P, S]

Seymeria Pursh (Seymeria)

A genus of about 25 species, herbs, of s. North America (including Mexico). References: Pennell (1935)=P.

1 Corolla glabrous on its outer surface; leaf segments linear, < 0.5 mm wide; stem glabrous or puberulent; seeds wingless (though with ridges). ..... ***S. cassioides***
1 Corolla pubescent externally; leaf segments lanceolate, 1-2 mm wide; stem pubescent; seeds 3-4-winged ..... ***S. pectinata ssp. pectinata***

Seymeria cassioides (J.F. Gmelin) Blake, Senna Seymeria. Cp (GA, NC, SC, VA), Pd (GA, SC): dry to moist pinelands, wet pine savannas, sandhills, other dry woodlands; common, rare in VA (VA Rare). August-October. Se. VA south to c. peninsular FL, west to LA; disjunct in nc. AL and se. TN (Chester, Wofford, & Kral 1997). [= RAB, C, F, G, GW, K, P; = *Afzelia cassioides* J.F. Gmelin – S]

Seymeria pectinata Pursh *ssp. pectinata*, Comb Seymeria. Cp (GA, NC, SC): dry pinelands, sandhills; rare (NC Rare). July-October. Ssp. *pectinata* ranges from se. NC south to c. peninsular FL, west to s. MS, a Southeastern Coastal Plain endemic. Ssp. *peninsularis* (Pennell) Pennell ranges from n. peninsular FL south to s. FL. [= K; < *S. pectinata* – RAB; = *S. pectinata* ssp. *typica* – P; = *Afzelia pectinata* (Pursh) Kuntze ssp. *pectinata* – S]

Striga Loureiro (Witchweed)

A genus of about 40 species, hemiparasitic herbs, of tropical to temperate regions of the Old World.

* ***Striga asiatica*** (Linnaeus) Kuntze, Witchweed. Cp (NC, SC): cultivated fields, parasitic on the roots of corn and other grasses; rare, native of the Old World. A serious weed, *Striga* has been the subject of eradication efforts and quarantine policies since its appearance in our area. [= K; = *S. lutea* Loureiro – RAB]

OXALIDACEAE R. Brown 1818 (Wood-sorrel Family)

A family of 5-6 genera and 600-775 species, herbs, shrubs, vines, and small trees, nearly cosmopolitan (especially temperate). References: Cocucci in Kubitzki (2004).

Oxalis Linnaeus 1753 (Wood-sorrel, Oxalis)

A genus of about 500-700 species, herbs, shrubs, and vines. References: Ward (2004a)=Z; Eiten (1963)=Y; Lourteig (1979)=X; Robertson (1975)=Q; Cocucci in Kubitzki (2004).

1 Plant acaulescent; leaves basal; flowers white, pink, or purple.
  2 [section *Oxalis*] ..... ***O. montana***
  2 [section *Ionoxalis*].
    3 [naturalized] ..... ***O. rubra***
    3 [native] ..... ***O. violacea***
1 Plant caulescent; leaves alternate; flowers yellow; [section *Corniculatae*].
O. corniculata, O. corymbosa, O. dillenii, O. grandis, O. priceae ssp. colorea, O. priceae ssp. priceae, [O. priceae ssp. texana], O. stricta

* ***Oxalis corniculata*** Linnaeus, Creeping Lady's-sorrel. Cp, Pd (NC, SC, VA), Mt (NC, VA?), {GA}: gardens, disturbed areas; uncommon. February-December. [= *O. corniculata* – RAB, C, F, K, Q, Y; = *O. repens* Thunberg – G; > *Xanthoxalis corniculata* (Linnaeus) Small – S; > *Xanthoxalis langloisii* Small – S; > *O. corniculata* var. *corniculata* – Z; > *O. corniculata* var. *atropurpurea* Planchon – Z]

* ***Oxalis corymbosa*** A.P. de Candolle. {GA, SC}. native of South America. See Kartesz (1999). [= Q, Z; = *Oxalis debilis* Kunth var. *corymbosa* (A.P. de Candolle) Lourteig – K]

Oxalis dillenii Jacquin, Southern Yellow Wood-sorrel. Cp, Pd, Mt (GA, NC, SC, VA): [= C, K; > *O. dillenii* – RAB; > *O. florida* var. *florida* – RAB; > *O. florida* Salisbury var. *filipes* (Small) Ahles – RAB; = *O. stricta* Linnaeus – G, misapplied; > *O. dillenii* ssp. *dillenii* – Q, W, Y, Z; > *O. dillenii* Jacquin ssp. *filipes* (Small) Eiten – Q, W, Y, Z; > *O. florida* – F; > *O. filipes* – F; > *Xanthoxalis filipes* (Small) Small – S; > *Xanthoxalis brittoniae* (Small) Small – S]

Oxalis grandis Small, Great Yellow Wood-sorrel. Mt (GA, NC, SC, VA), Pd (NC, VA): rich moist forests; common (rare in Piedmont). May-June. [= RAB, C, F, G, K, Q, W, Y; = *Xanthoxalis grandis* (Small) Small – S]

Oxalis montana Rafinesque, American Wood-sorrel, White Wood-sorrel. Mt (GA, NC, VA): spruce-fir forests, northern hardwood forests, at high elevations; uncommon (GA Special Concern). Closely related to the Eurasian *O. acetosella*, and sometimes treated as merely a geographic phase. [= F, K, S; < *O. acetosella* Linnaeus – RAB, C, G, W; = *O. acetosella* ssp. *montana* (Rafinesque) Hultén ex D. Löve – Q]

Oxalis priceae Small *ssp.* ***colorea*** (Small) Eiten. Pd (GA, NC, SC, VA), Cp (GA, NC, SC): [= K, Q, Y; = *O. recurva* Elliott var. *recurva* – F; < *O. recurva* – G; = *O. florida* Salisbury var. *recurva* (Elliott) Ahles – RAB; = *O. macrantha* (Trelease) Small – C; > *Xanthoxalis colorea* Small – S; > *Xanthoxalis recurva* Elliott) Small – S]

Oxalis priceae Small *ssp.* ***priceae***. {GA}. In TN, GA (Eiten 1963). [= K, Q, Y; = *O. recurva* Ellitt var. *macrantha* (Trelease) Wiegand – F; < *O. recurva* – G; > *Xanthoxalis priceae* Small – S; > *Xanthoxalis hirsuticaulis* (Small) Small – S; > *Xanthoxalis macrantha* (Trelease) Small – S, misapplied]

* ***Oxalis rubra*** St. Hilaire. Cp, Pd (GA, NC, SC, VA): native of South America. [= RAB, K, Q; ? *Ionoxalis martiana* (Zuccarine) Small – S, misapplied; = *O. articulata* Savigny ssp. *rubra* (St. Hilaire) Lourteig]

Oxalis stricta Linnaeus, Common Yellow Wood-sorrel. Mt, Pd, Cp (GA, NC, SC, VA): May-October. [= RAB, C, K, Q, W, Y, Z; > *O. europaea* Jord. var. *europaea* – F; > *O. europaea* var. *bushii* (Small) Wiegand – F; = *O. europaea* – G; > *Xanthoxalis stricta* (Linnaeus) Small – S; > *Xanthoxalis bushii* Small – S; > *Xanthoxalis rufa* Small – S; > *Xanthoxalis cymosa* (Small) Small – S]

Oxalis violacea Linnaeus, Violet Wood-sorrel. Pd, Mt (GA, NC, SC, VA), Cp (GA?, NC, SC, VA): dry forests; common. MA, VT, MI, SD, and CO south to FL, TX, and AZ. [= RAB, C, G, K, Q, W, Z; > *O. violacea* var. *violacea* – F; > *O. violacea* var. *trichophora* Fassett – F; = *Sassia violacea* (Linnaeus) Holub; = *Ionoxalis violacea* (Linnaeus) Small – S]

Oxalis illinoensis Schwegman, Illinois Wood-sorrel. KY, IN, and IL. [= K]
Oxalis priceae Small ssp. *texana* (Small) Eiten. In GA (GANHP, Kartesz 1999); not in GA (Ward 2004). [= K, Q, Y]

PAPAVERACEAE A.L. de Jussieu 1789 (Poppy Family)

References: Kiger in FNA (1997); Kadereit in Kubitzki, Rohwer, & Bittrich (1993).

1 Flowering stem scapose, leaves basal only; petals 8-16, white; [subfamily *Chelidonioideae*] ..... ***Sanguinaria***
1 Flowering stem with leaves at least low on the stem; petals 0-6, purple, red, orange-red, orange, yellow, cream.
  2 Inflorescence a panicle; petals absent; [subfamily *Chelidonioideae*] ..... ***Macleaya***
  2 Inflorescence not a panicle; petals present, 4-6.
    3 Leaves and fruits prickly; [subfamily *Papaveroideae*] ..... ***Argemone***
    3 Leaves and fruits not prickly.
      4 Sepals connate; leaves ternately dissected into linear segments; sap watery; [subfamily *Eschscholzioideae*] ..... ***Eschscholzia***
      4 Sepals separate; leaves pinnately lobed; sap yellow, orange, or milky.
        5 Flowers several in a terminal umbel; [subfamily *Chelidonioideae*].
          6 Stigma lobes, placentae, and capsule valves 2; style very short; fruit linear, glabrous ..... ***Chelidonium***
          6 Stigma lobes, placentae, and capsule valves (2-) 3-4; style ca. 1 cm long; fruit ellipsoid, pubescent ..... ***Stylophorum***
        5 Flowers solitary, terminal.
          7 Fruit 15-30 cm long, 2-locular (the partitions complete), dehiscent by elongate valves; stigmatic lobes 2; [subfamily *Chelidonioideae*] ..... ***Glaucium***
          7 Fruit 1-8 cm long, 4-20-locular (the partitions incomplete), dehiscent by small valves beneath the stigmatic disc; stigmatic lobes 4-20; [subfamily *Papaveroideae*] ..... ***Papaver***

Argemone Linnaeus 1753 (Prickly-poppy)

A genus of about 32 species, annual and perennial herbs, of North America, West Indies, Central America, South America, and Hawaii. References: Ownbey in FNA (1997); Kadereit in Kubitzki, Rohwer, & Bittrich (1993).

1 Flowers white to pink; latex white or nearly clear ..... ***A. albiflora*** *ssp.* ***albiflora***
1 Flowers yellow to cream; latex yellow ..... ***A. mexicana***

Argemone albiflora Hornemann *var.* ***albiflora***, Carolina-poppy, White Prickly-poppy. Cp (GA, NC, SC): sandy roadsides and disturbed areas; uncommon. April-May (sporadically later). This species is apparently native to the southeastern United States, presumably including our area. Var. *texana* (G.B. Ownbey) Shinners occurs in TX, AR, and LA. The species' weediness suggests, however, that it may be merely adventive in our area. [= *A. albiflora* ssp. *albiflora* – FNA, K; < *A. albiflora* – RAB, C; < *A. alba* Lestib. f. – G, S, misapplied]

* ***Argemone mexicana*** Linnaeus, Mexican-poppy, Mexican Prickly-poppy. Cp (GA, NC, SC): sandy roadsides and disturbed areas; rare, native of s. FL, West Indies, and maybe Mexico and Central America. April-May (sporadically later). [= RAB, C, FNA, G, K]

Chelidonium Linnaeus 1753 (Greater-celandine)

A monotypic genus, a perennial herb, of temperate Eurasia. References: Kiger in FNA (1997); Kadereit in Kubitzki, Rohwer, & Bittrich (1993).

* ***Chelidonium majus*** Linnaeus, Greater-celandine, Rock-poppy, Swallow-wort. Mt (GA, NC, VA), Pd, Cp (VA): moist slopes, shaded roadsides, rocky forests; common (rare south of VA), native of Eurasia. April-July. First reported for GA (Rabun County) by Stiles & Howel (1998). [= RAB, C, F, FNA, G, S, W; > *Ch. majus* var. *majus* – K]

Eschscholzia Chamisso 1820 (California-poppy)

A genus of about 12 species, annual and perennial herbs, of sw. North America and n. Mexico. References: Clark in FNA (1997); Kadereit in Kubitzki, Rohwer, & Bittrich (1993).

* ***Eschscholzia californica*** Chamisso *ssp.* ***californica***, California-poppy. Cp (GA, NC, SC), Pd (NC, SC): roadsides, disturbed areas; uncommon, native of w. North America. May-August. [= FNA, K; < *Eschscholtzia californica* – RAB, F, orthographic variant]

Glaucium P. Miller 1754 (Horned-poppy)

A genus of about 23 species, annual and perennial herbs, of temperate Europe and w. Asia. References: Kiger in FNA (1997); Kadereit in Kubitzki, Rohwer, & Bittrich (1993).

* ***Glaucium flavum*** Crantz, Yellow Horned-poppy, Sea-poppy. Cp, Pd (VA): disturbed areas; rare, native of Mediterranean Europe. June. [= C, F, FNA, G, K]

Macleaya R. Brown 1826 (Plume-poppy)

A genus of 2 species, perennial herbs, of e. Asia. References: Kiger in FNA (1997); Kadereit in Kubitzki, Rohwer, & Bittrich (1993).

* ***Macleaya cordata*** (Willdenow) R. Brown, Plume-poppy, Tree-celandine. Pd, Cp (VA), Mt (NC) {SC}: moist streambanks, persistent or escaped from cultivation; rare, native of e. Asia. Reported as naturalized in TN by Kral (1981). [= C, F, FNA, G, K] {check Castanea 38: 114-116, 302-304 for SC report}

Papaver Linnaeus 1753 (Poppy)

A genus of about 80 species, annual and perennial herbs, of temperate Northern Hemisphere. References: Kiger & Murray in FNA (1997); Kiger (1975)=Z; Kadereit in Kubitzki, Rohwer, & Bittrich (1993).

1 Upper cauline leaves clasping the stem; [section *Papaver*] ..... ***P. somniferum***
1 Upper cauline leaves not clasping the stem.
  2 Ovaries and capsules sparsely to densely setose-pubescent; [section *Argemonidium*].
    3 Capsules oblong to clavate, sparsely setose with weak hairs ..... ***[P. argemone]***
    3 Capsules obovoid-ellipsoid to subglobose, densely setose with strong hairs ..... ***P. hybridum***
  2 Ovaries and capsules glabrous.
    4 Flowers > 10 cm across; perennial; [section *Macrantha*] ..... ***P. orientale***
    4 Flowers < 10 cm across; annual; [section *Rhoeadium*].
      5 Capsule 2-3× as long as broad; stigmatic lobes 5-9 ..... ***P. dubium***
      5 Capsule 1-1.5× as long as broad; stigmatic lobes 8-15 ..... ***P. rhoeas***

* ***Papaver dubium*** Linnaeus, Long-headed Poppy. Mt, Pd, Cp (NC, SC, VA): roadsides, fields, disturbed areas; uncommon, native of Europe. April-June. [= RAB, C, F, FNA, G, K, S, W, Z]
* ***Papaver hybridum*** Linnaeus, Rough Poppy. Mt (NC) {SC}: disturbed areas; rare, native of Eurasia. May-June. [= RAB, FNA, K, Z]
* ***Papaver orientale*** Linnaeus, Oriental Poppy. Cp (VA): rare, native of sw. Asia. [= FNA, G, K, Z]
* ***Papaver rhoeas*** Linnaeus, Corn Poppy, Field Poppy, Red Poppy, Shirley Poppy, Common Poppy. Mt (VA), Pd (NC, VA) {SC}: disturbed areas; rare, native of Eurasia and n. Africa. May. [= RAB, C, F, FNA, G, K, Z]
* ***Papaver somniferum*** Linnaeus, Opium Poppy, Common Poppy. Pd (NC, VA), Cp, Mt (NC): disturbed areas; rare, native of Mediterranean Europe and Asia Minor. May-June. [= RAB, C, F, FNA, G, K, S, Z]

* *Papaver argemone* Linnaeus is reported from PA (Rhoads & Klein 1993, Kiger & Murray in FNA 1997), VA, and MD (Kiger & Murray in FNA 1997). {herbarium verification} [= FNA]

Other species are cultivated and may be found in our area persistent, escaped, as waifs, or as naturalized populations.

Sanguinaria Linnaeus 1753 (Bloodroot)

A monotypic genus, a perennial herb, of e. North America. References: Kiger in FNA (1997); Kadereit in Kubitzki, Rohwer, & Bittrich (1993).

Sanguinaria canadensis Linnaeus, Bloodroot, Red Puccoon. Mt, Pd, Cp (GA, NC, SC, VA): moist nutrient-rich forests; common (uncommon in Coastal Plain of GA, NC, and SC). March-April; April-May. Nova Scotia west to MN and Manitoba, south to FL and OK. Var. *rotundifolia*, more southern and the primary form in our area, is considered to have leaves less lobed than the more northern var. *canadensis*; leaf shape variability within populations makes it impractical to recognize infraspecific taxa. [= RAB, C, FNA, G, K, S, W; > *S. canadensis* var. *canadensis* – F; > *S. canadensis* var. *rotundifolia* (Greene) Fedde – F]

Stylophorum Nuttall 1818 (Celandine-poppy)

A genus of 2-5 species, perennial herbs, of e. North America and e. Asia. References: Kiger in FNA (1997); Kadereit in Kubitzki, Rohwer, & Bittrich (1993).

Stylophorum diphyllum (Michaux) Nuttall, Celandine-poppy, Woods-poppy. Mt (GA, VA): moist forests over calcareous rocks (such as limestone); rare (GA Rare, VA Rare). March-April. W. PA (where perhaps only introduced) to s. MI and WI, south to sw. VA, e. TN, nw. GA, sc. TN, and AR. [= C, F, FNA, G, K, S, W]

PARNASSIACEAE Gray 1821 (Grass-of-Parnassus Family)

A family of 2 genera and about 16 species, herbs, of largely north temperate and arctic areas. Numerous anomalous features separate *Parnassia* from the Saxifragaceae; affinities with the Droseraceae, Clusiaceae, Celastraceae, and other families have been suggested. Considering the uncertainties of its relationships, *Parnassia* is best treated as a family, the Parnassiaceae, as suggested by numerous workers as early as 1821, and increasingly accepted in recent decades. The very distant relationship of *Parnassia* to the Saxifragaceae (sensu stricto) has been strongly reaffirmed by molecular analyses (Morgan & Soltis 1993, Soltis et al. 2000, Savolainen et al. 2000). References: Simmons in Kubitzki (2004). [including *LEPUROPETALACEAE*]

1 Plants diminutive, rosettes < 3 cm across; winter annual ..... ***Lepuropetalon***
1 Plants larger, rosettes over 8 cm across; perennial from rhizomes ..... ***Parnassia***

Lepuropetalon Elliott 1817 (Lepuropetalon)

A monotypic genus, of se. North America, Mexico, c. Chile, and Uruguay. Sometimes treated as part of a broad and polymorphic Saxifragaceae, *Lepuropetalon* has often been associated with *Parnassia* in the Parnassiaceae. Morgan & Soltis (1993) suggest a close relationship of *Lepuropetalon* and *Parnassia*, as well as the "distant relationship between both genera and the Saxifragoideae." The affinities of *Lepuropetalon* with *Parnassia* remain uncertain, however, as emphasized by Gastony & Soltis (1977) in their analysis of chromosomes and partially reiterated by Morgan & Soltis (1993). *Lepuropetalon* is here treated in the Parnassiaceae, as supported by molecular analyses (Soltis et al. 2000, Savolainen et al. 2000); treatment in a monotypic Lepuropetalaceae is perhaps equally warranted. References: Ward & Gholson (1987); Spongberg (1972); Gastony & Soltis (1977); Wilbur (1988b); Simmons in Kubitzki (2004).

Lepuropetalon spathulatum Elliott, Lepuropetalon. Pd (GA, SC), Cp (GA, NC, SC): in moist open areas, such as seepage on granitic flatrocks, ditches, seasonally wet depressions; rare (SC Rare). February-April. Se. NC and SC south to GA, west to e. TX and Mexico; also in Chile and Uruguay. As indicated by Ward & Gholson (1987), *Lepuropetalon* is more common than collections would indicate; the rosettes are 0.5-2 (-3) cm across, the greenish flowers are 2-3 mm across. It has been considered "the smallest terrestrial angiosperm" (Morgan & Soltis 1993). Its apparently greater abundance in the western portion of its range, where largely found by a few botanists "who have made determined efforts to establish its range" (Ward & Gholson), and in habitats such as granitic flatrocks, which have overall received close scrutiny, may be more a reflection of its diminutive size and early season of occurrence than of its real distribution and abundance. The recent increase in collections, mostly in disturbed or human-maintained habitats, also suggests a possible increase in abundance (and range?) from its original state. It should be more vigorously sought in our area. The presence of lines of red glandular dots on the leaves and sepals is a helpful diagnostic character. [= RAB, GW, K, S]

Parnassia Linnaeus 1753 (Grass-of-Parnassus, Parnassia)

A genus of 15-70 species, herbs, primarily of arctic and north temperate areas. Our species (especially *P. caroliniana*) are among the most southerly of the genus in distribution. *Parnassia* (all species) are among the most beautiful of our native plants. From a distance the white flowers are attractive but not extraordinary; when observed closely, though, the delicate tracery of the green veins on the waxy white petals is astonishing. References: Gastony & Soltis (1977); Spongberg (1972); GW; Simmons in Kubitzki (2004).

Identification notes: Note that the five staminodia are (in our species) deeply three-lobed to the base, thus appearing as 15.

1 Leaf blades reniform, as wide or wider than long, the base strongly cordate; staminodia shorter than the stamens [note that the stamens elongate after the staminodia; thus at a certain early stage the stamens of *P. asarifolia* may be shorter than the staminodia; check several flowers] ..... ***P. asarifolia***
1 Leaf blades ovate, longer than wide, the base rounded, broadly cuneate, truncate, or cordate; staminodia longer than the stamens (*P. caroliniana* and *P. grandifolia*) or shorter than the stamens (*P. glauca*).
  2 Staminodia shorter than the stamens; [of NJ, PA, and OH northward] ..... ***[P. glauca]***
  2 Staminodia longer than the stamens; [of VA, WV, MO, OK southward].
    3 Main parallel veins of each petal (9-) 11-17 (counted at a point halfway between the base and the apex and ignoring short laterals), usually not dilated toward the apex of the petal; outer- or basal-most main vein branching pseudo-dichotomously several times; rhizome horizontal, long-creeping, the leaves scattered or loosely clustered, tending to form clonal patches to several m in diameter; ovary white; [of Coastal Plain pinelands] ..... ***P. caroliniana***
    3 Main parallel veins of each petal 5-9 (counted at a point halfway between the base and the apex and ignoring short laterals), often strongly dilated toward the apex of the petal; outer- or basal-most main vein with numerous short laterals on the outer side, extending to the petal margin with few or no branchings; rhizome erect, short, the leaves strongly clustered, not forming large clonal patches; ovary green, sometimes white toward the base; [primarily of the Mountains, rarely also disjunct in the Coastal Plain] ..... ***P. grandifolia***

Parnassia asarifolia Ventenat, Kidney-leaved Grass-of-Parnassus, Appalachian Grass-of-Parnassus, Brook Parnassia. Mt (GA, NC, SC, VA), Pd (GA, VA), Cp (VA): bogs, sphagnous seeps, brookbanks, generally in more acidic habitats than *P. grandifolia*, up to elevations over 6,000 feet; uncommon, rare in VA Piedmont and Coastal Plain (SC Rare). (July-) August-October. VA, WV, and AR south to GA and TX, primarily in the Appalachian and Ozarkian highlands. [= RAB, C, F, G, GW, K, S, W]

Parnassia caroliniana Michaux, Carolina Grass-of-Parnassus, Savanna Parnassia, Eyebright. Cp (NC, SC): wet longleaf pine, pond pine, or pond cypress savannas (especially but not strictly where shallowly underlain by coquina limestone), sandhill seepage bogs; rare (US Species of Concern, NC Endangered, SC Rare). September-November (-December). Se. and sc. NC south through SC to the Panhandle of FL, the distribution (at least now) fragmented and disjunctive. In NC, locally common in three small areas, centered around Maple Hill (Pender and Onslow counties), Old Dock (Columbus and Brunswick counties), and the Green Swamp (Brunswick County). Following Michaux's discovery of the species it was apparently not reported again in the Carolinas until found by H.A. Rankin near Hallsboro. His comments, quoted in Alexander (1934) are interesting. "What if our savannas are sometimes steaming, it is the condition necessary for the development for many wonderful plants which find here their most congenial surroundings. But Grass-of-Parnassus does not star the meadows during the steaming season, instead, by local tradition, the 'Eyebright,' its local name, times its first flowers to come just two weeks before frost ... As a matter of fact, I saw the first flowers this year on October 12th and our first frost came the morning of the 25th. Its chosen habitat is the wet savannas and hundreds of acres may be seen liberally dotted with its white stars, but it finds its best development in the lower places, and here it often almost covers the ground. Today, November 1st, it is in its prime and is the most conspicuous flower on many acres and in one little depression less than two feet in diameter I counted seventy-two flowers and buds." With the extensive destruction of our wet savannas (by conversion to pine tree farms, agriculture, and developed areas) and fire suppression, very few such places now remain. [= RAB, GW, K, S]

Parnassia grandifolia A.P. de Candolle, Bigleaf Grass-of-Parnassus, Limeseep Parnassia, Undine. Mt (GA, NC, SC, VA), Cp (NC): fens, gravelly seepages, primarily or solely over calcareous, mafic, or ultramafic rocks, in the outer Coastal Plain in seepage over marl on nearly vertical river bluffs on the Cape Fear River; rare (GA Special Concern, NC Rare, SC Rare, VA Rare). September-October. VA, WV, s. MO, and OK south to n. GA, Panhandle FL, s. MS (Sorrie & Leonard 1999), AR, and e. TX, primarily in the Appalachian and Ozarkian highlands. The discovery of populations of this species in Brunswick and Columbus counties, NC, was remarkable. In the Panhandle of FL and the West Gulf Coastal Plain of LA and TX it also occurs in wet savannas and pitcherplant bogs (MacRoberts, MacRoberts, & Jackson 2004), in FL sometimes in close proximity to *P. caroliniana*; *Parnassia* in Coastal Plain savannas should not necessarily be assumed to be *P. caroliniana*. [= RAB, C, F, G, GW, K, S, W]

Parnassia glauca Rafinesque, American Grass-of-Parnassus. South to NJ, s. PA (Rhoads & Klein 1993), OH, IN, IA, and SD (Kartesz 1999). [= C, F, G, K]

PASSIFLORACEAE A.L. de Jussieu ex Kunth 1817 (Passionflower Family)

A family of about 17 genera and 575-750 species, vines, shrubs, and trees, of tropical and warm temperate regions, especially America. References: Feuillet & MacDougal in Kubitzki, Bayer, & Stevens (2007).

Passiflora Linnaeus 1753 (Passionflower)

A genus of about 525 species, vines, shrubs, and trees, largely of tropical America, with a few species in warm temperate America and Asia. References: Ulmer & MacDougal (2004)=Z; Feuillet & MacDougal in Kubitzki, Bayer, & Stevens (2007).

1 Leaves entire, herbaceous in texture; petioles without 2 glands near the junction of the petiole and the blade; berry 0.8-1.5 cm long; [subgenus *Decaloba*; supersection *Decaloba*] ..... ***P. lutea var. lutea***
1 Leaves serrulate, thick and subcoriaceous in texture; petioles with 2 glands near the junction of the petiole and the blade; berry 2-7 cm long.

2 Petals blue (to nearly white), 30-40 mm long; berry 4-7 cm long; calyx subtended by 3 bracts; [native, widespread and common in our area]; [subgenus *Passiflora*; supersection *Passiflora*] ..... ***P. incarnata***
2 Petals white to yellowish, 6-8 mm long; berry 2-3 cm long; calyx not subtended by bracts; [introduced, very rare in our area]; [subgenus *Decaloba*; supersection *Bryonioides*] ..... ***P. morifolia***

Passiflora incarnata Linnaeus, Maypops. Cp, Pd, Mt (GA, NC, SC, VA): roadsides, fencerows, thickets, fields; common. May-July (-later); July-October. N. VA and sw. PA west to OK, south to FL and TX. Certainly one of our most interesting and beautiful flowers. [= RAB, C, F, G, K, S, W, Z]

Passiflora lutea Linnaeus *var.* ***lutea***, Yellow Passionflower. Cp, Pd, Mt (GA, NC, SC, VA): woodlands, forests, thickets, maritime forests; common. June-September; August-October. Var. *lutea* ranges from PA, WV, and TN south to FL and AL. Var. *glabriflora*, differing in the calyx, petioles, and stems glabrous (vs. pilose in var. *lutea*) is more western, ranging from OH west to OK, south to AL and TX. [= C, F, G; < *P. lutea* – RAB, K, S, W, Z]

* ***Passiflora morifolia*** Masters. Pd (SC): thickets; rare, native of South America. May-July; July-October. [= RAB, K, Z; ? *P. warmingii* Masters – S]

* *Passiflora gracilis* Jacquin ex Link is reported for SC (Kartesz 1999). {investigate – not in SC Plant Atlas} [= K] {not yet keyed}

PAULOWNIACEAE Nakai 1949 (Paulownia Family)

There has been disagreement over whether *Paulownia* is best placed in Scrophulariaceae, Bignoniaceae, or its own family, Paulowniaceae; superficially it closely resembles *Catalpa* of the Bignoniaceae. Armstrong (1985) concluded that *Paulownia*'s affinities lie with the Scrophulariaceae, based on floral anatomy, embryo morphology, and seed morphology. A molecular study by Spangler & Olmstead (1999) conclude that *Paulownia* is best retained in its own family. Manning (2000) concurs with its removal from Bignoniaceae. Molecular evidence supports that it is sister to the reconstituted Orobanchaceae. References: Spangler & Olmstead (1999); Manning (2000).

Paulownia Siebold & Zuccarini 1835 (Princess-tree)

A genus of 6 species, trees, of e. Asia. References: Armstrong (1985).

* ***Paulownia tomentosa*** (Thunberg) Siebold & Zuccarini ex Steudel, Princess Tree, Empress Tree, Paulownia. Cp, Pd, Mt (GA, NC, SC, VA): roadsides, disturbed areas, roadcuts, forests; common, native of China. April-May; September-October. *Paulownia* is becoming a nuisance, showing an ability to invade pristine woodlands. The very soft wood is highly prized in Asia. The leaves of stump sprouts can reach very large sizes (at least to 80 cm long and wide). The woody capsules are persistent, and the densely tomentose, tan flower buds are conspicuous through the winter. [= RAB, C, F, G, K, S, W]

PENTHORACEAE Rydberg ex Britton 1901 (Ditch-stonecrop Family)

A family of one genus and 2 species, herbs, of e. North America and e. Asia. *Penthorum* has been variously placed in the Crassulaceae, Saxifragaceae, or in the Penthoraceae. Haskins & Hayden (1987) concluded that *Penthorum* was best treated in a monogeneric Penthoraceae, a conclusion based on extensive anatomical evidence. Among those who do not favor a monotypic family, there is nearly evenly divided opinion between the Crassulaceae and Saxifragaceae; this in itself perhaps supports segregation in the Penthoraceae. Molecular evidence supports the recognition of the Penthoraceae, and suggests closer affinities with the Haloragaceae than with either the Crassulaceae or the Saxifragaceae (Morgan & Soltis 1993). References: Thiede in Kubitzki, Bayer, & Stevens (2007).

Penthorum Linnaeus 1753 (Ditch-stonecrop, Penthorum)

A genus of 2 species, herbs, of e. North America and e. and se. Asia. The only other species in the genus is *P. chinense* Pursh, of e. Russia, China, Korea, and Japan. References: Haskins & Hayden (1987)=Z; Thiede in Kubitzki, Bayer, & Stevens (2007).

Penthorum sedoides Linnaeus, Ditch-stonecrop, American Penthorum. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): shores, drawdown areas, moist forests, floodplain forests, moist disturbed areas, ditches; common. June-October. Widespread in e. North America. [= RAB, C, F, G, GW, K, S, W, Z]

PETIVERIACEAE C. Agardh 1824 (Petiveria Family)

Sometimes included in the Phytolaccaceae.

Rivina Linnaeus 1753 (Rouge-plant)

Rivina humilis Linnaeus, Rouge-plant, Baby-pepper. Cp (FL, LA): hammocks; rare. {} [= K, S]

PHRYMACEAE Schauer 1847 (Lopseed Family)

As radically circumscribed, a family of about 20 genera and 240 species, herbs, cosmopolitan. See Tank et al. (2006). References: Lee et al. (1996)=Z; Tank, Beardsley, Kelchner, & Olmstead (2006); Thieret (1972); Wagstaff & Olmstead (1997); Fischer in Kadereit (2004); Cantino in Kadereit (2004).

Glossostigma Wight & Arnott

A genus of 7-8 species of aquatics, native to Australia, East Africa, India, and New Zealand. References: Les, Capers, & Tippery (2006)=Z.

* *Glossostigma cleistanthum* W.R. Barker. Aquatic in oligotrophic lakes and reservoirs. Introduced, naturalized, and invasive in NJ, PA, CT, and RI (Les, Capers, & Tippery 2006). Native of Australia. [= Z]

Mazus Loureiro

A genus of 10-15 species, herbs, of Asia to Australia. References: Pennell (1935)=P.

1 Plant stoloniferous, perennial; corolla ca. 15 mm long ..... ***M. miquelii***
1 Plant not stoloniferous, annual; corolla 7-10 mm long ..... ***M. pumilus***

* ***Mazus miquelii*** Makino. Pd (NC): lawns; rare, native of e. Asia. April-June. [= C, K; = *M. miguelii* – RAB, misspelling; ? *M. reptans* N.E. Brown]
* ***Mazus pumilus*** (Burmann f.) Steenis. Cp, Pd (GA, NC, SC, VA): lawns; rare, native of e. Asia. December-June. [= C, K; ? *M. japonicus* (Thunberg) Kuntze – RAB, F, G, P]

Mimulus Linnaeus (Monkey-flower)

A genus of about 150 species, herbs and shrubs, of w. North America, s. Africa, Asia, and e. North America. *Mimulus* reaches its greatest diversity in w. North America. References: Grant (1924)=Y; Pennell (1935)=P.

1 Corolla yellow; stem viscid glandular-pubescent; plant usually 2-4 dm tall ..... ***M. moschatus***
1 Corolla blue; stem glabrous; plant usually 3-15 dm tall; [section *Mimulus*].
  2 Leaves petiolate (the upper sessile or nearly so); pedicels 2-15 mm long; stem with 4 winged angles ..... ***M. alatus***
  2 Leaves sessile; pedicels 20-45 mm long; stem with 4 rounded angles ..... ***M. ringens var. ringens***

Mimulus alatus Aiton, Winged Monkey-flower. Cp, Pd (GA, NC, SC, VA), Mt (GA, VA): marshes, bottomlands, ditches; common. July-November. MA and CT west to s. MI and s. IA, south to Panhandle FL and TX. [= RAB, C, F, G, GW, K, P, S, W, Y]

Mimulus moschatus Douglas ex Lindley, Muskflower, Musky Monkey-flower. Mt (NC, VA): streambanks, brookbanks, saturated soil of springs; rare (NC Watch List, VA Rare). July; August. Newfoundland and Québec west to MI, south to w. VA, WV, NC, and MI, and in w. North America. The native/naturalized status of *M. moschatus* in e. North America is controversial. Some at least of our populations appear to be native, not occurring in situations where likely to have been introduced. [= RAB, C, F, G, P, W; > *M. moschatus* var. *moschatus* – K]

Mimulus ringens Linnaeus *var.* ***ringens***, Allegheny Monkey-flower. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): marshes, bogs, wet meadows, bottomlands; common. June-September. Nova Scotia and Québec west to Saskatchewan, south to c. GA, LA, OK, and CO. [= G, K; < *M. ringens* – RAB, C, GW, S, W; > *M. ringens* var. *minthodes* (Greene) A.L. Grant – F, Y; > *M. ringens* var. *ringens* – F, Y; = *M. ringens* var. *typica* – P]

Phryma Linnaeus 1753 (Lopseed)

A genus of 1-2 species, herbs, of e. North America and Asia. The disjunct populations have been variously treated as species, varieties, or races. References: Lee et al. (1996)=Z; Thieret (1972); Wagstaff & Olmstead (1997); Cantino in Kadereit (2004).

Phryma leptostachya Linnaeus *var.* ***leptostachya***, American Lopseed. Mt, Pd, Cp (GA, NC, SC, VA): bottomland forests, nutrient-rich slopes, in the Coastal Plain primarily in places underlain by coquina limestone ("marl") and essentially absent from the more acidic portions of the NC Coastal Plain; common (uncommon in Coastal Plain). June-August; August-October. The species is interpreted as occurring disjunctly in e. North America and e. Asia. Var. *leptostachya* ranges from Québec west to

Manitoba, south to FL and TX; var. *asiatica* Hara occurs in e. Asia. The fruits "lopped down" against the stem are unmistakable. [= Z; < *Ph. leptostachya* – RAB, C, G, K, S, W; > *Ph. leptostachya* var. *leptostachya* – F; > *Ph. leptostachya* var. *confertifolia* Fernald – F]

Torenia Linnaeus (Bluewings)

A genus of about 40 species of the Old World tropics.

* *Torenia fournieri* Linden ex E. Fournier, Bluewings, Wishbone-flower. Reported for Jackson County, NC, as a "sporadic waif growing in plant beds from overwintering seeds" (Pittillo & Brown 1988). Reported for other southeastern states (Florida, Louisiana) by Kartesz (1999). [= K]

PHYLLANTHACEAE Martinov 1820 (Leaf-flower Family)

A family of about 60 genera and 1800 species, trees, shrubs, and herbs, mainly tropical. References: Webster (1994); Chase et al. (2002).

1 Woody shrub; stamens 5-6 ..... ***[Leptopus]***
1 Annual herb; stamens 3 ..... ***Phyllanthus***

Leptopus Dcne. (Maidenbush)

Generic boundaries uncertain at this time (Wurdack et al. 2004). References: Wurdack et al. (2004).

Leptopus phyllanthoides (Nuttall) G.L. Webster, Maidenbush. Disjunct in AL from a main distribution in the Ozarks (AR, MO, OK) and TX. [= K; = *Andrachne phyllanthoides* (Nuttall) Coulter – F, G]

Phyllanthus Linnaeus (Leaf-flower)

A genus of about 1200-1300 species, trees, shrubs, and herbs, of tropical, subtropical and warm temperate regions of the Old and New Worlds. Heterogeneous and perhaps to be divided. References: Rossignol, Rossignol, & Haicour (1987)=Z; Webster (1970)=Y; Govaerts, Frodin, & Radcliffe-Smith (2000)=X.

1 Plant with "normal" arrangement of branches and leaves (leaves uniformly distributed on the stem and branches, alternate and either distichous or spirally arranged, the ultimate branches not deciduous, flowers produced on ultimate and penultimate orders of branches); [subgenus *Isocladus*].
  2 Leaves arranged distichously; stipules typically auriculate; [section *Loxopodium*].
    3 Stems terete; filaments free; seeds 0.8-1.0 mm long; [widespread in our area] ..... ***Ph. caroliniensis ssp. caroliniensis***
    3 Stems flattened and winged; filaments connate; seeds 1.3-1.5 mm long; [of e. LA westward] ..... ***[Ph. pudens]***
  2 Leaves arranged spirally; stipules not auriculate; [section *Paraphyllanthus*].
    4 Plant herbaceous, with a single or few stems; seeds 1.7-1.8 mm long; calyx lobes 2.8-3.5 mm long (when in fruit);; [endemic to FL Gulf Coast] ..... ***Ph. platylepis***
    4 Plant suffruticose, with many stems clustered from the plant base; seeds 1.1-1.5 mm long; calyx lobes 1.5-2.5 mm long (when in fruit); [of e. LA westward] ..... ***[Ph. polygonoides]***
1 Plant with "phyllanthoid" arrangement of branches, leaves, and flowers (leaves lacking on the main stem, the penultimate order of branches with scales arranged spirally, the ultimate order of branches deciduous, bearing normal leaves alternately and distichously, flowers produced only on the ultimate, deciduous branches).
  5 Stamens 5, filaments free; fruiting pedicels capillary, 3-7 mm long; seeds densely papillose; [subgenus *Kirganelia*] ..... ***Ph. tenellus***
  5 Stamens 3, filaments connate into a column 0.1-0.15 mm long; fruiting pedicels thicker and often also shorter; seeds variously ribbed or striate; [subgenus *Phyllanthus*]
    6 Fruiting pedicels 0.5 mm long; seeds with 12-15 transverse ridges and sometimes 1-3 pits; male flowers borne towards the tip of the branchlets, female flowers towards the base; [section *Urinaria*] ..... ***Ph. urinaria ssp. urinaria***
    6 Fruiting pedicels > 0.5 mm long; seeds longitudinally ribbed or striate; female flowers borne towards the tip of the branchlets, male flowers towards the base; [section *Phyllanthus*].
      7 Cymules bisexual (each with 1 female and 1 male flower); calyx lobes of male flowers 4 (-5) ..... ***Ph abnormis var. abnormis***
      7 Cymules unisexual; calyx lobes usually 6 ..... ***[Ph. fraternus]***

Phyllanthus abnormis Baill. *var.* ***abnormis***, Drummond's Leaf-flower Cp (FL): dunes; uncommon. All year. Ne. FL south to s. peninsular FL; TX south into Mexico. Another variety occurs along the Rio Grande River in TX. [= K, X, Y; > *Ph. garberi* Small – S; < *Ph. abnormis* – WH]

*? ***Phyllanthus caroliniensis*** Walter *ssp.* ***caroliniensis***, Carolina Leaf-flower. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): roadsides, moist woodlands, forests, and fields, often in seasonally wet, muddy places; common (rare in VA Mountains). July-November. PA and IL south to c. peninsular FL and TX, and south to Argentina and Paraguay, the original range not clear, likely introduced in part of the area. Ssp. *saxicola* (Small) G.L. Webster (sometimes treated as a species) is

restricted to s. FL, the Bahamas, and Greater Antilles. [= K, X, Y; < *Ph. caroliniensis* – RAB, F, G, W; = *Ph. caroliniensis* var. *caroliniensis* – C; < *Ph. carolinensis* – GW, orthographic error; = *Ph. caroliniensis* – S]

Phyllanthus platylepis Small. Cp (FL): wet hammocks; rare. Late March-late June. Endemic to the Big bend area of the FL Gulf Coast (Dixie, Levy, and Taylor counties). Apparently related to *Ph. liebmannianus* of the western Gulf Coast (Tamaulipas south to Yucatan and Belize). [= S; = *Ph. liebmannianus* Müller of Aargau ssp. *platylepis* (Small) G.L. Webster – K, WH, X, Y]

* ***Phyllanthus tenellus*** Roxburgh, Mascarene Island Leaf-flower. Cp (FL, GA, NC, SC), Pd (GA, NC): disturbed areas, in and around greenhouses; uncommon (rare north of FL), native of the Mascarene Islands. This species appeared in FL in the 1920's, s. GA in the 1940's, SC in the 1950's, NC in the 1960's, and TN in the 1970's (Kral 1981). Reported from a single collection from VA, as a "contaminant in a container plant" (Virginia Botanical Associates 2007)[= GW, K, WH, Y; ? *Ph. amarus* – RAB, misapplied (misidentified); > *Ph. tenellus* var. *tenellus* – X]

* ***Phyllanthus urinaria*** Linnaeus *ssp.* ***urinaria***, Chamber Bitter. Cp (FL, GA, NC, SC, VA): gardens and roadsides, apparently preferring nitrogen-rich soils; uncommon (rare north of FL), native of tropical Southeast Asia, now scattered in the tropics and subtropics of both hemispheres. March-November. This species appeared in the 1940's to 1960's in FL, GA, AL, LA, TX, and NC, and in the 1970's in TN (Kral (1981). [= X, Z; < *Ph. urinaria* – GW, K, WH, Y]

* *Phyllanthus fraternus* G.L. Webster. S. FL, MS, LA. Introduced in SC (Kartesz 1999). {investigate} [= K, WH, X, Y]
Phyllanthus polygonoides Nuttall ex Sprengel. E. LA west to NM, south into Mexico. April-October. [= K, X, Y]
Phyllanthus pudens L.C. Wheeler. LA. [= K, X, Y]

Several other species have been previously but erroneously reported for our area. *Phyllanthus amarus* Schumacher, Gale-of-wind, Carry-me-seed, reported by RAB for NC and SC, was misidentified and actually represents *Ph. tenellus* (Webster 1970); see above. Reports of *Ph. niruri* Linnaeus from NC and SC also proved to be *Ph. tenellus* (Webster 1970). *Phyllanthus pentaphyllus* Wright, Fivepetal Leaf-flower, unlikely to be correctly labeled from Darlington County, SC (as also indicated by RAB), is likewise here excluded.

PHYTOLACCACEAE R. Brown 1818 (Pokeweed Family)
[also see *PETIVERIACEAE*]

A family of about 18 genera and 70 species, herbs, shrubs, vines, and trees, of tropical and warm temperate regions, especially America. References: Nienaber & Thieret in FNA (2003b); Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

Phytolacca Linnaeus 1753 (Pokeweed)

A genus of about 25 species, herbs, shrubs, and trees, of tropical and warm temperate regions. References: Caulkins & Wyatt (1990)=Z; Hardin (1964a)=Y; Rogers (1985)=X; Nienaber & Thieret in FNA (2003b); Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

1 Fruiting pedicels (6-) 7-12 (-15) mm long; raceme (not including the peduncle) 10-20 (-25) cm long, divergent or drooping in flower and fruit (or erect in flower); [widespread in our area] ..... ***Ph. americana***
1 Fruiting pedicels (2-) 4-6 (-7) mm long; raceme (not including the peduncle) (3-) 6-9 (-13) cm long, erect (rarely divergent) in flower and fruit; [restricted in our area to maritime habitats] ..... ***Ph. rigida***

Phytolacca americana Linnaeus, Common Pokeweed. Pd, Mt, Cp (GA, NC, SC, VA): in a wide variety of natural and disturbed habitats, usually associated with exposed mineral soil; common. May-frost. An abundant "native weed" occurring throughout e. North America, *P. americana* is widely dispersed by birds and quickly colonizes exposed mineral soil even in undisturbed forests, such as on tree-fall tip-up mounds or flood scours. It is most abundant, however, as a weed of urban, suburban, and agricultural disturbances. The berries and mature stems are poisonous; the young stems have been used as a potherb and the purple berries as a source of ink. [= C, F, G, S, W, X, Y; < *Ph. americana* – RAB, GW (also see *Ph. rigida*); = *Ph. americana* var. *americana* – FNA, K, Z]

Phytolacca rigida Small, Maritime Pokeweed. Cp (GA, NC, SC, VA): dune slacks, dune slopes, edges of tidal marshes, disturbed areas on barrier islands, xeric sandhills near the coast; rare (NC Watch List). May-frost. DE (reportedly), se. VA south to FL and west to TX in the Southeastern Coastal Plain. In the northern parts of our area, in NC and VA, *P. rigida* is rather rare, limited to the vicinity of the coast, and less weedy than *P. americana*. Caulkins and Wyatt (1990) reduce *Ph. rigida* to a variety of *Ph. americana*, but it seems distinct at the species level, at least in our area. [= S, X, Y; < *Ph. americana* – RAB, GW; = *Ph. americana* var. *rigida* (Small) Caulkins & Wyatt – FNA, K, Z]

PIPERACEAE C.A. Agardh 1824 (Pepper Family)

A family of about 5-8 genera and 3000 species, shrubs, herbs, trees, and vines, of tropical and subtropical areas. References: Tebbs in Kubitzki, Rohwer, & Bittrich (1993).

Peperomia Ruiz & Pavón 1794 (Peperomia)

PHYTOLACCACEAE

A genus of about 1000 species, of tropical and subtropical regions, especially America. References: Boufford in FNA (1997); Boufford (1982)=Z; Tebbs in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves opposite or whorled; stems pubescent ..... ***P. humilis***
1 Leaves alternate; stems glabrous ..... ***P. pellucida***

Peperomia humilis A. Dietrich. Cp (FL): calcareous hammocks; rare. Coast of FL, north to vicinity of Jacksonville, FL. [= FNA, K, Z; > *Micropiper humilis* (Vahl) Small – S; > *Micropiper leptostachyon* (Nuttall) Small – S]
* ***Peperomia pellucida*** (Linnaeus) Kunth, Pepper-elder. Cp (FL, GA): disturbed areas; rare, introduced. *P. pellucida* has been collected escaped from cultivation in FL, LA, and GA (in the vicinity of Savannah). Boufford (1982) describes the species as showing "weedy tendencies" in the southeastern United States, where "first collected in 1957," and states that "it will be interesting to see if this plant will continue to expand its range". [= FNA, K, Z]

PITTOSPORACEAE R. Brown 1814 (Pittosporum Family)

A family of about 9-11 genera and 150-200 species, trees, shrubs, and vines, of tropical and warm temperate Old World. References: Judd (1996).

Pittosporum Banks ex Solander (Pittosporum)

A genus of about 100-150 species, trees and shrubs, of tropical and warm temperate Old World. References: Judd (1996)=Z.

* ***Pittosporum tobira*** (Thunberg) Aiton f., Japanese Pittosporum, Australian Laurel. Cp (FL, GA?, NC, SC?): frequently planted on barrier islands, at least persisting and apparently naturalizing; rare, native of Japan and China. Various cultivars are seen, including ones with variegated leaves. This species is one of the more common landscaping plants used on developed barrier islands. The revolute, obovate leaves are characteristic. [= K, WH, Z]

PLANTAGINACEAE A.L. de Jussieu 1789 (Plantain Family)

As newly and radically recircumscribed, a family of about 120 genera. References: Albach, Meudt, & Oxelman (2005); Olmstead et al. (2001); Schwarzbach in Kadereit (2004); Fischer in Kadereit (2004).

"subfamily Antirrhinoideae"
  "tribe Cheloneae": *Chelone, Collinsia, Penstemon.*
  "tribe Antirrhineae": *Antirrhinum, Chaenorrhinum, Cymbalaria, Kickxia, Linaria, Misopates, Nuttallanthus.*
"subfamily Gratioloideae":
  "tribe Gratioleae":
    "subtribe Gratiolinae": *Bacopa, Gratiola, Mecardonia, Scoparia, Sophronanthe.*
    "subtribe Dopatriinae": *Limnophila.*
  "tribe Limoselleae": *Limosella.*
  "tribe Stemodieae": *Leucospora.*
"subfamily Digitalidoideae":
  "tribe Digitalideae": *Digitalis.*
  "tribe Veroniceae":
    "subtribe Veroniciinae": *Veronica, Veronicastrum.*
tribe Plantaginae: *Plantago.*
tribe Callitricheae: *Callitriche*

Antirrhinum Linnaeus (Snapdragon)

A genus of about 20 species, herbs, of Mediterranean Europe. References: Sutton (1988)=Z. [also see *Misopates*]

1 Corolla 25-40 mm long; calyx lobes ovate; leaves to 15 mm wide ..... ***A. majus***
1 Corolla 10-13 mm long; calyx lobes linear; leaves to 5 mm wide ..... ***[A. orontium]***

* ***Antirrhinum majus*** Linnaeus, Common Snapdragon. Mt, Pd (VA): cultivated, rarely persistent or naturalized; rare, native of Mediterranean Europe. July. [= C, G, K, P, Z]

* *Antirrhinum orontium* Linnaeus, Lesser Snapdragon, is introduced at least far south as se. PA (Rhoads & Klein 1993) and KY (Pennell 1935). [= C, K, P, Z]

Bacopa Aublet (Water-hyssop)

A genus of about 50 species, herbs (mostly aquatic or at least wetland), of tropical, subtropical, and warm temperate regions of the Old and New Worlds. References: Schuyler (1989)=Z; Fernald (1942).

1 Leaves obovate to oblanceolate, cuneate at the base, 1-veined (or with 1-2 additional obscure veins), 3-8 mm wide; stems glabrous; fresh plants not aromatic ..... ***B. monnieri***
1 Leaves mostly orbicular to ovate (or sometimes obovate in the very rare *B. repens*), rounded to clasping at the base, 3-9-veined; stems pubescent or puberulent, at least when young (check at growing tips) or glabrous (in tidal forms of *B. innominata*); fresh plants aromatic or not.
  2 Fresh plants strongly aromatic when bruised; corolla pale to bright blue, 9-13 mm long; calyx subtended by 2 subulate bractlets; stamens 4 ..... ***B. caroliniana***
  2 Fresh plants not aromatic when bruised; corolla predominantly white (in some species slightly pink or marked with yellow), 2-10 mm long; calyx not subtended by bractlets; stamens 2 or 4.
    3 Corolla 4-10 mm long, white with a yellow throat; capsule ca. 5 mm long ..... ***B. rotundifolia***
    3 Corolla 2-5 mm long, white or pink, without a yellow throat; capsule 2-3 mm long.
      4 Leaves strongly clasping, mostly ovate; stamens 2 (or very rarely 4); [native] ..... ***B. innominata***
      4 Leaves only slightly clasping, mostly obovate; stamens 4; [a very rare introduction] ..... ***B. repens***

Bacopa caroliniana (Walter) B.L. Robinson, Blue Water-hyssop, Sweet Water-hyssop, Carolina Water-hyssop, Lemon Bacopa. Cp (FL, GA, NC, SC, VA), Pd (GA, SC): wet shores, tidal muds, marshes; common, rare north of SC (NC Watch List, VA Rare). May-September. Se. VA south to s. FL, west to e. TX; disjunct in KY. The strongly fragrant stems and leaves are unique. [= RAB, C, F, G, GW, K, W, WH; = *Hydrotrida caroliniana* (Walter) Small – P, S]

Bacopa innominata (Gómez Maza) Alain, Tropical Water-hyssop. Cp (FL, GA, NC, SC, VA): freshwater tidal muds, marshes, shallow water; uncommon, rare north of FL. June-September. MD south to s. FL, and in the West Indies and Central America. *B. stragula* Fernald has been considered a rare endemic of tidal areas in VA and MD, differing from *B. innominata* in its glabrous stems (vs. pubescent), smaller flowers (the corolla < 3 mm long vs. > 3 mm long), and shorter, glabrous pedicels 3-6 mm long (vs. pubescent and to 8 mm long). Schuyler (1989) concluded that *B. stragula* is an intertidal form of *B. innominata*, the morphologic differences induced by the flooding regime. Additional work, perhaps involving growth under experimental conditions or chemical or molecular studies, is needed to corroborate Schuyler's conclusion. See Schuyler (1989), F, and Fernald (1942) for further discussion. [= C, GW, K, WH, Z; > *B. cyclophylla* Fernald – RAB; > *B. stragula* Fernald – F, G; ? *Herpestis rotundifolia* Gaertner f. – P, S; ? *Macuillamia obovata* Rafinesque – P]

Bacopa monnieri (Linnaeus) Wettstein, Monnier's Water-hyssop. Cp (FL, GA, NC, SC, VA): freshwater tidal marshes, muddy shores, streams and pools; common, uncommon north of FL. E. VA south to s. FL, west to c. TX, and in the West Indies and the New World subtropics and tropics. [= RAB, C, F, G, GW, K, WH; = *Bramia monnieri* (Linnaeus) Drake – P, S]

* ***Bacopa repens*** (Swartz) Wettstein, South American Water-hyssop. Cp (SC): freshwater pools; rare, presumably native of the New World tropics. [= RAB, GW, K; = *Macuillamia repens* (Swartz) Pennell – P, S]

Bacopa rotundifolia (Michaux) Wettstein, Midwestern Water-hyssop. Cp (NC, VA): tidal muds, shallow water of large natural lake; rare (NC Watch List, VA Rare). June-September. IN and IA west to ND and MT, south to AL and AZ; disjunct in e. MD, e. VA, and ne. NC, where apparently native (though C considers introduced). Known in NC only from Lake Mattamuskeet, Hyde County, where not seen since 1929. *B. simulans* Fernald has been considered a rare endemic of tidal areas in VA and MD. It is alleged to differ from *B. rotundifolia* in its glabrous to glabrescent stems (vs. pubescent), more succulent condition, smaller leaves (the larger 1-2 cm long and 0.6-1.5 cm wide vs. 2-3.5 cm long and 1.5-2.7 cm wide), smaller flowers (corolla 3-4 mm long vs. 6-10 mm long). Schuyler (1989) concluded that *B. simulans* is an intertidal form of *B. rotundifolia*, the morphologic differences the result of differences in inundation. Additional work, perhaps involving growth under experimental conditions or chemical or molecular studies, is needed to corroborate Schuyler's conclusion. See Schuyler (1989), F, and Fernald (1942) for further discussion. [= C, GW, K, Z; > *B. rotundifolia* – F, G; > *B. simulans* Fernald – F, G; = *Macuillamia rotundifolia* (Michaux) Rafinesque – P, S]

Callitriche Linnaeus 1753 (Water-starwort)

A genus of 20-50 species, annual and perennial herbs of aquatic, wetland, and upland habitats, nearly cosmopolitan. This genus should be included in a greatly expanded Plantaginaceae. References: Angiosperm Phylogeny Group (2003); Crow & Hellquist (2000)=Z; Fassett (1951)=Y; Erbar & Leins in Kadereit (2004). Key based on Z.

1 Flowers and young fruits with 2 inflated bracteoles at the base; leaves dimorphic (with floating rosettes of spatulate leaves and submersed linear leaves) or monomorphic.
  2 Fruit margin distinctly winged, the wing nearly 0.1 mm wide, extending the entire distance from the summit to the base of the fruit; fruit globose ..... ***C. stagnalis***
  2 Fruit margin either not winged or with a wing < 0.05 mm wide, narrowing towards the base of the fruit before ending above the base; fruit ellipsoidal, obovoid, or nearly heart-shaped.
    3 Fruit as wide as long, obovoid or nearly heart-shaped ..... ***C. heterophylla*** *var.* ***heterophylla***
    3 Fruit longer than wide by > 0.2 mm, ellipsoidal ..... ***C. verna***
1 Flowers and young fruits lacking bracts at their base; leaves monomorphic, obovate-spatulate, rounded at the tip.
  4 Mericarps bent at an angle and thickened on one side at the base; [of SC southward] ..... ***C. peploides***
  4 Mericarps not bent at an angle nor thickened at the base; [collectively widespread].
    5 Fruit on pedicels 0.5-7 mm long; margin of fruit curled over on itself, appearing thickened; fruit developing underground ..... ***C. nuttallii***

5 Fruit on pedicels 0.1-0.6 mm long; margin of fruit narrow, thin; fruit developing aboveground ..... ***C. terrestris***

Callitriche heterophylla Pursh *var.* ***heterophylla***. Cp, Pd, Mt (GA, NC, SC, VA): pools, slow-moving streams, ditches; common (uncommon in Piedmont and Mountains). March-October. Greenland west to AK, south to FL, TX, CA, and Mexico. The other variety, var. *bolanderi* (Hegelmann) Fassett, with larger fruits, co-occurs with var. *heterophylla* in nw. North America and is of uncertain taxonomic status, having been treated as species, subspecies, variety, and lumped. [< *C. heterophylla* – RAB, C, G, GW, S, W, Z; > *C. heterophylla* – F; > *C. anceps* Fernald – F, Y; = *C. heterophylla* ssp. *heterophylla* – K; > *C. heterophylla* var. *heterophylla* – Y]

Callitriche nuttallii Torrey. Cp, Pd (NC): low fields; rare. NC, c. TN, and OK south to FL, AL, and TX. [= GW, Y, Z; = *C. pedunculosa* Nuttall – K]

Callitriche peploides Nuttall. Cp (GA, SC): low fields, ditches; rare. April-June. SC south to FL, west to TX; disjunct inland in TN, AR; e. Mexico south to Costa Rica. [= RAB, GW, K, S; > *C. peploides* var. *peploides* – Y]

* ***Callitriche stagnalis*** Scopoli. Pd, Mt (VA): ponds, stagnant water, wet soil; uncommon, native of Europe, or possibly also native in some areas. See Philbrick, Aakjar, & Stuckey (1998) for additional discussion of the spread of this species in North America. [= C, F, G, K, Y, Z]

Callitriche terrestris Rafinesque emend. Torrey. Cp, Pd, Mt (GA, NC, SC, VA): ditches, low fields, wet paths; rare. April-June. MA to KS, south to FL, TX, and Mexico. [= C, GW, K, S, W, Z; = *C. deflexa* A. Braun – RAB, Y; > *C. deflexa* var. *austinii* (Engelmann) Hegelmann – F, G]

Callitriche verna Linnaeus. Cp, Pd, Mt (VA): ponds, lakes, stagnant streams, wet soil; rare. Circumboreal, in North America south to n. VA, WV, IL, TX, and CA; South America. The nomenclatural debate between *C. palustris* and *C. verna* is difficult to resolve. [= G, W, Y, Z; = *C. palustris* – C, F, K, S]

Chaenorrhinum (A.P. de Candolle ex Duby) Reichenbach
(Dwarf Snapdragon, Lesser Toadflax)

A genus of about 21 species, herbs, of Mediterranean Europe. References: Sutton (1988)=Z.

* ***Chaenorrhinum minus*** (Linnaeus) Lange *ssp.* ***minus***, Dwarf Snapdragon, Lesser Toadflax. Mt, Cp (VA), Pd (GA, NC, VA): disturbed areas; common, rare south of VA, native of Eurasia. June-November. [= Z; ? *Chaenorrhinum minus* – C, F, G, K, P, W]

Chelone Linnaeus (Turtlehead)

A genus of about 4 species, perennial herbs, of e. North America. References: Nelson, Elisens, & Benesh (1998).

Identification notes: The four fertile stamens are inserted on either side of the corolla near its base and are flattened and conspicuously pilose. The single staminodium (the color of which is used in the key) is much shorter (often only a few mm long), and is inserted uppermost on the corolla near its base.

1 Leaves sessile; flowers distinctly 4-ranked; staminodium purple; corolla purple ..... ***Ch. cuthbertii***
1 Leaves with petioles 0.5-1.5 cm long (or subsessile in *Ch. glabra*); flowers less distinctly 4-ranked; staminodium white or green; corolla purple or white.
  2 Petioles 1.5-4 cm long; leaf blade rounded at the base; leaf blades averaging ca. 2× as long as wide, 4-8 cm wide; staminodium white; corolla purple ..... ***Ch. lyonii***
  2 Petioles 0.1-1.5 cm long; leaf blade cuneate at the base; staminodium white or green; leaf blades averaging 3× (or more) as long as wide, 1-6 cm wide; corolla purple or white.
    3 Corolla white (or tinged with purple near the summit); staminodium green ..... ***Ch. glabra***
    3 Corolla purple throughout; staminodium white ..... ***Ch. obliqua***

Chelone cuthbertii Small, Cuthbert Turtlehead. Mt (GA, NC, SC, VA), Pd (NC), Cp (NC, VA): bogs, sphagnous swamps, seeps; uncommon (GA Special Concern). Late July-September; September-October. This species has a curious, disjunct distribution: Mountains and rarely upper Piedmont of w. NC and n. GA, and Coastal Plain of se. VA and e. NC. The species is diploid (Nelson, Elisens, & Benish 1998). [= RAB, C, F, G, GW, F, K, P, S, W]

Chelone glabra Linnaeus, White Turtlehead. Mt, Pd, Cp (GA, NC, SC, VA): streambanks, seeps, swamp forests; common. August-October; September-November. Newfoundland and MN south to GA and AL. The named varieties are intergrading and the characters used to distinguish them do not correlate well. The species is diploid (Nelson, Elisens, & Benish 1998). [= RAB, C, GW, K, W; > *Ch. glabra* var. *dilatata* Fernald & Wiegand – F, P; > *Ch. glabra* var. *elatior* Rafinesque – F, G, P, S; > *Ch. glabra* var. *elongata* – F, G, P, S; > *Ch. glabra* var. *ochroleuca* Pennell & Wherry – F, G, P, S; > *Ch. glabra* var. *glabra* – F, G, S; > *Ch. glabra* var. *chlorantha* (Pennell & Wherry) Pennell – P; > *Ch. glabra* var. *typica* – P; > *Ch. chlorantha* Pennell & Wherry – S; > *Ch. montana* (Rafinesque) Pennell & Wherry var. *montana* – S; > *Ch. montana* var. *elatior* (Rafinesque) Small – S]

Chelone lyonii Pursh, Appalachian Turtlehead. Mt, Pd (NC, SC): cove forests, spruce-fir forests, balds, streambanks; uncommon. July-September; October. W. NC and e. TN south to nw. SC. The species is diploid (Nelson, Elisens, & Benish 1998). [= RAB, C, GW, K, W; = *Ch. lyoni* – F, G, P, S, orthographic variant]

Chelone obliqua Linnaeus, Purple Turtlehead. Cp (GA, NC, SC, VA), Pd, Mt (GA, NC, SC): streambanks, swamp forests; uncommon. October; November. MD and MN south to AL, w. TN, and MO. A tetraploid race is restricted to the southern Blue Ridge; plants in the remainder of the distribution are hexaploid (Nelson, Elisens, & Benish 1998). [= RAB, C, GW, F, G, S, W; > *Ch. obliqua* var. *obliqua* – K; > *Ch. obliqua* var. *typica* – P; > *Ch. obliqua* var. *erwiniae* Pennell & Wherry – K, P]

Collinsia Nuttall (Blue-eyed Mary)

A genus of about 20 species, herbs, of North America (especially diverse in w. North America).

Collinsia verna Nuttall, Eastern Blue-eyed Mary. Mt (VA): nutrient-rich, moist bottomlands and forested slopes; rare (VA Rare). April-May. NY west to s. WI, south to w. VA, nc. TN (Chester, Wofford, & Kral 1997), KY, and AR. [= C, F, G, K, P, S, W]

Cymbalaria Hill (Kenilworth-ivy)

A genus of about 9 species, herbs, of Europe west to c. Asia. References: Sutton (1988)=Z.

* ***Cymbalaria muralis*** P.G. Gaertner, B. Meyer, & Scherbius *ssp.* ***muralis***, Kenilworth-ivy. Mt (NC, VA), Pd (VA): naturalized on walls and rock outcrops near plantings; rare, native of Eurasia. May-August. The other two subspecies, both villous throughout (vs. glabrous or with a few scattered hairs in ssp. *muralis*) are Mediterranean and are not known to be naturalized in North America. Reported for NC (Henderson County) by Pittillo & Brown (1988) as "derived from potted plants that have become established beneath the overhang of a porch for over a decade," and reported again more recently as spreading from plantings in Alleghany County, NC (Poindexter 2006). [= Z; < *C. muralis* – C, F, G, K, P; = *C. cymbalaria* (Linnaeus) Wetts.;= *Linaria cymbalaria* (Linnaeus) P. Miller]

Digitalis Linnaeus (Foxglove)

A genus of about 19 species, herbs, of Europe west to central Asia. Famous as the source of the drug digitalis, a cardiac glycoside.

1 Corolla 2-3 cm long, the lower median lobe much longer than the others ..... ***D. lanata***
1 Corolla 4-5.5 cm long, the lower median lobe only slightly longer than the others ..... ***[D. purpurea]***

* ***Digitalis lanata*** Ehrhart, Grecian Foxglove, Hairy Foxglove. Pd (SC): naturalized along roadside; rare, native of Mediterranean Europe. May-June. Reported for South Carolina by Hill & Horn (1997). [= C, F, G, K, P]

* *Digitalis purpurea* Linnaeus, Digitalis, Common Foxglove, is introduced and established at scattered locations as far south as PA (Rhoads & Klein 1993). [= C, P; > *D. purpurea* var. *purpurea* – K; > *D. purpurea* var. *alba* – K]

Gratiola Linnaeus 1753 (Hedge-hyssop)

A genus of about 20 species, herbs, of temperate regions (and tropical mountains) of the Old and New Worlds. References: Estes & Small (2007); Estes & Small (2008)=Y. [including *Amphianthus*]

Identification notes: *Gratiola amphiantha* somewhat resembles *Callitriche*, but has floating leaves in single pairs rather than in a whorl.

1 ..... ***G. amphiantha***
1
  2 Flowers and fruits sessile or subsessile, the pedicels < 1 mm long; perennial.
    3 Leaves linear-subulate; corolla 2-3× as long as the calyx ..... ***[see Sophronanthe hispida]***
    3 Leaves ovate; corolla 1-1.5 × as long as the calyx ..... ***[see Sophronanthe pilosa]***
  2 Flowers and fruits on definite pedicels; annual or perennial.
    4 Leaves clasping or subclasping-rounded at the base; perennial; [section *Gratiola*].
      5 Calyx subtended by 0 (-1) bractlet; corolla lobes white; corolla tube greenish yellow, conspicuously veined ..... ***G. ramosa***
      5 Calyx subtended by 2 bractlets; corolla lobes white or yellow-orange; corolla tube greenish yellow and conspicuously veined, or orange and not conspicuously veined.
        6 Corolla lobes and tube yellow-orange (very rarely white), not conspicuously veined; sepals and flower stalks sparsely or not at all glandular-puberulent ..... ***G. aurea***
        6 Corolla lobes white to lavender, corolla tube greenish yellow, usually conspicuously veined; sepals and flower stalks densely glandular-puberulent.
          7 Leaves triangular to lanceolate, margins entire, or with a few teeth toward the tip; corolla veined with brown lines; sepals linear-lanceolate ..... ***G. brevifolia***
          7 Leaves oblong-ovate to ovate (or linear-lanceolate in submersed forms), finely dentate; corolla veined with purple lines; sepals lanceolate to oblong-lanceolate ..... ***G. viscidula***

4 Leaves cuneate at the base; annual; [section *Nibora*].
8 Pedicels stout, erect, 1-5 (-12) mm long..... ***G. virginiana***
8 Pedicels slender, spreading, 10-45 mm long.
9 Corolla 13-25 mm long; leaves oval or oblanceolate..... ***G. floridana***
9 Corolla 5-14 mm long; leaves elliptic, rhombic-lanceolate, or lanceolate
10 Mid-stem leaves (6-) 7-13 (-18) mm long; proximal fruiting pedicels (5-) 7-17 (-22) mm long, (0.9-) 1-2 (-2.3) × as long as the subtending bracteal leaves; bracteoles shorter than to barely exceeding the sepals; [of granite outcrops in the GA Piedmont]..... ..... ***G. graniticola***
10 Mid-stem leaves (11-) 20-41 -66) mm long; proximal fruiting pedicels (8-) 13-25 (-37) mm long, (0.3-) 0.5-1 (-1.6) × as long as the subtending bracteal leaves; bracteoles slightly to conspicuously longer than the sepals; [collectively of more habitats and more widespread].
11 ..... ***G. neglecta***
11 ..... ***[G. quartermaniae]***

Gratiola amphiantha D. Estes & R.L. Small, Pool-sprite, Snorkelwort. Pd (GA, SC): vernal pools on granitic flatrocks; rare. April. Endemic to granitic flatrocks of ec. AL, nc. GA (17 counties), and sc. SC. Hilton & Boyd (1996) and Patrick, Allison, & Krakow (1995) discuss the ecology and population ecology of this remarkable plant in detail. [= Y; = *Amphianthus pusillus* Torrey – RAB, GW, K, P, S]

Gratiola aurea Pursh, Yellow Hedge-hyssop, Golden-pert. Cp (FL, GA, NC, SC): blackwater river banks, pondcypress savannas in Carolina bays; uncommon (rare in FL). May-September. Newfoundland and Québec south in the Coastal Plain to panhandle FL; disjunct around the Great Lakes and inland in NY, Ontario, IL, and ND. [= RAB, C, F, G, GW, K, S; > *G. lutea* Rafinesque var. *typica* – P; > *G. lutea* var. *obtusa* (Pennell) Pennell – P]

Gratiola brevifolia Rafinesque. Cp (FL, GA): wet places; uncommon. E. GA, south and west to c. peninsular FL, e. panhandle FL, and se. AL; c. AR, se. OK, se. LA, and e. TX; c. TN; s. DE (Knapp & Estes 2006). Previous reports from SC are based on misidentifications (Knapp & Estes 2006). [= GW, K, P, S]

Gratiola floridana Nuttall. Cp (FL, GA), Mt, Pd (GA): stream banks, spring runs, blackwater swamps; uncommon. Ne. GA and se. TN (in counties adjacent to NC) (Chester, Wofford, & Kral 1997), south to e. GA (in counties adjacent to SC) (Jones & Coile 1988), panhandle FL, AL, and MS. [= GW, K, P, S]

Gratiola neglecta Torrey, Mud-hyssop. Cp (NC, SC, VA), Pd, Mt (GA, NC, SC, VA): ditches, wet areas, bottomlands; common. May-July. Québec and ME west to British Columbia, south to GA, TX, and AZ. [= RAB, C, G, GW, K, P, S, W; > *G. neglecta* var. *neglecta* – F]

Gratiola ramosa Walter. Cp (FL, GA, NC, SC, VA): wet pine savannas, marshes, pond margins; ditches; common. May-June. Se. NC south to s. FL, west to sw. LA; disjunct in se. VA (Greensville County) and (at least historically) in e. MD. [= RAB, C, F, G, GW, K, P, S]

Gratiola virginiana Linnaeus. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): sluggish streams, bogs, wet areas; common. March-May. NJ west to OH and IA and KS, south to c. peninsular FL and e. TX. Var. *aestuariorum* Pennell, of s. NJ south to e. VA, is alleged to differ in being shorter, with more rounded leaves, short pedicels (< 2 mm long), a shorter calyx and corolla, and a smaller capsule; it is likely merely a stunted aquatic form, but needs additional study (see F and P for additional details). [= RAB, C, G, GW, S, W; > *G. virginiana* var. *virginiana* – F, K, P; > *G. virginiana* var. *aestuariorum* Pennell – F, K, P]

Gratiola viscidula Pennell. Cp (FL, NS, SC, VA), Pd (NC, SC, VA), Mt (GA, NC, SC): bogs, wet areas, ditches, margins of Coastal Plain ponds; common (uncommon in Mountains, rare in FL). June-November. DE, MD and e. VA, south to c. SC and ne. GA; disjunct in s. OH, WV, e. TN, MO, and ne. FL. Spooner (1984) studied infraspecific taxa recognized in *G. viscidula* and determined that they did not warrant recognition. [= RAB, C, F, GW, K, S, W; > *G. viscidula* var. *viscidula* – G; > *G. viscidula* var. *shortii* Pennell – G, P; > *G. viscidula* var. *typica* – P]

Gratiola graniticola D. Estes, Granite Hedge-hyssop. Pd (GA): granitic flatrocks; rare. April-May. Endemic to granitic flatrocks of GA (and other states?).

Gratiola quartermaniae D. Estes, Limestone Hedge-hyssop, Quarterman's Hedge-hyssop. Ip (TN): limestone glades; rare. April-early June.

Kickxia Dumortier (Fluellen, Cancerwort)

A genus of about 47 species, herbs, of Mediterranean Europe west to c. Asia. References: Sutton (1988)=Z.

1 Leaves round-ovate, rounded to cordate at the base; pedicels villous throughout their length; [ballast waif]..... ***K. spuria***
1 Leaves triangular-ovate or hastate, truncate at the base; pedicels glabrous through much of their length **or** villous; [more widespread alien].
2 Stems densely villous; stems robust (usually 1.5-3.5 mm thick), often much-branched; pedicels 5-12 (-20) mm long, 0.25-0.35 mm in diameter, often villous their entire lengths..... ***K. elatine ssp. crinita***
2 Stems sparsely villous; stems slender (to 1.5 mm thick), sparingly (if at all) branched, pedicels mostly (8-) 15-25 (-30) mm long, 0.1-0.2 mm in diameter, glabrous except for immediately below the calyx..... ***K. elatine ssp. elatine***

* ***Kickxia elatine*** (Linnaeus) Dumortier *ssp.* ***crinita*** (Mabille) W. Greuter, Sharp-leaved Fluellen. Pd (NC, VA), Cp (VA), {GA?}: disturbed areas; uncommon, native of Eurasia. May-November. [= Z; < *K. elatine* – RAB, C, F, G, K, P, S]

* ***Kickxia elatine*** (Linnaeus) Dumortier *ssp.* ***elatine***, Sharp-leaved Fluellen. Pd (NC, SC, VA), Mt (NC, VA), Cp (VA), {GA?}: disturbed areas; uncommon, native of Eurasia. May-November. [= Z; < *K. elatine* – RAB, C, F, G, K, P, S]

* ***Kickxia spuria*** (Linnaeus) Dumortier, Round-leaved Fluellen, Female Fluellen. Cp (NC): ballast near old port (Wilmington); rare, perhaps onlya waif, native of s. Europe. July. [= RAB, C, F, G, K, P, S; > *K. spuria* ssp. *spuria* – Z]

Leucospora Nuttall (Leucospora)

A genus of 2 species, herbs, of e. North America and Coahuila, Mexico. *Leucospora* may not be distinct from *Stemodia*.

* ***Leucospora multifida*** (Michaux) Nuttall, Leucospora, Narrowleaf Paleseed. Cp (FL, NC), Pd (VA) {GA}: moist to wet, sandy margins of artificial ponds, drawdown depressional wetland; rare (NC Watch List). S. Ontario west to IA and KS, south to nw. GA, AL, LA, and e. TX; scattered occurrences further east (as in e. NC, FL, KY, TN, and se. PA) probably represent recent introductions. [= C, G, GW, K, P, S; = *Conobea multifida* (Michaux) Bentham – F, WH; = *Stemodia multifida* (Michaux) Sprengel]

Limnophila R. Brown

A genus of about 37 species, of tropical regions of the Old World.

* ***Limnophila sessiliflora*** (Vahl) Blume. Cp (GA): {habitat}; rare. Reported as introduced in sw. GA (Jones & Coile 1988). [= K]

Limosella Linnaeus (Mudwort, Awl-leaf)

A genus of about 11 species, aquatic herbs, of cosmopolitan distribution.

Limosella australis R. Brown, Mudwort, Awl-leaf. Cp (NC, VA): fresh or slightly brackish tidal flats; rare (NC Rare, VA Rare). June. Newfoundland and Québec south along the Atlantic Coast to se. VA and extreme ne. NC. This plant is very inconspicuous, though locally abundant. [= K; *? L. subulata* Ives – RAB, C, F, G, GW, P]

Linaria P. Miller (Yellow-toadflax)

A genus of about 150 species, of temperate regions of Eurasia. References: Sutton (1988)=Z. [also see *Nuttallanthus*]

* ***Linaria vulgaris*** P. Miller, Butter-and-eggs, Yellow Toadflax, Wild-snapdragon. Mt (GA, NC, SC, VA), Pd (GA, NC, VA), Cp (NC, VA): fields, pastures, roadsides, disturbed areas; common (uncommon in Piedmont of NC, rare in Coastal Plain of NC), native of Europe. [= RAB, C, F, G, K, P, W, Z; = *Linaria linaria* (Linnaeus) Karsten – S]

* *Linaria maroccana* Hooker f., Moroccan Toadflax. Introduced in VA and WV. [= K] {investigate; not yet keyed; synonymy incomplete}

Mecardonia Ruiz & Pavón (Mecardonia)

A genus of about 10 species, of tropical, subtropical, and warm temperate regions of America.

1 Peduncles > 10 mm long; sepals < 2 mm wide.....***M. acuminata*** *var.* ***acuminata***
1 Peduncles < 10 mm long; sepals > 2 mm wide.....***[M. acuminata*** *var.* ***microphylla]***

Mecardonia acuminata (Walter) Small *var.* ***acuminata***, Mecardonia. Cp, Pd (GA, NC, SC, VA), Mt (GA): marshes, ditches, bottomland forests, wet disturbed areas; common. July-September; August-October. DE and MD south to s. FL, west to e. TX, north in the interior to KY, TN, and MO. The long, ascending pedicels are distinctive. The plant blackens on drying. [= K, S; < *M. acuminata* – RAB, C, G, GW; < *Bacopa acuminata* (Walter) B.L. Robinson – F; = *Pagesia acuminata* (Walter) Pennell ssp. *typica* – P]

Mecardonia acuminata (Walter) Small *var.* ***microphylla*** (Rafinesque) Pennell. Cp (GA): margins of Coastal Plain ponds; rare (GA Special Concern). Sc. GA south to panhandle FL and west to e. LA. [= K, S; < *M. acuminata* – GW; = *Pagesia acuminata* (Walter) Pennell ssp. *microphylla* (Rafinesque) Pennell – P]

Misopates Rafinesque (Weasel's-snout)

A genus of about 8 species, herbs, of Mediterranean Europe and n. Africa west to c. Asia.

* ***Misopates orontium*** (Linnaeus) Rafinesque, Weasel's-snout, Lesser Snapdragon. Pd (VA): cultivated, persistent or possibly naturalized; rare, native of Eurasia. [= K; = *Antirrhinum orontium* Linnaeus – C, G]

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Nuttallanthus D.A. Sutton (American-toadflax)

A genus of 4 species, herbs, of North and South America. Sutton (1988) separates these three species, along with *N. subandinus* (Diels) D.A. Sutton, of Bolivia, Chile, Ecuador, Peru, and Uruguay, from *Linaria* on the basis of "the corolla with the abaxial lip greatly exceeding the adaxial lip; the palate weakly developed and scarcely occluding the tube; the spur very slender or absent and the prismatic seeds with 4-7 longitudinal ridges." *Nuttalanthus* is American; *Linaria* is Eurasian. References: Sutton (1988)=Z. Key based on Z.

1 Infructescence axis zigzag; fruiting pedicels densely glandular pubescent, 5-13 mm long, 2× or more as long as the calyx ..... ***N. floridanus***
1 Infructescence axis straight or nearly so; fruiting pedicels glabrous or with a few scattered glandular hairs, 2-6 (-9) mm long, < 1× as long as the calyx.
  2 Corolla 8-11 (-13) mm long (measured from the tip of the spur to the apex of the adaxial lip), the abaxial lip 2-6 mm long; seeds longitudinally ridged, the intervening faces smooth or with sparse low tubercles ..... ***N. canadensis***
  2 Corolla 14-22 mm long (measured from the tip of the spur to the apex of the adaxial lip), the abaxial lip 6-11 mm long; seeds densely tuberculate, not longitudinally ridged ..... ***N. texanus***

Nuttallanthus canadensis (Linnaeus) D.A. Sutton, Common Toadflax. Cp, Pd, Mt (GA, NC, SC, VA): in a wide variety of natural and disturbed habitats, especially common and weedy in disturbed sites such as roadsides and fields, also common and apparently native in thin soil of rock outcrops; common. March-May. Sutton (1988) comments that there is substantial variation in this species not taxonomically explained. [= K, Z; < *Linaria canadensis* (Linnaeus) Dumortier – RAB, W (also see *N. texanus*); = *Linaria canadensis* var. *canadensis* – C, F, G, S; = *Linaria canadensis* (Linnaeus) Dumortier – P]

Nuttallanthus floridanus (Chapman) D.A. Sutton, Florida Toadflax. Cp (GA): dry, sandy places; uncommon. E. GA south to FL and west to MS. [= K, Z; = *Linaria floridana* Chapman – P, S]

* ***Nuttallanthus texanus*** (Scheele) D.A. Sutton, Texas Toadflax. Cp (GA, NC, SC, VA), Pd (NC, SC): disturbed soils of roadsides and fields; uncommon, introduced from further southwest. March-May. Ranging as a native species in sc. and sw. North America and in temperate South America; introduced elsewhere (as in our area). [= K, Z; < *Linaria canadensis* (Linnaeus) Dumortier – RAB, W; = *Linaria canadensis* var. *texana* (Scheele) Pennell – C, F, G, S; = *Linaria texana* Scheele – P]

Penstemon Mitchell 1769 (Beard-tongue, Penstemon)

A genus of about 250 species, perennila herbs and shrubs, of w. North America, e. North America, and (a single species) ne. Asia. References: Clements, Baskin, & Baskin (1998)=Z. Key based in part on Z.

1 Cauline leaves bipinnatifid; basal leaves sessile; [section *Dissecti*] ..... ***P. dissectus***
1 Cauline leaves entire or toothed; basal leaves petioled.
  2 Inflorescence with many nodes; anther cells dehiscing by short proximal slits; [section *Multiflori*] ..... ***P. multiflorus***
  2 Inflorescence with<10 nodes; anther cells dehiscing their entire length.
    3 Corolla glandular-pubescent within; [section *Tubiflori*] ..... ***[P. tubiflorus]***
    3 Corolla pubescent with non-glandular hairs within; [section *Graciles*].
      4 Throat of corolla more-or-less closed by a palate formed by the upward arch of the corolla lip.
        5 Buds yellow-purple; corolla violet-purple with white lobes (fading white when dried); leaves essentially glabrous ..... ***P. hirsutus***
        5 Buds yellow; corolla creamy white; leaves pubescent ..... ***[P. tenuiflorus]***
      4 Throat of corolla open.
        6 Corolla differentiated (above the calyx) into a basal tube and a dilated or inflated throat, with little ridging of the floor; anterior lobes of the corolla essentially equalling the posterior lobes.
          7 Corolla white, lined with purple.
            8 Stems pubescent; inflorescence glabrous or slightly glandular-pubescent ..... ***[P. alluviorum]***
            8 Stems glabrous; inflorescence glandular-pubescent ..... ***P. digitalis***
          7 Corolla purple to violet.
            9 Sepals long-attenuate, to 12 mm long; leaves finely serrate; corolla 20-35 mm long ..... ***P. calycosus***
            9 Sepals < 8 mm long; leaves obscurely serrate; corolla lobes strongly deflexed; corolla 15-22 mm long ..... ***P. laevigatus***
        6 Corolla only gradually and slightly dilated upward, the floor strongly ridged; anterior lobes of the corolla projecting beyond the posterior lobes.
          10 Peduncles strongly ascending, the inflorescence therefore narrow; corolla reddish-purple ..... ***P. australis***
          10 Peduncles spreading, the inflorescence therefore relatively broad; corolla white to violet or purple.
            11 Leaves velvety pubescent; corolla white with fine purple lines ..... ***P. pallidus***
            11 Leaves pubescent, but not velvety; corolla violet or purple.
              12 Basal leaves truncate or cordate at base; lower bracts of inflorescence foliose, slightly smaller than the cauline leaves ..... ***P. smallii***
              12 Basal leaves cuneate at base; lower bracts of inflorescence reduced, much smaller than the cauline leaves.
                13 Cauline leaf blades wide, ovate-lanceolate to ovate ..... ***P. canescens***
                13 Cauline leaf blades narrow, acute to acuminate ..... ***P. laxiflorus***

Penstemon australis Small, Southern Beardtongue, Sandhill Beardtongue. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, SC): sandhills, dry sandy roadsides; common. May-July; July-August. Se. VA south to FL, west to AL, primarily on the

Coastal Plain, but not uncommon westward into the Piedmont and lower Mountains, and extending in the interior into c. TN. [= K, P, S, Z; < *P. australis* – RAB, C, F, G, W]

Penstemon calycosus Small. Mt (GA, NC, SC, VA): limestone ledges, other woodlands; rare (GA Special Concern). May-July. OH and s. MI and IL south to w. VA, GA, and AL. [= F, G, GW, K, P, S, W, Z; < *P. laevigatus* – C]

Penstemon canescens (Britton) Britton, Appalachian Beardtongue. Mt, Pd (GA, NC, SC, VA), Cp (VA): woodlands, glades, forest edges, roadsides; common. May-July. PA and s. IN south to nc. GA, n. AL, and c. TN. [= RAB, C, K, W, Z; > *P. canescens* – F, G, S; > *P. canescens* var. *typicus* – P; > *P. canescens* var. *brittonorum* (Pennell) Pennell – P; > *P. brittonorum* Pennell – S; > *P. brevisepalus* Pennell – F, G, P, S]

*? ***Penstemon digitalis*** Nuttall ex Sims, Tall White Beardtongue. Mt (NC, SC, VA), Pd, Cp (VA): alluvial forests, moist fields, disturbed areas; common. May-June; July-August. Nova Scotia and ME west to MN and SD, south to e. VA, w. SC, AL, and TX. [= RAB, C, F, G, GW, K, P, S, W, Z]

Penstemon dissectus Elliott, Georgia Beardtongue, Grit Beardtongue. Cp (GA): Altamaha Grit outcrops, sandhills; rare (GA Rare). Endemic to Altamaha Grit outcrops and other sandy areas from e. GA south and west to sw. GA. This species is unmistakable because of its bipinnatifid leaves. [= K, P, S, Z]

Penstemon hirsutus (Linnaeus) Willdenow, Northeastern Beardtongue. Pd, Mt (VA): dry woodlands, forests, and fields; uncommon. May-July. Québec and ME west to MI and WI, south to VA and KY. [= C, F, G, K, P, S, W, Z]

Penstemon laevigatus Aiton, Eastern Beardtongue. Cp, Pd, Mt (GA, NC, SC, VA): low meadows, bottomlands, forest edges; common. May-June; July-August. ME west to MI, south to s. GA, MS, and AR. [= RAB, F, G, GW, K, P, W, Z; < *P. laevigatus* – C (also see *P. calycosus*); *P. pentstemon* (Linnaeus) MacM. – S]

Penstemon laxiflorus Pennell. {GA}: {habitat}. C. GA and n. AL west to c. OK and c. TX. [= K, P, Z; < *P. australis* – S; = *P. australis* Small ssp. *laxiflorus* (Pennell) Bennett]

Penstemon multiflorus Chapman ex Bentham. Cp (GA): {habitat}; uncommon. S. and e. GA south to FL. [= K, P, S, Z]

Penstemon pallidus Small, Eastern White Beardtongue. Cp (GA, NC, VA), Pd, Mt (GA, VA): limestone and shale barrens, other dry, disturbed areas; uncommon (GA Special Concern). May-June. ME west to MN, south to NC, GA, and AR. [= RAB, C, F, G, K, P, S, W, Z]

Penstemon smallii A. Heller, Blue Ridge Beardtongue. Mt (GA, NC, SC): woodlands, cliffs, glades, roadbanks; common (GA Special Concern). May-June; July. A Southern Appalachian endemic, distributed from nw. NC and ne. TN south to nw. SC, n. GA, and n. AL. [= RAB, K, P, S, W, Z]

Penstemon alluviorum Pennell, Lowland Beardtongue. East to AL, TN, KY. [= C, F, G, K, P, S, Z]

Penstemon tenuiflorus Pennell, Plateau Beardtongue, Limestone Beardtongue, Kentucky Beardtongue. Endemic to the Interior Low Plateau of wc. KY, c. TN, n. AL, extending slightly into the Coastal Plain to the west, and disjunct in the Black Belt of AL and MS. [= C, F, G, K, P, S, Z]

Penstemon tubiflorus Nuttall, Tube Beardtongue. A more western species, reaching its eastern limit in w. TN (Chester, Woffor, & Kral 1997). It is also known from adventive sites further east, as in e. PA (Rhoads & Klein 1993). [= S; = *P. tubaeflorus* – C, F, G, P, Z, orthographic variant; > *P. tubiflorus* var. *achoreus* Fernald – K; > *P. tubiflorus* var. *tubiflorus* – K]

Plantago Linnaeus 1753 (Plantain)

A genus of about 270 species, herbs and rarely shrubs, of cosmopolitan distribution. Harper (1944) discusses at length the interesting issue of the native distributions of the many weedy species of *Plantago*. The native or introduced status of many of our species is uncertain or controversial. References: Rosatti (1984)=Z; Bassett (1966)=Y; Bassett (1967)=X; Schwarzbach in Kadereit (2004).

1 Leaves cauline, opposite; spikes on peduncles from the leaf axils; [section *Psyllium*] ..... ***P. psyllium***
1 Leaves basal; spikes on scapes from the base of the plant.
  2 Leaves ovate to broadly lanceolate or broadly oblanceolate, distinctly broadened upward from a petiolar base, the leaves > 1 cm wide (some species keyed both ways).
    3 Leaf venation pinnate, some major veins departing from the midvein well above the leaf base; perennial from thick, fleshy rootstock, typically 3-8 cm wide near its summit, with a cavity below (like an inverted bowl), and with 3-10 fleshy roots 3-15 mm thick descending or spreading from the bowl rim; capsule 2-4-seeded; scapes hollow and terete; [aquatic or semi-aquatic]; [section *Palaeopsyllium*] ..... ***P. cordata***
    3 Leaf venation parallel, with all of the major veins separating at the base of the leaf; **either** perennial from thin, fibrous roots or an erect caudex, **or** annual from a small taproot; capsule 2-30-seeded; scapes either solid and terete, solid and angled, or hollow and terete; [terrestrial].
      4 Leaves broadly ovate-elliptic, the blades 1-3× as long as wide, distinctly petiolate; scapes solid and terete; [section *Plantago*].
        5 Fruit 2.5-4 mm long, dehiscent near the middle, the terminal portion about as long as the basal; sepals broadly ovate, ca. 1.5× as long as wide, mostly obtuse; petioles usually green and pubescent at the base ..... ***P. major***
        5 Fruit 4-6 mm long, dehiscent below the middle, the terminal portion about 2× as long as the basal; sepals narrowly elliptic, 2-4× as long as wide, mostly acute; petioles usually purple and glabrous at the base ..... ***P. rugelii***
      4 Leaves mostly broadly oblanceolate, broadly lanceolate,or spatulate, (3-) 4-10× as long as wide, attenuate to the only somewhat petiolar base; scapes solid and 5-angled, or hollow (to solid) and terete.
        6 Bracts and calyx pubescent, at least on the keels; ephemeral annual, flowering late March-June, and then senescing; [section *Virginica*]
          7 Mature seeds 2.5-3 mm long, reddish, nearly flat oin both sides; sepals with an excurrent midrib; leaves typically toothed; [rare adventive in western part of our area] ..... ***P. rhodosperma***
          7 Mature seeds tan or brown, 1.5-2 mm long, concave on one side, convex on the other; sepals obtuse to rounded; leaves entire; [common in our area] ..... ***P. virginica***

6 Bracts and calyx glabrous; perennial, flowering April-November.
8 Spikes very densely flowered, the rachis hidden; scape 5-angled; [widespread weedy alien]; [section *Lancifolia*]... ***P. lanceolata***
8 Spikes loosely flowered, the rachis visible its entire length; scape terete; [rare native of Coastal Plain pinelands and adjacent fire-plow lines and ditches]; [section *Palaeopsyllium*]... ***P. sparsiflora***

2 Leaves lanceolate or linear, slightly if at all broadened upward, the base not petiolar, the leaves typically < 1 cm wide.
9 Summer and winter leaves dimorphic, the winter leaves lanceolate (typically submersed), the summer leaves ovate or cordate (emersed except in floods); plant perennial from thick, fleshy rootstock, typically 3-8 cm wide near its summit, with a cavity below (like an inverted bowl), and with 3-10 fleshy roots 3-15 mm thick descending or spreading from the bowl rim; [aquatic or semi-aquatic]; [section *Palaeopsyllium*]... ***P. cordata***
9 Summer and winter leaves not dimorphic, all leaves lanceolate or linear; plant either perennial from thin, fibrous roots, or annual from a small taproot; [terrestrial].
10 Leaves fleshy; corolla tube pubescent on its outer surface; [of sea beaches]... ***P. maritima*** *var.* ***juncoides***
10 Leaves herbaceous (though often rather thick and leathery); corolla tube glabrous on its outer surface; [of various habitats, not as above].
11 Bracts of the inflorescence and sepals conspicuously pubescent; annual (rarely biennial), with a taproot; stamens 4.
12 Leaves oblanceolate; [section *Virginica*]... ***P. virginica***
12 Leaves linear; [section *Gnaphaloides*].
13 Bracts of the lower flowers in the spikes conspicuously exserted, at least 2 × as long as the subtended flower.
14 Leaves glabrous or puberulent above; longer bracts 8-30 mm long; seeds 2.2-3.0 mm long... ***P. aristata***
14 Leaves silky-pubescent above; longer bracts mostly < 5 mm long; seeds 1.3-1.9 mm long... ***P. patagonica***
13 Bracts of the lower flowers in the spikes not conspicuously exserted, < 2× as long as the subtended flower.
15 Bracts 1-2× as long as the the calyx; seeds 1.3-1.9 mm long... ***P. patagonica***
15 Bracts 0.5-1× as long as the calyx; seeds 2.7-3 mm long... ***P. wrightiana***
11 Bracts of the inflorescence glabrous or inconspicuously ciliate-margined; stamens 2 or 4; [annual or perennial].
16 Annual; flowers with 2 stamens; capsule 4-25-seeded; leaves linear, 0.5-5 mm wide; [section *Micropsyllium*].
17 Capsule mostly 10-25-seeded; seeds 0.5-0.8 mm long... ***P. heterophylla***
17 Capsule 4-seeded; seeds 0.75-1.8 mm long... ***P. pusilla***
16 Perennial; flowers with 4 stamens; capsule 1-2-seeded; leaves lanceolate (or broader), 7-50 mm wide.
18 Spikes very densely flowered, the rachis hidden; scape 5-angled; [widespread weedy alien]; [section *Lancifolia*]... ***P. lanceolata***
18 Spikes loosely flowered, the rachis visible its entire length; scape terete; [rare native of Coastal Plain pinelands and adjacent fire-plow lines and ditches]; [section *Palaeopsyllium*]... ***P. sparsiflora***

* ***Plantago aristata*** Michaux, Buckhorn Plantain. Cp, Pd, Mt (GA, NC, SC, VA): disturbed areas, especially dry, barren, exposed soil, such as clay soils denuded by bull-dozing; common, introduced from farther west. Late April-July. [= RAB, C, F, G, K, S, W, Z]

Plantago cordata Lamarck, King-root, Heartleaf Plantain. Pd (NC), Mt (GA, VA), Cp (VA): aquatic or semi-aquatic in streambeds with outcrops of slate, aquatic in tidal estuaries; rare (NC Endangered, VA Rare). March-April; May-June. NY and s. Ontario west to WI, south to w. VA, c. NC, nw. GA, AL, sc. TN, and MO, very scattered and rare in every state in which it occurs, except MO. Characteristically, *P. cordata* is a very robust plant, the inflorescences often 1 meter in height, and the glabrous leaves with ovate blades to 30 cm long and 20 cm wide, on ascending petioles up to 40 cm long and 2 cm wide; Winter leaves are 3-10 cm long, ca. 1 cm wide, and remotely toothed. Spring leaves show a gradual transition from the winter form to the summer form. *P. cordata* is not known to be extant in VA, where it formerly occurred in the estuary of the Potomac River and in Smyth County in sw. VA. In NC, *P. cordata* is apparently limited to 2 slate-bottomed streams in s. Davidson County, where it is locally abundant. A recent study of morphological and genetic variability in the species found the 2 NC populations to "represent sites of primary [conservation] concern with unique genetic composition" (Mymudes & Les 1993). [= RAB, C, F, G, GW, K, S, W, X, Z]

Plantago heterophylla Nuttall, Many-seeded Plantain. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): fields, roadsides, disturbed areas; common (VA Watch List). March-May. Se. VA and MO south to FL and TX; adventive at scattered sites further north (at least as far north as NY). [= RAB, C, F, G, K, S, W, Y, Z; = *P. hybrida* W. Bart. – GW]

* ***Plantago lanceolata*** Linnaeus, English Plantain, Rib-grass. Cp, Pd, Mt (GA, NC, SC, VA): lawns, roadsides, disturbed areas; common, native of Europe. April-November. [= RAB, C, K, S, W, Z; > *P. lanceolata* var. *lanceolata* – F, G; > *P. lanceolata* var. *sphaerostachya* Mertens & Koch – F, G; > *P. lanceolata* var. *angustifolia* Poiret – G]

*? ***Plantago major*** Linnaeus, Common Plantain, Whiteman's-foot. Cp (GA, NC, SC, VA), Pd, Mt (GA, NC, VA): lawns, roadsides, disturbed areas; uncommon, native of Europe, possibly also native in ne. North America, possibly as far south as the northern part of our area. June-November. Very variable, and possibly worthy of some of the infraspecific subdivisions suggested by various authors. The Coastal Plain populations associated with the Chesapeake Bay in VA may represent a native, estuarine genotype. [= RAB, C, GW, K, S, W, Z; > *P. major* var. *major* – F; > *P. major* var. *scopulorum* Fries & Broberg – F; > *P. major* ssp. *pleiosperma* Pilger var. *paludosa* Béguinot – G; > *P. major* ssp. *pleiosperma* Pilger var. *scopulorum* Fries & Broberg – G; > *P. major* var. *intermedia* (A.P. de Candolle) Pilger]

Plantago maritima Linnaeus *var.* ***juncoides*** (Lamarck) A. Gray, Seaside Plantain. Cp (VA): salt marshes; rare (VA Rare). Var. *juncoides* apparently ranges from Greenland and ne. Canada south to e. VA. Other varieties occur in nw. North America and n. Eurasia, the species as a whole is an interruptedly circumboreal plant of ocean shores, also disjunct inland in saline areas. [= K; = *P. maritima* ssp. *juncoides* (Lamarck) Hultén – C; > *P. juncoides* Lamarck var. *decipiens* (Barnéoud) Fernald – F; < *P. maritima* – G]

* ***Plantago patagonica*** Jacquin, Woolly Plantain. Pd (GA, SC), Cp (GA): roadsides; rare. United States and s. South America. May-June. [= K, Z; > *P. purshii* Roemer & Schultes – RAB, F; > *P. patagonica* var. *patagonica* – C, G; > *P. patagonica* var. *gnaphaloides* (Nuttall) A. Gray – C, G]

* ***Plantago psyllium*** Linnaeus, Leafy-stemmed Plantain. Cp, Mt (NC, VA): disturbed areas; rare, inroduced from Europe. June-November. [= C, K, Z; = *P. psillium* – RAB, orthographic variant; > *P. indica* Linnaeus – F, G; ? *P. arenaria* Waldstein & Kitaibel]

* ***Plantago pusilla*** Nuttall, Little Plantain. Cp (NC), Pd (VA) {GA, SC}: roadsides, disturbed areas; uncommon, probably native of sc. United States (the original range uncertain). March-May. Belden et al. (2004) discuss the Virginia occurrence, on Fort Pickett Military Reservation, Nottoway County. [= C, K, S, Y, Z; > *P. pusilla* var. *pusilla* – F, G; > *P. pusilla* var. *major* Engelmann – F, G; = *P. elongata* Pursh – GW]

* ***Plantago rhodosperma*** Decaisne, Redseed Plantain, reported as ranging east to KY, TN, and GA (Kartesz 1999), probably as adventive from further west. The reports for GA and TN require confirmation. [= C, F, G, K]

Plantago rugelii Decaisne, American Plantain, Broad-leaved Plantain. Cp, Pd, Mt (GA, NC, SC, VA): roadsides, lawns, disturbed areas; common. June-November. Widespread in e. and c. North America, the original distribution obscure. [= RAB, C, F, G, GW, S, W, Z; > *P. rugelii* var. *rugelii* – K; > *P. rugelii* var. *asperula* Farwell – K]

Plantago sparsiflora Michaux, Pineland Plantain. Cp (GA, NC, SC): wet savannas over calcareous substrates (coquina limestone), now usually found in moister human-created microhabitats adjacent to these sites, such as fire-plow lines, shallow ditches along roadsides, or mowed powerline rights-of-way; rare (US Species of Concern, GA Special Concern, NC Endangered, SC Rare). April-October. Se. NC south to ne. FL, restricted to the Coastal Plain. Harper (1944), with his usual keen understanding of the ecology of southeastern plants, has provided the most succinct and accurate description of the habitat of this plant: "flattish pine-barrens where there is evidently some calcareous material not far from the surface." Reports of this species for VA are in error. [= RAB, GW, K, S, X, Z]

Plantago virginica Linnaeus, Virginia Plantain. Cp, Pd, Mt (GA, NC, SC, VA): roadsides, lawns, disturbed areas; common. Late March-June. MA and NY west to SD, south to FL and TX. [= RAB, C, G, K, S, W, Z; > *P. virginica* var. *virginica* – F; > *P. virginica* var. *viridescens* Fernald – F]

Plantago wrightiana Decaisne, Wright's Plantain. Cp (GA, NC, SC), Pd (GA, NC, SC, VA): roadsides, lawns, disturbed areas; common (uncommon in NC). Late April-July. VA, NC, OK, and AZ south to GA, AL, MS, TX, and Mexico, the original distribution unclear. [= K, Z; = *P. hookeriana* Fischer & C.A. Meyer var. *nuda* (A. Gray) Poe – RAB, W]

Scoparia Linnaeus (Goat-weed, Sweet-broom)

A genus of about 20 species, herbs, of tropical and subtropical America.

1 Corolla white; sepals 4, ovate; stem 3-8 dm tall; annual ..... ***S. dulcis***
1 Corolla yellow; sepals 5, lanceolate; stem 1-1.5 d tall; perennial ..... ***S. montevidensis*** *var.* ***glandulifera***

Scoparia dulcis Linnaeus, Goat-weed, Sweet-broom. Cp (FL, GA, SC): disturbed places; common (uncommon north of FL), rather weedy and the original distribution unclear. May-October. [= RAB, GW, K, P, S, WH]

* ***Scoparia montevidensis*** (Sprengel) R.E. Fries *var.* ***glandulifera*** (Fritsch) R.E. Fries. Cp (FL, NC): on ballast, other disturbed areas; rare, native of South America. [= K, P, WH]

Sophronanthe Bentham

The two taxa included here are not part of *Gratiola*; it remains to be determined whether *Tragiola* Small & Pennell should be recognized as distinct from *Sophronanthe* (Estes, pers. comm. 2004).

1 Leaves linear-subulate; corolla 2-3× as long as the calyx ..... ***S. hispida***
1 Leaves ovate; corolla 1-1.5 × as long as the calyx ..... ***S. pilosa***

Sophronanthe hispida Bentham ex Lindley. Cp (FL, GA): dry pinelands; common (uncommon in GA). E. GA (within a few counties of SC) south to s. FL, and west to MS. [= P, S; = *Gratiola hispida* (Bentham ex Lindley) Pollard – GW, K, WH]

Sophronanthe pilosa (Michaux) Small. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): marshes, wet areas, wet pine savannas; common (rare in Mountains). June-September. NJ south to s. FL, west to e. TX, northward in the interior to KY, TN, AR, and e. OK. [= *Gratiola pilosa* Michaux= RAB, C, F, G, GW, K, W, WH; > *Tragiola pilosa* (Michaux) Small & Pennell var. *typica* – P; = ***Tragiola pilosa*** (Michaux) Small & Pennell – S]

Veronica Linnaeus 1753 (Speedwell)

A genus of about 180 species, herbs, nearly cosmopolitan (at least now), most diverse in Europe. The genus appears to be paraphyletic as currently circumscribed (Albach & Chase 2001). References: Walters & Webb (1972)=Z; Crow & Hellquist (2000)=Y. Key partly based on C.

1 Flowers in axillary racemes; upper bracteal leaves opposite throughout.
  2 Leaves and stems pubescent; [plants of mesic to dry habitats]; [section *Veronica*].
    3 Leaves cuneate at the base; leaves widest at the middle or beyond; pedicels shorter than the subtending bracts ..... ***V. officinalis***
    3 Leaves cordate, truncate or rounded at the base; leaves widest towards the base; pedicels equalling or longer than the subtending bracts.
      4 Stem pubescence generally distributed; calyx shorter than the capsule; style 6-8 mm long; stems erect .... ***[V. austriaca*** *ssp.* ***teucrium]***

4 Stem pubescence restricted to 2 lines; calyx longer than the capsule; style 3-5 mm long; stems creeping or ascending ..*V. chamaedrys*
2 Leaves and stems glabrous, or with fine glandular hairs in the inflorescence only; [plants of wetlands].
5 Leaves (even the upper) short-petiolate; [section *Beccabunga*].
6 Leaves broadest towards the base, acute at the tip; style 2.5-3.5 mm long ..... ***V. americana***
6 Leaves broadest near or above the middle, rounded at the tip; style 1.8-2.2 mm long ..... ***V. beccabunga***
5 Leaves (at least the middle and upper) sessile.
7 Capsule flattened, conspicuously notched at the style and therefore appearing 2-lobed, wider than long; seeds 1.2-1.8 mm long; leaves (3-) 4-20× as long as wide; < 1 cm wide, tapering to the base and not clasping; [section *Veronica*]..... ***V. scutellata***
7 Capsule turgid, slightly or not notched at the style, about as long as wide; seeds <0.5 mm long; leaves 1.5-5 (-8)× as long as wide, mostly > 1 cm wide, clasping at the base; [section *Beccabunga*].
8 Racemes 20-65-flowered; pedicels 4-8 mm long; capsule ovoid to globose, not notched or barely so ..... ***V. anagallis-aquatica***
8 Racemes 5-25 (-35)-flowered; pedicels 3-6 mm long; capsule broadly obcordate, distinctly though slightly notched at the style .... ***[V. catenata]***
1 Flowers in terminal racemes or solitary and axillary, subtended by normally-sized leaves; upper bracteal leaves often alternate.
9 Bracts abruptly smaller than the foliage leaves, the flowers thus in well-developed terminal racemes or spikes; perennials from rhizomes.
10 Stems 3-10 dm tall; flowers in a crowded terminal spike; larger leaves > 4 cm long, sharply serrate; [section *Pseudolysimachium*] .... ***[V. longifolia]***
10 Stems 1-3 dm tall; flowers in loose racemes; larger leaves < 2.5 cm long, entire to weakly toothed; [section *Veronicastrum*].
11 Flowers bright blue; pedicels with some longer gland-tipped hairs; flowers usually < 12 per raceme ... ***[V. serpyllifolia** var. **humifusa]***
11 Flowers pale blue with darker blue lines; pedicels puberulent; flowers usually > 12 per raceme ..... ***V. serpyllifolia** var. **serpyllifolia***
9 Bracts gradually reduced in size upwards, all of the flowers or at least those lower on the stem axillary in the axils of well-developed foliage leaves; annuals (except *V. filiformis*); [section *Pocilla*].
12 Pedicels 0-2 mm long; flowers in the axils of bracts, all or at least the upper of which are very different than foliage leaves.
13 Leaves 3-10× as long as wide, toothed or entire; flowers white or very pale, ca. 2 mm across; stems usually glabrous (except *V. peregrina* var. *xalapensis*).
14 Stem glabrous; sepals and fruit glabrous ..... ***V. peregrina** var. **peregrina***
14 Stem pubescent with short, gland-tipped hairs; sepals and fruit glabrous or pubescent with short, gland-tipped hairs .... ***V. peregrina** var. **xalapensis***
13 Leaves 1-2× as long as wide, palmately lobed or toothed; flowers blue, 2-4 mm across; stems pubescent.
15 Upper leaves and lower bracts trilobed, the lobes cut > ½ way to base ..... ***V. triphyllos***
15 Leaves unlobed (though crenate-serrate).
16 Style 0.4-1.0 mm long ..... ***V. arvensis***
16 Style ca. 1.5 mm long ..... ***V. dillenii***
12 Pedicels 5-40 mm long; flowers in the axils of leaves similar in shape and size to foliage leaves (though the upper are sometimes somewhat smaller).
17 Perennial, the stems rooting at the nodes the length of the stem; pedicels > 2× as long as the the leaves ..... ***[V. filiformis]***
17 Annual, the stems not rooting at the nodes (or at most only at the base of the plant); pedicels < 2× as long as the the leaves.
18 Calyx lobes cordate at the base; leaves with 3-7 teeth or shallow lobes ..... ***V. hederifolia***
18 Calyx lobes cuneate to rounded at the base; leaves with usually > 7 small teeth or crenations.
19 Lobes of the capsule with apices diverging at ca. 90 degrees; corolla > 8 mm wide ..... ***V. persica***
19 Lobes of the capsule with apices parallel or diverging at an acute angle; corolla < 8 mm wide.
20 Capsule with all hairs straight and gland-tipped; corolla white to pale blue or violet ..... ***V. agrestis***
20 Capsule with a mixture of short, arching, non-glandular hairs and longer, straight, gland-tipped hairs; corolla bright blue .... ***V. polita***

* ***Veronica agrestis*** Linnaeus, Field Speedwell. Pd (GA, NC), Mt (GA), {VA}: lawns and disturbed areas; rare, native of Eurasia. [= C, F, G, K, P, Z; < *V. agrestis* – RAB, G]

Veronica americana Schweinitz ex Bentham, American Speedwell, Brooklime. Mt (NC, VA), Pd (VA), {SC}: bogs, marshes, streamsides; uncommon (rare south of VA). May-June; July. Newfoundland west to AK, south to NC, TN, TX, and CA; ne. Asia. [= RAB, C, F, G, K, P, S, W, Y]

Veronica anagallis-aquatica Linnaeus, Water Speedwell. Mt (NC, VA), Cp (NC, VA), Pd (VA): bogs, marshes, streamsides, ditches; uncommon (rare south of VA). May-June; July. Circumboreal, south in North America to FL, TX, and CA; some occurrenmces probably represnt introductions of European material. Some authors interpret V. anagallis-aquatica as being non-native in North America. [= C, F, G, P, Y; < *V. anagallis-aquatica* – RAB, C, K, W, Z]

* ***Veronica arvensis*** Linnaeus, Corn Speedwell, Wall Speedwell. Mt, Pd, Cp (GA, NC, SC, VA): fields, roadsides, disturbed areas; common, native of Eurasia. March-June. [= RAB, C, F, G, K, P, S, W, Z]

* ***Veronica beccabunga*** Linnaeus, European Brooklime. Mt (VA?): wet places; rare, native of Europe. South to MD, WV, and perhaps VA. [= C, F, G, K, P, Y, Z]

* ***Veronica chamaedrys*** Linnaeus, Germander Speedwell. Mt (NC), Pd (VA): golf course, lawns; rare, native of Eurasia. [= RAB, C, F, G, K, P; *V. chamaedrys* ssp. *chamaedrys* – Z]

* ***Veronica dillenii*** Crantz. Mt (VA): {habitat}; rare, native of Europe. [= C, G, K, P, Z; < *V. verna* Linnaeus – F]

* ***Veronica hederifolia*** Linnaeus, Ivyleaf Speedwell. Pd (GA, NC, SC, VA), Cp (NC, SC, VA), Mt (NC, VA): lawns, fields, disturbed areas; common, native of Europe. March-May. [= K, W; *V. hederaefolia* – RAB, C, F, G, P, S, orthographic variant; *V. hederifolia* ssp. *hederifolia* –Z]

* ***Veronica officinalis*** Linnaeus, Common Speedwell, Gypsyweed, Heath Speedwell. Mt (GA, NC, VA), Pd (NC, VA), Cp (NC, SC, VA): May-August. [= RAB, C, G, P, S, W, Z; *V. officinalis* var. *officinalis* – F, K; *V. officinalis* var. *tournefortii* (Vill.) Reichenbach – F, K]

Veronica peregrina Linnaeus *var.* ***peregrina***, Common Purslane Speedwell. Mt, Pd, Cp (GA, NC, SC, VA): fields, roadsides, disturbed areas; common. April-May. Nova Scotia and ND south to FL and TX; AK south to OR (perhaps only as an

introduction?); South America. [= C, F, G, S; *V. peregrina* ssp. *peregrina* – K; < *V. peregrina* – RAB, W, Z; *V. peregrina* var. *typica* – P]

* ***Veronica peregrina*** Linnaeus *var.* ***xalapensis*** (Kunth) Pennell, Western Purslane Speedwell. Cp (GA), {NC?, SC?}: fields, lawns, disturbed places; rare, probably introduced in our area on ballast. April-May. Québec and AK south to MA, KY, TX, and south to Guatemala. [= C, F, G, P, S; = *V. peregrina* ssp. *xalapensis* (Kunth) Pennell – K; < *V. peregrina* – RAB, W, Z]

* ***Veronica persica*** Poiret, Bird's-eye Speedwell. Cp (NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, VA): lawns, fields, roadsides, disturbed areas; common, native of Eurasia. March-June. [= RAB, C, F, G, K, P, S, W, Z]

* ***Veronica polita*** Fries. Pd (NC, VA), Mt, Cp (VA): lawns, waste areas; rare, native of Eurasia. March-April. This species is introduced in c. TN (Chester, Wofford, & Kral 1997), WV, and s. PA (Rhoads & Klein 1993), FL (Pennell 1935), NC, and VA (Kartesz 1999). It is similar to *V. agrestis* and has been much confused with it. [= C, F, K, S, Z; < *V. agrestis* – RAB, G; *V. didyma* Tenore – P, misapplied]

Veronica scutellata Linnaeus, Narrowleaf Speedwell. Mt (VA), {NC?}: marshes; rare. May-September. Circumboreal, south in North America to VA, NC?, TN, and CA. In ne. TN (Chester, Wofford, & Kral 1997). [= C, G, K, P, W, Y, Z; *V. scutellata* var. *scutellata* – F]

* ***Veronica serpyllifolia*** Linnaeus *var.* ***serpyllifolia***, Thymeleaf Speedwell. Mt, Pd, Cp (GA, NC, SC, VA): meadows, lawns, roadsides, other disturbed areas; common (rare in Coastal Plain), native of Eurasia. April-June. [= C, G; *V. serpyllifolia* ssp. *serpyllifolia* – K, Z; < *V. serpyllifolia* – RAB, F, S, W; = *V. serpyllifolia* – P]

* ***Veronica triphyllos*** Linnaeus. Pd (NC, SC): cultivated fields; rare, native of Eurasia. April. [= RAB, K, P]

* *Veronica austriaca* Linnaeus ssp. *teucrium* (Linnaeus) D.A. Webb, native of Eurasia, is naturalized at scattered locations in PA (Rhoads & Klein 1993) and MD (Kartesz 1999). [= K, Z; = *V. teucrium* Linnaeus – C; *V. latifolia* Linnaeus – F, G, P, nomen ambiguum, perhaps misapplied]

Veronica catenata Pennell. Streams and wetlands. Circumboreal, the southern limits obscure because of taxonomic confusion, misidentifications, and misattributions. [= C, Y; < *V. anagallis-aquatica* Linnaeus – K, W, Z; > *V. comosa* Richter – F; > *V. salina* Schur – G; > *V. connata* Rafinesque var. *typica* – P; > *V. glandifera* Pennell – P, S; > *V. catenata* Pennell – P, Z]

* *Veronica filiformis* J.E. Smith, Creeping Speedwell. In WV, MD, and scattered in PA (Rhoads & Klein 1993). [= C, F, G, K, P, Z]

* *Veronica longifolia* Linnaeus, Garden Speedwell, Longleaf Speedwell. In WV, scattered in PA (Rhoads & Klein 1993), KY, and in MD (F). native of Europe. [= C, F, G, K, P, Z]

*? *Veronica serpyllifolia* Linnaeus var. *humifusa* (Dickson) Vahl, may range south to MD (Pennell 1935, Kartesz 1999). It is native in n. North America. April-June. [= C, G; < *V. serpyllifolia* – F; *V. serpyllifolia* ssp. *humifusa* (Dickson) Syme – K, Z; = *V. humifusa* Dickson – P]

Veronicastrum Heister ex Fabricius (Culver's-root)

A genus of 2 species, herbs, of e. North America and e. Asia.

Veronicastrum virginicum (Linnaeus) Farwell, Culver's-root. Mt (GA, NC, VA), Pd (GA, NC, SC, VA): streambanks, bogs, wet meadows, dryish soils in areas with prairie affinities; uncommon (NC Watch List, SC Rare). July-August. VT west to Manitoba, south to nc. and nw. GA, w. FL Panhandle, and LA. Populations seem to be of somewhat sporadic or irregular appearance from year to year. [= RAB, C, F, G, GW, K, P, S, W]

PLATANACEAE Dumortier 1829 (Plane-tree Family)

A family of a single genus and about 7 species (and several addional infrataxa), trees, of North America south to Central America and w. Asia to se. Asia. Probably with a close relationship to the Proteaceae, and perhaps best included there (Angiosperm Phylogeny Group 1998, 2003). References: Kaul in FNA (1997); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Platanus Linnaeus 1753 (Plane-tree, Sycamore)

A genus of about 7 species (and several additional infrataxa), trees, of North America south to Central America and w. Asia to se. Asia. References: Kaul in FNA (1997); Nixon & Poole (2003)=Z; Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: The exposed white inner bark on the middle and upper trunks make *Platanus* recognizable at long distances, especially in winter.

Platanus occidentalis Linnaeus *var.* ***occidentalis***, Sycamore, Plane-tree. Pd, Mt, Cp (GA, NC, SC, VA): riverbanks and alluvial forests, streambanks, sometimes weedy on rocky roadcuts; common (in the Mountains present only along the larger rivers, except in the Ridge and Valley of VA, uncommon in the Coastal Plain except along brownwater rivers). April-May; September-November. Var. *occidentalis* ranges from s. ME west to s. Ontario, MI, and MN, south to w. FL and TX; var. *palmeri* (Kuntze) Nixon & Poole ex Geerinck occurs from central TX south into Coahuila. One of the largest trees in e. North America, and probably the largest that is widespread in the Piedmont of our area. [= Z; < *P. occidentalis* – RAB, C, FNA, G, GW, K, S, W; > *P. occidentalis* var. *occidentalis* – F; > *P. occidentalis* var. *glabrata* (Fernald) Sargent – F]

PLUMBAGINACEAE A.L. de Jussieu 1789 (Leadwort Family)

A family of about 24-27 genera and 650-775 species, shrubs, vines, and herbs, of cosmopolitan distribution. Lledó et al. (1998) and other authors suggest that the portion of the Plumbaginaceae often recognized as tribe Staticeae or subfamily Staticoideae (which includes *Limonium*) would be better treated as a distinct family. References: Morin in FNA (2005); Lledó et al. (1998); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Limonium P. Miller 1754 (Sea-lavender)

A genus of about 350 species, dwarf shrubs, perennial, and annual herbs, of cosmopolitan distribution. References: Luteyn (1976)=Z; Smith in FNA (2005); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Limonium carolinianum (Walter) Britton, Carolina Sea-lavender. Cp (GA, NC, SC, VA): tidal marshes, especially in hypersaline flats; common. August-October. Along the coast from Labrador south to FL, west to TX and ne. Mexico. Various treatments recognize from 1 to 4 taxa in our area. The most recent monographer, Luteyn (1976), recognizes only a polymorphic *L. carolinianum* – a treatment followed by most flora authors since. Godfrey & Wooten (1981) follow Luteyn's treatment, but state "we are not at all confident that Luteyn's treatment is a reasonable one." [= C, FNA, GW, K, Z; > *L. carolinianum* var. *carolinianum* – RAB, G; > *L. carolinianum* var. *obtusilobum* (Blake) Ahles – RAB; > *L. nashii* Small var. *nashii* – RAB, G; > *L. nashii* Small var. *angustatum* (A. Gray) Ahles – RAB; > *L. carolinianum* – F, S; > *L. nashii* Small – F, S; > *L. carolinianum* var. *angustatum* (A. Gray) Blake – G; > *L. angustatum* (A. Gray) Small – S; > *L. obtusilobum* Blake – S]

PODOSTEMACEAE Richard ex C. Agardh 1822 (Riverweed Family)

A family of about 47-49 genera and 280 species, aquatic herbs, of tropical, subtropical, and rarely temperate regions of the New World and Old World. References: Graham & Wood (1975); Cook & Rutishauser in Kubitzki, Bayer, & Stevens (2007).

Podostemum Michaux 1803 (Riverweed)

A genus of about 7-17 species, reduced aquatic herbs, of tropical to temperate America. References: Graham & Wood (1975)=Z; Philbrick & Crow (1983); Cook & Rutishauser in Kubitzki, Bayer, & Stevens (2007).

Identification notes: *Podostemum* is a curious plant, seeming more like an alga than a vascular plant in color, texture, mode of attachment to substrate (by a fleshy disk), and irregular thalloid branching.

Podostemum ceratophyllum Michaux, Threadfoot, Riverweed. Mt, Pd, Cp (GA, NC, SC, VA): attached to rocks and dams in rapidly or slowly flowing water; common (rare in Coastal Plain). May-July. Nova Scotia, ME, and Québec south to sw. GA, s. AL, s. MS, se. LA (Florida parishes), AR, and w. TN; disjunct in the Ozark-Ouachita Highlands of w. AR and se. OK; Dominican Republic; Honduras. [= RAB, C, F, G, K, W, Z; = *Podostemon ceratophyllum* - GW, orthographic variant; > *Podostemon ceratophyllum* – S, orthographic variant; > *Podostemon abrotanoides* Nuttall – S]

POLEMONIACEAE A.L. de Jussieu 1789 (Jacob's-ladder Family)

A family of 18 genera and 350-380 species, herbs, vines, and shrubs (rarely trees), mainly of temperate North America, but extending into tropical America and also in Eurasia. References: Wilson (1960a); Grant (1997); Grant (1998); Prather, Ferguson, & Jansen (2000); Wilken in Kubitzki (2004).

1 Leaves simple; [tribe *Polemoniae*] ..... ***Phlox***
1 Leaves compound.
  2 Leaf segments linear, ca. 1 mm wide; corolla red or yellow; [tribe *Gilieae*] ..... ***Ipomopsis***
  2 Leaf segments ovate or elliptic, 5-16 mm wide; corolla blue; [tribe *Polemoniae*] ..... ***Polemonium***

Ipomopsis Michaux 1803 (Standing-cypress)

A genus of about 30 species, herbs, mainly of w. North America (1 species in se. North America, 1 in w. South America); an example of the affinities of the Sandhill flora to that of the dry sw. United States. References: Grant (1956)=Z; Wilken in Kubitzki (2004).

Ipomopsis rubra (Linnaeus) Wherry, Standing-cypress. Cp (FL, GA, NC, SC), Pd (GA*?, NC*), Mt* (NC*): sandhills, sand rims of Carolina bays, dunes, roadbanks, disturbed areas; uncommon (rare in GA, NC, and SC). June-August; August-September. Sc. NC south to c. peninsular FL, west to TX and OK, spread from cultivation in other areas to the north (including sites in the Piedmont and Mountains of GA and NC). [= RAB, K, W, WH, Z; = *Gilia rubra* (Linnaeus) A.A. Heller – C, F, G, S]

Phlox Linnaeus 1753 (Phlox)

A genus of about 70 species, herbs (to subshrubs), of temperate North America (with 1 species in ne. Asia). This treatment is probably no closer to the truth than the diversity of previous ones; some will even consider it a regression, in its (provisional) acceptance of many of Wherry's infraspecific taxa. He studied the genus more carefully than anyone since, and it seems premature to reduce to synonymy without further critical study many of the entities which he recognized. As Wherry (1955) wrote "when it becomes realized how difficult from one another some of them are, the writer will no doubt be classed as a 'splitter;' then workers who revel in drawing up tables of 'synonymy' are going to have a field day. It is deemed of importance, however, to record the presence in nature of all material which may be of value in future studies by cytogenetic, serologic, or other specialized techniques. When multiple taxa get relegated to 'synonymy' under a few comprehensive ones, their very existence is likely to be overlooked." References: Wherry (1955)=Z; Ferguson, Krämer, & Jansen (1999); Wilken in Kubitzki (2004). Key based on C and Z.

1 Stems woody or suffrutescent, trailing or decumbent; leaves to 25 mm long, to 3 (-5) mm wide, generally with short-shoots or fascicles of leaves in the axils of leaves of the sterile shoots.
  2 United portion of the style 1.5-4 mm long, the cleft portion 0.5-2 mm long.
    3 Fertile shoots (10-) 15-30 cm tall; upper leaves oblong-lanceolate, up to 12-25 mm long, 1.5-3 mm wide on sterile shoots, 2.5-5 mm wide on fertile shoots; pubescence of the inflorescence mostly with conspicuously glandular tips ..... ***Ph. nivalis** var. **hentzii***
    3 Fertile shoots (3-) 8-12 (-15) cm tall; upper leaves linear-lanceolate, up to 8-12 mm long, 0.5-1.5 mm wide on sterile shoots, 1.5-3 mm wide on fertile shoots; pubescence of the inflorescence mostly with finely glandular tips ..... ***Ph. nivalis** var. **nivalis***
  2 United portion of the style 5-12 mm long, the cleft portion ca. 1 mm long.
    4 Inflorescence glandless (rarely glandular); corolla tube ca. 10.5 mm long; petal notch generally ca. 1.0 mm deep (range 0-3.0 mm); [of high elevations] ..... ***Ph. subulata** var. **subulata***
    4 Inflorescence glandular (rarely glandless); corolla tube ca. 10.5-12 mm long; petal notch generally ca. 1.5 mm deep (range 0.5-3.0 mm); [of low to high elevations].
      5 Corolla tube ca. 12 mm long; petal blades ca. 8.5 mm long, ca. 6 mm wide; flowers mostly purple (to pale lavender); [mostly of moderate to high elevation calcareous or mafic rocks] ..... ***Ph. subulata** var. **australis***
      5 Corolla tube ca. 10.5 mm long; petal blades ca. 7.5 mm long, ca. 5 mm wide; flowers mostly pale lavender; [mostly of low elevation acidic gneisses and shales] ..... ***Ph. subulata** var. **brittonii***
1 Stems herbaceous, erect or decumbent; leaves (at least the larger) > 25 mm long and/or > 5 mm wide, generally lacking axillary of leaves.
  6 Style short, 1-4 mm long, the united portion 1-1.5 (-2)× as long as the cleft portion; stamens shorter than the corolla tube (thus included).
    7 Upper leaves alternate; annual; corolla red, white, or variegated; [alien, mostly naturalized in dry sandy soils of roadsides, fields, and disturbed areas] ..... ***Ph. drummondii***
    7 Upper leaves opposite or subopposite; perennial; corolla blue, lavender, or pink; [native, mostly of forests, woodlands, or roadbanks].
      8 Sterile shoots rooting at the nodes; leaves broad-elliptic, ca. 2-3× as long as wide; sepals acuminate to very slightly awned, the awn 0-0.5 mm long; corolla tube glabrous.
        9 Petal blade notched, the sinus usually 0.5-3 mm deep ..... ***Ph. divaricata** var. **divaricata***
        9 Petal blade entire ..... ***Ph. divaricata** var. **laphamii***
      8 Sterile shoots not rooting at the nodes; leaves lanceolate to linear, ca. 4-10× as long as wide; sepals awned, the awn 0.5-3.0 mm long; corolla glabrous, pilose, or glandular-pubescent.
        10 Cymes open, the lowest branches elongate, > 1 cm long; corolla usually glandular-pubescent or pilose (rarely glabrous); pedicels 1-8 (-12) mm long ..... ***Ph. pilosa** ssp. **pilosa***
        10 Cymes compact, the lowest branches short, < 0.5 cm long; corolla glabrous; pedicels 1-6 mm long.
          11 Leaves and bracts oblong-elliptic to lanceolate, acute to obtuse (rarely acuminate), the larger 20-40 (-50) mm long, 4-8 (-12) mm wide, ca. 5× as long as wide; bracts below the inflorescence hiding the calyces ..... ***Ph. amoena***
          11 Leaves and bracts linear to lanceolate, acuminate, the larger 35-45 mm long, 3-5 mm wide, ca. 10× as long as wide; bracts below the inflorescence not hiding the calyces ..... ***Ph. lighthipei***
  6 Style long, (12-) 14-26 mm long, the united portion 3-30× as long as the cleft portion; stamens equalling or exceeding the corolla tube (thus in part exserted).
    12 Plants forming colonies by rhizomes, stolons, and/or prostrate sterile shoots with evergreen to semi-evergreen leaves; flowering shoots 1-4 (-5) dm tall.
      13 Plants with rhizomes and stolons tipped with clustered, evergreen, linear to lanceolate leaves 3-12 cm long, 5-10 (-12) mm wide ..... ***Ph. buckleyi***
      13 Plants with prostrate sterile shoots with scattered, semi-evergreen, spatulate to obovate leaves 1.5-4.5 cm long, 5-16 mm wide ..... ***Ph. stolonifera***
    12 Plants not colony-forming by rhizomes or stolons; flowering shoots (3-) 5-20 dm tall.
      14 Leaf margin ciliate-serrulate; lateral veins of the leaves readily apparent, these joining to form a connecting vein parallel to the leaf margin.
        15 Bracts of the inflorescence pubescent with glandular hairs; corolla tube glabrous; leaves opposite; nodes usually 8-15; leaves usually 2-3× as long as wide ..... ***Ph. amplifolia***
        15 Bracts of the inflorescence pubescent with non-glandular hairs; corolla tube pubescent (rarely glabrous); leaves subopposite (at least near the inflorescence); nodes usually 15-40; leaves usually 3-4× as long as wide ..... ***Ph. paniculata***
      14 Leaf margin smooth or slightly rough; lateral veins of the leaves not readily apparent, not forming a connecting vein parallel to the leaf margin.
        16 Flowering shoots arising from decumbent stems; nodes below the inflorescence 3-5 ..... ***Ph. latifolia***
        16 Flowering shoots arising from rhizomes; nodes below the inflorescence 7 or more.
          17 Cymes several, the lower on rather short and uniform peduncles, thus the inflorescence as a whole subcylindric in outline.
            18 Nodes 7-15, well-spaced; upper leaves oblong to ovate, cordate at the base; flowering early summer ..... ***Ph. maculata** var. **maculata***
            18 Nodes 16-35, crowded; upper leaves lanceolate to ovate-oblong; truncate to subcordate at the base; flowering late summer ..... ***Ph. maculata** var. **pyramidalis***

17 Cymes solitary or several, if several then the lower on long peduncles, thus the inflorescence as a whole broadly rounded or even flat-topped.
  19 Calyx subcampanulate, the sepals narrow with a well-developed midrib, the junction-membranes firm, broad and flat (to slightly plicate-keeled).
    20 Main leaves ca. 12× as long as wide; sepals 7-9 mm long; ultimate cymules 5-7-flowered ..... ***Ph. glaberrima** var. **glaberrima***
    20 Main leaves ca. 6× as long as wide; sepals 8-12 mm long; ultimate cymules 3-flowered..... ***Ph. glaberrima** var. **triflora***
  19 Calyx subcylindric, the sepals fairly broad, with a rather weak midrib, the junction-membranes thin, narrow, becoming markedly plicate-keeled.
    21 Largest leaves low on the stem, the leaves markedly reduced upward in size and also widely spaced..... ***Ph. carolina** ssp. **angusta***
    21 Largest leaves well above the midpoint of the stem, the leaves neither markedly reduced upward in size nor markedly more widely spaced.
      22 Plant (5-) 7.5-20 tall, with (12-) 15-25 nodes below the inflorescence ..... ***Ph. carolina** ssp. **alta***
      22 Plant 4-10 dm tall, with 6-12 (-15) nodes below the inflorescence ..... ***Ph. carolina** ssp. **carolina***

Phlox amoena Sims, Hairy Phlox, Chalice Phlox. Mt, Pd (GA, NC, SC), Cp (GA, SC): dry woodlands and forests, roadbanks, sandhills; common. April-June; June-July. W. NC west to s. KY, south to n. FL and MS. [= C, F, G, S, W; = *Ph. amoena* ssp. *amoena* – K, Z; < *Ph. amoena* – RAB, in part only (also see *Ph. lighthipei*)]

Phlox amplifolia Britton, Broadleaf Phlox. Mt (GA, NC, VA): moist forests, particularly over mafic rocks; rare (GA Special Concern, NC Watch List, VA Rare). July-August. W. VA west to s. IN and se. MO, south to w. NC, AL, and n. AR. [= RAB, C, F, G, K, S, W, Z]

Phlox buckleyi Wherry, Swordleaf Phlox, Shale-barren Phlox. Mt (VA): shale woodlands and woodland edges, shaley roadbanks; rare (VA Rare). May-June. Endemic to w. VA and e. WV. [= C, F, G, K, W, Z]

Phlox carolina Linnaeus *ssp.* ***alta*** Wherry, Giant Phlox. Mt (GA, NC, SC), Pd (GA, NC): forests, woodlands, woodland borders; common? May-July. C. NC and se. TN south to c. GA. [= K, Z; < *Ph. carolina* – RAB, G, S, W]

Phlox carolina Linnaeus *ssp.* ***angusta*** Wherry, Narrowleaf Phlox. Cp (SC), Pd, Mt (NC, SC) {GA}: woodlands and woodland borders: uncommon? May-October. Sw. NC and e. SC south to panhandle FL, west to e. TX, north in the interior to w. TN, s. IL and s. MO. [= K, Z; < *Ph. carolina* – RAB, G, S, W]

Phlox carolina Linnaeus *ssp.* ***carolina***, Thick-leaf Phlox. Mt, Pd, Cp (NC, SC, VA) {GA}: woodlands, woodland borders, barrens, and forests; common. May-July. W. NC and s. MO south to panhandle FL and s. MS. [= K, Z; < *Ph. carolina* – RAB, G, S, W]

Phlox divaricata Linnaeus *var.* ***divaricata***, Eastern Blue Phlox, Timber Phlox. Mt (GA, NC, VA), Pd, Cp (GA, VA): moist deciduous forests in circumneutral soils; uncommon (rare in VA Coastal Plain). April-May. VT and Québec west to MI, south to NC, GA, and TN. [= C, F, G; = *Ph. divaricata* ssp. *divaricata* – K, Z; < *Ph. divaricata* – RAB, S, W]

Phlox divaricata Linnaeus *var.* ***laphamii*** A.W. Wood, Western Blue Phlox. Cp (GA, NC, VA?), Pd, Mt (GA): moist deciduous forests in circumneutral soils; rare. April. WI west to MN, south to GA and TX, and apparently with scattered populations eastward, as along the Roanoke River in NC. [= C, F, G; = *Ph. divaricata* ssp. *laphamii* (A.W. Wood) Wherry – K, Z; < *Ph. divaricata* – RAB, S, W]

* ***Phlox drummondii*** Hooker, Annual Phlox, Drummond Phlox. Cp (GA, NC, SC, VA), Pd (NC): dry sandy soils of roadsides, fields, disturbed areas; common, native of TX. April-July. Wherry recognized 3 subspecies in *Ph. drummondii*, all endemic to TX; it does not seem meaningful to try to distinguish infraspecific taxa in our area, since our plants are the progeny of various cultivars derived from hybrids and selections of the wild taxa. [= RAB, F, G, S; > *Ph. drummondii* spp. *drummondii* – K, Z]

Phlox glaberrima Linnaeus *var.* ***glaberrima***, Piedmont Smooth Phlox. Pd (NC, SC, VA), Mt (NC, Cp (SC): wet forests and woodlands, especially bottomlands; uncommon. April-June; June-July. Sc. VA south to c. SC and w. NC, apparently endemic to our area. [= *Ph. glaberrima* ssp. *glaberrima* – RAB, K, Z; < *Ph. glaberrima* – C, F, G, S, W]

Phlox glaberrima Linnaeus *var.* ***triflora*** (Michaux) Reveal & Broome, Appalachian Smooth Phlox. Mt (GA, NC, SC, VA), Pd (GA, NC, SC), Cp? (GA?): wet woodlands and forests, especially bottomlands; uncommon. April-June; June-July. MD west to s. OH and s. IN, south to c, NC, c. GA, and n. AL. [= *Ph. glaberrima* ssp. *triflora* (Michaux) Wherry – RAB, K, Z; < *Ph. glaberrima* – C, F, G, S, W]

Phlox latifolia Michaux, Mountain Phlox, Appalachian Phlox. Mt, Pd (NC, SC, VA): moist forests, woodlands, woodland borders, and barrens; uncommon. May-June; July. PA to NC and ne. TN in the Appalachians; disjunct in OH and IN. [= K; ? *Ph. ovata* Linnaeus – RAB, C, F, G, S, W, Z, misapplied]

Phlox lighthipei Small, Lighthipe's Phlox. Cp (GA, SC): dry to moist sandy soils; rare? April-May; June-July. S. SC south to n. FL. [= S; = *Ph. amoena* ssp. *lighthipei* (Small) Wherry – K, Z; < *Ph. amoena* – RAB]

Phlox maculata Linnaeus *var.* ***maculata***, Northern Meadow Phlox. Mt, Pd (NC, SC, VA), {GA}: moist forests and openings; uncommon? June-July. S. Québec west to MN, south to c. NC, KY, and IA. [= F, G; = *Ph. maculata* ssp. *maculata* – K, Z; < *Ph. maculata* – S]

Phlox maculata Linnaeus *var.* ***pyramidalis*** (J.E. Smith) Wherry. Leafy Meadow Phlox. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (VA): moist forests and openings; uncommon. July-September. PA, OH, s. IN, and se. MO, south to NC, n. GA, and TN. [= *Ph. maculata* ssp. *pyramidalis* (J.E. Smith) Wherry – RAB, K, Z; =? *Ph. maculata* var. *purpurea* Fernald – F; < *Ph. maculata* – S]

Phlox nivalis Loddiges ex Sweet *var.* ***hentzii*** (Nuttall) Wherry, Trailing Phlox. Pd, Cp (GA, NC, SC, VA): rock outcrops, thin soils of rocky woodlands, roadbanks; common, rare in VA (VA Rare). March-May. Sc. VA west to n. AL, south to c. peninsular FL and s. AL. [= RAB; < *Ph. nivalis* – C, F, S, W; < *Ph. hentzii* – G (also see var. *nivalis*); = *Ph. nivalis* ssp. *hentzii* (Nuttall) Wherry – K, Z]

Phlox nivalis Loddiges ex Sweet *var.* ***nivalis***, Pineland Phlox. Cp, Pd (GA, NC, SC), Mt (NC): sandhills, other dry woodlands, roadbanks; common. March-May. Nc. NC south to panhandle FL. A third taxon, *Ph. nivalis* ssp. *texensis* Lundell is endemic in e. TX. [= RAB; < *Ph. nivalis* – C, F, S, W (also see var. *hentzii*); < *Ph. hentzii* – G; = *Ph. nivalis* ssp. *nivalis* – K, Z]

Phlox paniculata Linnaeus, Garden Phlox. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (NC, VA): streambanks, moist forests, woodlands, and woodland borders; common (rare in Coastal Plain and Piedmont south of VA). July-August; September. S. NY west to IL and MO, south to e. NC, w. SC, n. GA, n. MS, and AR. [= RAB, C, F, G, K, S, W, Z]

Phlox pilosa Linnaeus *ssp.* ***pilosa***, Downy Phlox. Cp (NC, SC, VA), Pd (NC, VA), Mt (VA): dry to mesic woodlands and forests, roadbanks; uncommon, rare in VA (VA Rare). April-May; May-June. Ssp. *pilosa* ranges from CT west to WI, IA, and KS, south to c. peninsular FL and TX. Several other subspecies are more southern or western. [= K, Z; = *Ph. pilosa* var. *pilosa* – C, F, G; < *Ph. pilosa* – RAB, S, W]

Phlox stolonifera Sims, Creeping Phlox. Mt, Pd (GA, NC, SC, VA): moist forests; uncommon, rare in Piedmont. April-May; May-June. PA and s. OH south to w. NC, n. GA, and e. TN, essentially a Southern and Central Appalachian endemic. This species is sometimes locally abundant, as in parts of Great Smoky Mountains National Park. [= RAB, C, F, G, K, S, W, Z]

Phlox subulata Linnaeus *var.* ***australis*** Wherry, Southern Moss Phlox, Southern Mountain-pink. Mt (NC, VA), Pd (VA): dry and exposed rock outcrops, rocky flood-scoured riversides; uncommon, rare south of VA (NC Rare). April-May. W. VA and e. WV south to w. NC and e. TN; also in OH, w. WV, and n. KY. The varieties of *Ph. subulata* seem morphologically confluent; they need more study. [< *Ph. subulata* var. *australis* – G (also see var. *brittonii*); < *Ph. subulata* – RAB, W; < *Ph. subulata* var. *setacea* (Linnaeus) Brand – C; < *Ph. subulata* var. *brittonii* – F; = *Ph. subulata* ssp. *australis* (Wherry) Wherry – K, Z; = *Ph. subulata* – S]

Phlox subulata Linnaeus *var.* ***brittonii*** (Small) Wherry, Alleghany Moss Phlox, Alleghany Mountain-pink. Mt (VA): dry woodlands and rock outcrops, over a wide variety of rocks, including in and around shale barrens; uncommon? April-May. Sc. PA south through w. MD to w. VA and e. WV. [< *Ph. subulata* var. *setacea* – C; < *Ph. subulata* var. *brittonii* – F (also see *Ph. subulata* var. *australis*); < *Ph. subulata* var. *australis* – G; = *Ph. subulata* ssp. *brittonii* (Small) Wherry – K, Z; = *Ph. brittonii* Small – S]

Phlox subulata Linnaeus *var.* ***subulata***, Northern Moss Phlox. Mt (NC): rock outcrops of circumneutral rocks; rare (NC Rare). May. NY west to MI, south to MD and WV, and rarely to w. NC. [= F; < *Ph. subulata* var. *subulata* – C (also see var. *brittonii*); = *Ph. subulata* var. *ciliata* Wherry – G; = *Ph. subulata* ssp. *subulata* – K, Z]

Phlox bifida Beck var. *bifida*. In TN and KY according to Kartesz (1999) but not according to Wherry {investigate}. [= *Phlox bifida* Beck ssp. *bifida* – K, Z] {not yet keyed; synonymy incomplete}

Phlox bifida Beck var. *stellaria* (A. Gray) Wherry. In c. TN (Chester, Wofford, & Kral 1997). [= *Phlox bifida* Beck ssp. *stellaria* (A. Gray) Wherry – K, Z] {not yet keyed; synonymy incomplete}

Phlox carolina Linnaeus *ssp.* ***turritella*** Wherry. In SC (Kartesz 1999) {?} and GA and southwestward to FL, AL, MS, and e. LA. [= K, Z] {not yet keyed}

Phlox floridana Bentham. Cp (GA): sandhills; common? Sw. GA and se. AL south to FL Panhandle and w. peninsula. [= K, S, Z]

Phlox glaberrima Linnaeus var. *interior* Wherry. East to KY, TN, AL, and perhaps GA (Kartesz 1999). {investigate} [= *Phlox glaberrima* Linnaeus ssp. *interior* (Wherry) Wherry – K, Z; < *Ph. glaberrima* – C, F, G, S] {not yet keyed}

Phlox pilosa Linnaeus ssp. *deamii* Levin. Endemic to IN, KY, and TN. [= K; < *Ph. pilosa* ssp. *pulcherrima* – Z] {not yet keyed; add to synonymy}

Phlox pilosa Linnaeus *ssp.* ***detonsa*** (A. Gray) Wherry. Cp, Pd (GA): Nw. GA south to c. peninsular FL, west on the Coastal Plain to e. TX. [= K, Z] {not yet keyed; add to synonymy}

Phlox pilosa Linnaeus ssp. *ozarkana* (Wherry) Wherry. East to TN (Kartesz 1999), or to GA (Wherry). {investigate} [= K, Z] {not yet keyed; add to synonymy}

Phlox pulchra Wherry, Alabama Phlox. Endemic to c. AL. [= K, Z]

Polemonium Linnaeus 1753 (Jacob's-ladder)

A genus of about 25 species, of temperate regions of North America and Eurasia. References: Davidson (1950); Wilken in Kubitzki (2004).

1 Stamens exserted 5-7 mm from the corolla; flowers in a compact panicle, the pedicels usually shorter than the calyx; flowering in July ..... ***[P. vanbruntiae]***

1 Stamens included in the corolla; flowers in a diffuse, corymbiform panicle, the pedicels usually longer than the calyx; flowering in April-May.

2 Inflorescence minutely puberulent; corolla 12-16 mm long ..... ***P. reptans*** *var.* ***reptans***

2 Inflorescence densely glandular-villous; corolla 8-12 (-13) mm long ..... ***[P. reptans*** *var.* ***villosum]***

Polemonium reptans Linnaeus *var.* ***reptans***, Spreading Jacob's-ladder. Mt (GA, NC, VA), Pd (NC, VA), Cp (VA): moist, nutrient-rich forests, such as bottomlands and rich slopes; uncommon, rare south of VA (NC Watch List). April-May; June. NY west to MN, south to VA, nc. NC, nw. GA, AL, and e. OK. [= C, K; < *P. reptans* – RAB, F, G, S, W]

Polemonium reptans Linnaeus var. *villosum* E.L. Braun occurs in the Appalachian Plateau and vicinity, in s. OH and e. KY. [= C, K; < *P. reptans* – F, G]

Polemonium vanbruntiae Britton occurs in calcareous fens and swamps from ME, VT, and n. NY south to se. PA, sw. PA, and e. WV. [= K; = *P. van-bruntiae* – C, F, G, orthographic variant]

POLYGALACEAE R. Brown 1814 (Milkwort Family)

A family of 17-21 genera and 800-1000 species, trees, shrubs, woody vines, and herbs, nearly cosmopolitan, but most diverse in tropical and subtropical areas. References: Miller (1971b); Eriksen & Persson in Kubitzki, Bayer, & Stevens (2007).

Polygala Linnaeus (Milkwort)

A genus of 300-400 species, trees, shrubs, and herbs, nearly cosmopolitan in distribution. The circumscription of the genus and its monophyly are uncertain. References: Smith & Ward (1976)=Z; Eriksen & Persson in Kubitzki, Bayer, & Stevens (2007).

Identification notes: *Polygala* has a distinctive flower structure which can be confusing. The corolla consists of **3 fused petals**, partly fused into a tubular form, and also fused with the stamens. The lower petal is called the **keel**; it is usually boatlike, and also lacerate, fringed, or lobed at its tip. The calyx is 5-lobed, the lobes usually of 3 distinct sizes. The two lateral sepals are called **wings**; they are generally large and petaloid (colored like petals). The upper sepal is usually the next largest; the two lower sepals are usually the smallest.

1 Fresh flowers orange, yellow, greenish-yellow, or greenish white (if greenish white, then the inflorescence a terminal many-brached cyme); [subgenus *Polygala*, series *Decurrentes*].
  2 Inflorescence a dense pom-pom-like raceme, terminating leafy branches.
    3 Lobes of lower petal (keel) < 0.7 mm long; fresh flowers bright orange or bright lemon-yellow; bracts of the inflorescence 1-3.5 mm long; plants to 40 cm tall ..... ***P. lutea***
    3 Lobes of lower petal (keel) > 1.5 mm long; fresh flowers lemon-yellow to greenish yellow; bracts of the inflorescence 4.5-6.5 mm long; plants to 15 cm tall ..... ***P. nana***
  2 Inflorescence a terminal, many-branched cyme, the many individual branches loosely to densely flowered.
    4 Fresh flowers cream-white to greenish-white; [of GA southward] ..... ***P. balduinii var. balduinii***
    4 Fresh flowers bright yellow; [collectively widespread in the Coastal Plain of our area].
      5 Plants 4.5-12 dm tall, the stem solitary; basal leaves 3.5-14 cm long, linear-lanceolate, about 15-20× as long as wide, persistent as a basal rosette; stem leaves linear-subulate, sharp-tipped, much reduced from the basal leaves, becoming bractlike upward; seeds glabrous, 0.7-0.9 mm long ..... ***P. cymosa***
      5 Plants 1-4 dm tall, the stems 1-several from the base; basal leaves 3-7 cm long, spatulate, about 10× as long as wide, usually not persistent after flowering; stem leaves narrowly spatulate to linear, blunt-tipped, only slightly reduced from the basal leaves; seeds pubescent, 0.5-0.7 mm long ..... ***P. ramosa***
1 Fresh flowers pink, purple, white, or green (if green or white, then the inflorescence a simple raceme, not a many-branched cyme).
  6 Leaves few, clustered near the tip of the stem; wings 13-20 mm long; stamens 6; [of moist soils of forests in the Mountains]; [subgenus *Chamaebuxus*] ..... ***P. paucifolia***
  6 Leaves many, evenly distributed along the stem, or not at least stronglt clustered near the tip; wings < 10 mm long; stamens 8; [collectively of a wide variety of habitats, but generally not as above, either in more open, drier, or non-montane habitats].
    7 Leaves whorled, at least at the principal lower nodes; annual, from a slender taproot; [subgenus *Polygala*].
      8 Racemes 3-6 mm in diameter, pointed in outline.
        9 Racemes 2-5 cm long, becoming interrupted below through persistence of the fruits on the axis; wings equalling the fruit ..... ***P. ambigua***
        9 Racemes 0.5-1.5 cm long, the fruits falling promptly, thus the inflorescence compact and truncate below; wings shorter than the fruit.
          10 Seeds finely pubescent; pedicels ¼-⅓ as long as the fruit; raceme peduncles 0.5-4 cm long ..... ***P. verticillata var. isocycla***
          10 Seeds hirsute; pedicels ⅓-½ as long as the fruit; raceme peduncles 2-7 cm long ..... ***P. verticillata var. verticillata***
      8 Racemes 8-15 mm in diameter, rounded in outline (somewhat rounded in *P. hookeri*).
        11 Racemes loosely flowered, with ca. 10 flowers per cm of length; raceme 7-12 mm in diameter, the tip pointed in outline (obconical apically); full raceme (including the portion with dropped fruits) to 6 cm long ..... ***P. hookeri***
        11 Racemes densely flowered, with ca. 20 flowers per cm of length; raceme 7–20 mm in diameter, the tip rounded to truncate in outline; full raceme (including the portion with dropped fruits) to 4.5 cm long.
          12 Bracts of the inflorescence ca. 1 mm long; wings 1.5-2.5 mm wide, acute or short-mucronate at the tip; raceme peduncle (0.8-) 3-5 cm long ..... ***P. brevifolia***
          12 Bracts of the inflorescence 1.5-3 mm long; wings 3-4 mm wide, acuminate, the tips cuspidate; raceme peduncle 0-0.8 (-4.0) cm long.
            13 Larger leaves (2-) 3-7 mm wide; raceme peduncles 0-0.5 cm long; racemes 7-15 mm in diameter ..... ***P. cruciata var. aquilonia***
            13 Larger leaves 1.5-3 (-4) mm wide; raceme peduncles 0-4 cm long; racemes 12-20 mm in diameter ..... ***P. cruciata var. cruciata***
    7 Leaves all alternate; **either** annual, from a slender taproot, the stems solitary, **or** biennial to perennial, from a taproot, the stems solitary to several, **or** perennial, from a thick rhizome, the stems several.
      14 Leaves glaucous, somewhat succulent, linear; corolla 7-10 mm long, > 2× as long as the wings; [subgenus *Polygala*] ..... ***P. incarnata***
      14 Leaves green, herbaceous, usually broader than linear; corolla < 5 mm long, roughly equal to or shorter than the wings.
        15 Annual, the stems solitary; [subgenus *Polygala*].
          16 Corolla about 0.5× as long as the wings ..... ***P. sanguinea***
          16 Corolla about 1× as long as the wings.
            17 Inflorescence bracts dropping from the axis promptly following flowering ..... ***P. mariana***
            17 Inflorescence bracts persistent.
              18 Wings 3-5 mm long; pedicels 1.5-2.5 mm long; racemes 8-13 mm in diameter ..... ***P. curtissii***
              18 Wings 2-2.5 mm long; pedicels 0.5-1.5 mm long; racemes 5-6 mm in diameter ..... ***P. nuttallii***
        15 Perennial or biennial, usually several stems arising together from a rhizome or taproot.
          19 Wings white, 2-3 mm long; flowers sessile or subsessile; plants from a thick crown; [subgenus *Polygala*].
            20 Larger leaves mostly 15-35 mm wide; capsules 3.5-4.2 mm long; seeds 3.0-3.5 mm long ..... ***P. senega var. latifolia***

20 Larger leaves mostly 2-15 mm wide; capsules 2.5-3.5 mm long ..... ***P. senega var. senega***
19 Wings pink, 4-7 mm long; flowers pedicelled; plants from a taproot.
21 Corolla keel entire at the tip; wings 5-7 mm long, reniform-orbicular; plants lacking cleistogamous flowers; [subgenus *Hebeclada*] ..... ***P. grandiflora var. grandiflora***
21 Corolla keel fringed at the tip; wings 4-6 mm long, elliptic; plants producing cleistogamous flowers in loose subterranean or surficial racemes; [subgenus *Polygala*].
22 Flowers mostly 1-4 mm apart; racemes elongating to 2-12 cm long; pedicels 0.5-2.0 mm long; [more northern in distribution] ..... ***P. polygama var. obtusata***
22 Flowers mostly 4-6 mm apart; racemes elongating to 8-15 cm long; pedicels 1.5-3.5 mm long; [more southern in distribution] ..... ***P. polygama var. polygama***

Polygala ambigua Nuttall, Loose Milkwort. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): fields, woodlands, openings; uncommon. June-September. ME west to MI, south to GA, AL, and OK. Through most of its range *P. ambigua* has wings 1.3-1.7 mm long; plants from se. VA south to SC and from the Ozarks have wings 2.0-2.6 mm long. These plants have been named as a variety of *P. verticillata*, var. *dolichoptera* Fernald. They may warrant taxonomic recognition, but need additional study, including resolution of our Coastal Plain plants and those of the Ozarks. [= C, G, K, S; = *P. verticillata* Linnaeus var. *ambigua* (Nuttall) Wood – RAB; > *P. verticillata* var. *ambigua* – F; > *P. verticillata* var. *dolichoptera* Fernald – F; < *P. verticillata* – W]

Polygala balduinii Nuttall *var.* ***balduinii***, White Milkwort, Baldwin's Milkwort. Cp (GA): wet pine savannas; rare (GA Special Concern). E. GA south to s. FL, west to s. MS; e. TX; Cuba. Var. *carteri* (Small) R.R. Smith & D.B. Ward occurs in s. FL. [= GW, Z; < *Polygala balduinii* – K; = *Pilostaxis baldwinii* (Nuttall) Small – S, orthographic variant; = *Pylostachya balduinii* (Nuttall) Small]

Polygala brevifolia Nuttall, Shortleaf Milkwort, Little-leaf Milkwort. Cp (GA, NC, SC, VA): pine savannas, pocosin margins; rare (VA Rare). June-October. NJ south to FL, west to s. MS. [= RAB, C, F, G, GW, K, S]

Polygala cruciata Linnaeus *var.* ***aquilonia*** Fernald & Schubert, Northern Drumheads. Cp?, Mt (NC, SC, VA): damp or wet soil in openings; uncommon. June-October. ME west to MN, south to e. VA, w. NC, n. AL, and TN. [= F, K; < *P. cruciata* – RAB, C, G, GW, S, W]

Polygala cruciata Linnaeus *var.* ***cruciata***, Southern Drumheads. Cp (GA, NC, SC, VA): pine savannas, bogs, pocosins; common. June-October. Se. VA south to FL, west to TX, inland north to KY. [= F, K; < *P. cruciata* – RAB, C, G, GW, W; > *P. ramosior* (Nash) Small – S]

Polygala curtissii A. Gray, Appalachian Milkwort. Mt, Pd, Cp (GA, NC, SC, VA): old fields, thickets, openings; common. June-October. DE and se. PA (Rhoads & Klein 1993) west to OH, south to SC, GA, and MS. [= RAB, C, F, G, K, S, W]

Polygala cymosa Walter, Tall Pinebarren Milkwort. Cp (GA, NC, SC): pond-cypress savannas, Coastal Plain depression ponds, clay-based Carolina bays, other sites with seasonally flooded hydrology; common. May-July. E. NC south to s. peninsular FL, west to s. MS; disjunct in s. DE. [= RAB, C, F, G, GW, K, Z; = *Pilostaxis cymosa* (Walter) Small – S; = *Pylostachya cymosa* (Walter) Small]

Polygala grandiflora Walter *var.* ***grandiflora***, Showy Milkwort. Cp (GA, NC, SC): sandhills, dry sandy soils of roadsides and fields; uncommon (NC Rare). May-July. S. NC south to FL, west to s. MS. [= K; < *P. grandiflora* – RAB; *Asemeia grandiflora* (Walter) Small – S]

Polygala hookeri Torrey & A. Gray, Hooker's Milkwort. Cp (NC, SC): pine savannas; rare (NC Rare). June-August. Sw. GA and adjacent panhandle FL, west to s. MS; disjunct in se. NC and ne. SC. [= RAB, GW, K, S]

Polygala incarnata Linnaeus, Pink Milkwort, Procession Flower. Cp, Pd (GA, NC, SC, VA), Mt (GA, NC, VA): pine savannas, woodlands, fields; common (rare in Mountains). June-July. NY (Long Island) and se. PA (Rhoads & Klein 1993) west to MI, WI, and IA, south to FL and TX. [= RAB, C, F, G, GW, K, W; = *Galypola incarnata* (Linnaeus) Nieuwland – S]

Polygala lutea Linnaeus, Orange Milkwort, Red-hot-poker. Cp (GA, NC, SC, VA), Pd (NC): wet savannas, ditches, bogs, other wet areas; common (rare in Piedmont). April-October. NY (Long Island), se. PA (Rhoads & Klein 1993), and NJ south to s. peninsular FL, west to e. LA. [= RAB, C, F, G, GW, K, Z; = *Pilostaxis lutea* (Linnaeus) Small – S; = *Pylostachya lutea* (Linnaeus) Small]

Polygala mariana P. Miller, Maryland Milkwort. Cp (GA, NC, SC, VA), Pd (VA): bogs, pine savannas, other open wet habitats; common (rare in Piedmont). June-October. S. NJ south to FL, west to TX; disjunct inland in sw. TN (Chester, Wofford, & Kral 1997). [= RAB, C, G, GW, K; > *P. mariana* – F, S; > *P. harperi* Small – F, S]

Polygala nana (Michaux) A.P. de Candolle, Dwarf Milkwort, Candyroot. Cp, Pd (GA, SC), Mt (GA, NC): longleaf pine flatwoods, other open moist areas; rare (NC Watch List, SC Rare). E. GA south to s. peninsular FL, west to e. TX, with scattered populations inland to n. SC, w. NC, nw. GA, n. AL, c. TN (Chester, Wofford, & Kral 1997), and ne. MS. This species is primarily a Coastal plain species of the deeper south; *P. nana* may be introduced in parts of our area. [= RAB, GW, K, Z; = *Pilostaxis nana* (Michaux) Rafinesque – S; = *Pylostachya nana* (Michaux) Rafinesque]

Polygala nuttallii Torrey & A. Gray, Nuttall's Milkwort. Cp (GA, NC, SC, VA), Pd (GA, NC), Mt (VA): pocosins, pine savannas, also in depression ponds (in Augusta and Rockingham counties, VA); uncommon (rare in Mountains). June-August. MA south to e. FL Panhandle; disjunct inland in w. VA, c. TN (Chester, Wofford, & Kral 1997), sc. KY, and allegedly c. AR. [= RAB, C, F, G, K, S, W]

Polygala paucifolia Willdenow, Gaywings, Fringed Polygala, Flowering Wintergreen, Bird-on-the-wing. Mt (GA, NC, SC, VA), Pd (GA): moist forests at moderate to high elevations; common (SC Rare). April-June; June-September. New Brunswick and Québec west to Saskatchewan, south to CT, NY, WI, and in the Appalachians south to w. NC, nw. SC, n. GA, and e. TN. [= RAB, C, F, G, K, W; = *Triclisperma paucifolia* (Willdenow) Nieuwland – S]

Polygala polygama Walter *var.* ***obtusata*** Chodat, Northern Bitter Milkwort. Mt, Pd (VA): woodlands and woodland borders; uncommon. May-July; June-July. ME west to MI and MN, south to NJ, w. VA, OH, c. IN, c. IL, and IA. [= C, F, G; < *P. polygama* – RAB, K, S, W]

Polygala polygama Walter *var.* ***polygama***, Southern Bitter Milkwort, Racemed Milkwort. Cp (GA, NC, SC, VA), Pd, Mt (GA, NC, SC): sandhills, woodlands, woodland borders; common. May-July; June-July. Se. VA, sw. NC, and AR, south to FL and TX. [= C, F, G; < *P. polygama* – RAB, K, S, W]

Polygala ramosa Elliott, Short Pinebarren Milkwort, Low Pinebarren Milkwort. Cp (GA, NC, SC, VA), Mt (NC): wet savannas, pocosin margins, bogs; common (VA Rare). June-September. S. NJ south to s. peninsular FL, west to e. TX; disjunct inland (as in Henderson County, NC). [= RAB, C, F, G, GW, K, Z; = *Pilostaxis ramosa* (Elliott) Small – S; = *Pylostachya ramosa* (Elliott) Small]

Polygala sanguinea Linnaeus, Blood Milkwort, Field Milkwort. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (GA?, NC, VA): woodlands, openings, woodland borders; uncommon. June-August. Nova Scotia and MN, south to nw. SC, n. GA, and LA. [= RAB, C, F, G, GW, K, W; ? *P. viridescens* Linnaeus – S]

Polygala senega Linnaeus *var.* ***latifolia*** Torrey & A. Gray, Seneca Snakeroot. {Mt (GA, NC, SC, VA), Pd (NC, SC, VA): woodlands and openings, especially over calcareous or mafic rocks; uncommon (NC Watch List)}. May-June. DE, PA, and MN, south to NC, TN, and MO. Trauth-Nare & Naczi (1998) studied the two varieties of *P. senega* and concluded that the taxa should be recognized at the specific level. The relative distributions, habitats, and phenology of the two taxa need assessment for our area. [= F, G; < *P. senega* – RAB, C, K, S, W]

Polygala senega Linnaeus *var.* ***senega***, Seneca Snakeroot. {Mt (GA, NC, SC, VA), Pd (NC, SC, VA): woodlands and openings, especially over calcareous or mafic rocks; uncommon (NC Watch List)}. April-May. Québec west to Alberta, south to n. GA, TN, AR, and SD. The relative distributions, habitats, and phenology of the two taxa need assessment for our area. [= F, G; < *P. senega* – RAB, C, K, S, W]

Polygala verticillata Linnaeus *var.* ***isocycla*** Fernald, Whorled Milkwort. {Mt, Pd, Cp (NC, SC, VA): dry woodlands, woodland borders, openings, fields; uncommon. June-September. The validity and relative distributions, habitats, phenology of the two varieties need additional assessment in the herbarium and the field.} VT west to Manitoba, south to FL and TX. [= C, F, G, K; < *P. verticillata* var. *verticillata* – RAB; = *P. verticillata* – S, apparently misapplied; < *P. verticillata* – W]

Polygala verticillata Linnaeus *var.* ***verticillata***, Whorled Milkwort. {Mt, Pd, Cp (NC, SC, VA): dry woodlands, woodland borders, openings, fields; uncommon. June-September. The validity and relative distributions, habitats, phenology of the two varieties need additional assessment in the herbarium and the field.} ME west to MI, south to w. VA, w. NC, and TN. [= C, F, G, K; < *P. verticillata* var. *verticillata* – RAB; = *P. pretzii* Pennell – S; < *P. verticillata* – W]

Polygala boykinii Nuttall *var.* ***boykinii***, Boykin's Milkwort. Cp (GA): In sc. TN (Chester, Wofford, & Kral 1997) and sw. GA (Jones & Coile 1988). Var. *sparsiflora* Wheelock occurs in s. FL. [= K; = *P. boykinii* – S] {not yet keyed; synonymy incomplete}

Polygala chapmanii Torrey & A. Gray. Cp (GA): pine savannas, seepage bogs. Panhandle FL and sw. GA west to s. MS. [= GW, K, S] {not yet keyed; synonymy incomplete}

Polygala crenata C.W. James. FL Panhandle and AL west to TX; reported for GA (Sorrie, pers. comm.). [= K] {not yet keyed; synonymy incomplete}

Polygala leptostachys Shuttleworth ex A. Gray, Georgia Milkwort. Cp (GA): sandhills; rare (GA Special Concern). In sw. GA (Jones & Coile 1988). In s. MS (Sorrie & Leonard 1999). [= K, S] {not yet keyed; synonymy incomplete}

Polygala setacea Michaux, Coastal Plain Milkwort. Cp (GA): widespread in the outer Coastal Plain of GA (Jones & Coile 1988), and also reported by Small (1933) as occurring north to NC. [= GW, K, S] {not yet keyed; synonymy incomplete}

POLYGONACEAE A.L. de Jussieu 1789 (Smartweed Family)

A family of about 43-48 genera and 1100-1200 species, trees, shrubs, vines, and herbs, cosmopolitan, but especially north temperate. Recent changes in the circumscription of various genera (including *Polygonum, Persicaria, Fallopia*, etc.) have received strong support from molecular phylogenetic studies (Kim & Donoghue 2008; Lamb Frye & Kron 2003). References: Freeman & Reveal in FNA (2005); Horton (1972)=Z; Mitchell & Dean (1978)=Y; Ronse Decraene & Akeroyd (1988); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993); Lamb Frye & Kron (2003); Kim & Donoghue 2008).

1 Woody vine, climbing by tendrils; [subfamily *Polygonoideae*, tribe *Coccolobeae*].
  2 Leaf base deeply cordate ..... ***Antigonon***
  2 Leaf base truncate to broadly cuneate ..... ***Brunnichia***
1 Herb (sometimes very robust and rather woody), herbaceous vine, or (*Fallopia baldschuanica*) a somewhat woody vine lacking tendrils.
  3 Stem leaves (in our species) whorled; flowers in involucrate heads; ocreae absent; stamens 9; leaves densely white-tomentose on the lower surface; [of xeric situations of shale barrens and sandhills]; [subfamily *Eriogonoideae*, tribe *Eriogoneae*] ..... ***Eriogonum***
  3 Stem leaves alternate; flowers in various inflorescences (not involucrate); ocreae present; stamens (3-) 5-8 (-9); leaves glabrous or variously pubescent, but not densely white-tomentose; [of various habitats, including xeric ones]; [subfamily *Polygonoideae*].
    4 Tepals 6, in 2 series of 3 each; plants with leaves basally disposed, the largest basal (these withering in some species later in the season); [tribe *Rumiceae*].
      5 Fruit 3-winged; basal leaves very large, 20-40 cm wide; inner and outer tepals similar; [plant cultivated, rarely persistent or escaped] ..... ***Rheum***
      5 Fruit 3-angled; basal leaves small to medium in size, 0.5-15 cm wide; inner tepals wider than the outer tepals; [plants common, mostly weedy] ..... ***Rumex***
    4 Tepals mostly 5 in a single whorl; plants with leaves along the stem, lacking well-developed basal leaves.
      6 Flowers in small clusters or very reduced racemes of 1-5 flowers, borne in the axils of normally sized or reduced leaves; plants erect or sprawling herbs with stems < 1 m long, from taproots; leaves jointed at base; [tribe *Polygoneae*] ..... ***Polygonum***
      6 Flowers in diffuse axillary panicles, or in terminal or long-peduncled axillary racemes, corymbs, or heads; plants various, either erect or sprawling herbs, or erect, robust, and suffrutescent herbs, or climbing herbaceous or suffrutescent vines, or suffrutescent bushy herbs; leaves not jointed at base (except *Polygonella*).

7 Leaves cuneate at the base, either linear, spatular, or oblanceolate, mostly < 4 cm long and < 5 mm wide; pedicels jointed at the base; [tribe *Polygoneae*] ..... ***Polygonella***
7 Leaves cuneate, cordate, or hastate at the base, either lanceolate or ovate, mostly > 5 cm long and > 8 mm wide; pedicels not jointed at the base.
8 Inflorescence corymbiform, terminal; achenes strongly exserted at maturity; tepals almost free, horizontally spreading, white, 3-4 mm long; [erect annual, uncommonly cultivated and rarely persistent or escaped]; [tribe *Persicarieae*] ..... ***Fagopyrum***
8 Inflorescence paniculate, racemiform, or headlike, terminal and axillary; achenes enclosed in the perianth at maturity; tepals fused for much of their length, ascending, pink, green, or white.
9 Outer tepals neither keeled nor winged at maturity; inflorescence of spikelike racemes, heads, or sparse, interrupted racemes; [tribe *Persicarieae*] ..... ***Persicaria***
9 Outer tepals keeled or winged at maturity; inflorescence a compound panicle of racemes; [tribe *Polygoneae*].
10 Plants climbing or sprawling, herbaceous to somewhat woody, the stems slender; perianth usually not enlarging in fruit; stigma capitate or peltate ..... ***Fallopia***
10 Plants erect, robust (1-4 m tall), woody, the stems generally over 1 cm in diameter, hollow; perianth enlarging in fruit; stigma fimbriate ..... ***Reynoutria***

Antigonon Endlicher 1837 (Love-chain, Coralvine)

A genus of about 6 species, vines, of tropical America. References: Freeman in FNA (2005).

* ***Antigonon leptopus*** Hooker & Arnott, Love-chain, Queen's-jewels, Confederate-vine. Cp (FL, GA, SC): cultivated and persisting; commonly cultivated, rarely persisting or escaping, native of tropical America. [= FNA, K, WH; = *Corculum leptopus* (Hooker & Arnott) Stuntz]

Brunnichia Banks ex Gaertner 1788 (Buckwheat-vine)

A genus of 3-4 species, vines, of. e. North America and w. Africa. References: Holmes in FNA (2005); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993).

Brunnichia ovata (Walter) Shinners, Buckwheat-vine, Eardrop-vine, Ladies'-eardrops, Redvine. Cp (FL, GA, SC, VA*): floodplain forests, swamp forests; uncommon (rare north of FL). June-July; August-September. Ne. SC south to n. FL, west to e. TX, and north in the interior to w. TN, w. KY, s. IL, and se. MO. Introduced in se. VA. [= FNA, GW, K, WH; = *B. cirrhosa* Gaertner – RAB, C, F, G, S]

Emex Campderá

* ***Emex spinosa*** (Linnaeus) Campderá. Cp (FL): disturbed areas; rare (not recently collected), native of Mediterranean Europe. [= K, WH] {not yet keyed; add synonymy}

Eriogonum Michaux 1803 (Wild-buckwheat)

A genus of about 250 species, herbs and shrubs, of w. North America (a few in se. North America). Like *Astragalus*, it is represented in e. North America by a few species restricted to unusually dry habitats. References: Reveal in FNA (2005); Reveal (1989, 2004)=Y; Brandbyge in Kubitzki, Rohwer, & Bittrich (1993).

1 Basal leaves absent; cauline leaves alternate; [of limestone glades and barrens of KY, TN, and n. AL]; [subgenus *Eriogonum*] ..... ***[E. harperi]***
1 Basal leaves well-developed; cauline leaves whorled; [of other habitats and areas (see below)].
2 Tepals bright yellow; plants 3-5 dm tall; achenes pilose at the beak; [of shale barrens of VA and WV]; [subgenus *Oligogonum*] ... ***E. allenii***
2 Tepals white to pink; plants 4-12 dm tall; achenes glabrous; [of sandhills of s. NC (at least formerly), SC, and southward]; [subgenus *Eriogonum*] ..... ***E. tomentosum***

Eriogonum allenii S. Watson, Shale-barren Wild-buckwheat. Mt (VA): open and sunny situations in shale barrens (and rarely sandstone); rare. July-August. Endemic to shale barrens of w. VA and e. WV. [= C, FNA, K, W, Y, Z; = *E. alleni* – F, G, orthographic variant]

Eriogonum tomentosum Michaux, Sandhill Wild-buckwheat, Southern Wild-buckwheat, Dog-tongue. Cp (FL, GA, NC, SC): sandhills, usually in white sand, primarily in the fall-line Sandhills and on riverine dunes in the middle and upper Coastal Plain; uncommon (rare in NC). Late July-September; September-November. S. NC (at least formerly) south to c. peninsular FL, west to s. AL. There seems no reason to doubt the label data of an 1890's Biltmore Herbarium collection from Bladen County, NC (Pittillo, Horton, & Herman 1972), as *E. tomentosum* is fairly common not far away in SC; the species has apparently not been seen in NC since. [= RAB, FNA, K, S, WH, Y, Z]

Eriogonum harperi Goodman, Harper's Wild-buckwheat. Limestone glades and barrens of sc. KY, nc. TN, and n. AL; rare. [*E. longifolium* Nuttall var. *harperi* (Goodman) Reveal – C, FNA, K, Y, Z]

Fagopyrum P. Miller 1754 (Buckwheat)

A genus of about 8-16 species, perennial and annual herbs, of e. Asia and Africa. References: Hinds & Freeman in FNA (2005); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993).

* ***Fagopyrum esculentum*** Moench, Buckwheat. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): fields, disturbed areas, railroad rights-of-way, escaped from cultivation; rare, native of Eurasia. June-November. The latin and common name refer to the similarity of the seeds to beechnuts. [= RAB, C, FNA, G, K, W, WH; = *F. sagittatum* Gilibert – F]

* *Fagopyrum tataricum* (Linnaeus) Gaertner, Tartarian Buckwheat. Introduced at scattered locations in n. North America, south to WV (FNA). [= FNA, F, K] {not yet keyed; add to synonymy}

Fallopia Adanson 1763 (Climbing Buckwheat)

A genus of about 9-10 species, woody and herbaceous vines, of temperate regions of the Northern Hemisphere. If accepted (as here) as a genus distinct from *Polygonum*, this group takes the name *Fallopia* Adanson (1763), which has priority over *Tiniaria* (1832) and *Bilderdykia* (1827). *Reynoutria* is sometimes included. References: Ronse Decraene & Akeroyd (1988)=X; Brandbyge in Kubitzki, Rohwer, & Bittrich (1993). [also see *Reynoutria*]

1 Plant woody; inflorescences freely branched, strongly paniculate; [sometimes cultivated, apparently naturalizing] ..... ***F. baldschuanica***
1 Plant herbaceous; inflorescences less-branched, usually a reduced panicle with only a few racemose branches; [collectively common and in various natural and disturbed habitats].
  2 Ocreae reflexed bristly at the base; perianth white; achene glossy black; [of high elevation openings and woodlands]..... ***F. cilinodis***
  2 Ocreae smooth; perianth greenish to yellowish; achene glossy or dull black; [mostly of lower elevations].
    3 Achene dull black; outer sepals keeled, not expanding into obvious wings in fruit, the fruit therefore 3.5-4.5 mm long (measured from the pedicel joint to the tip); [weedy annual] ..... ***F. convolvulus var. convolvulus***
    3 Achene glossy black; outer sepals expanding into obvious wings in fruit, the fruit therefore 7-15 mm long (measured from the pedicel joint to the tip); [native perennial].
      4 Perianth 7-10 mm long at maturity (measured from the pedicel joint to the tip); achenes 2-3.5 mm long ..... ***F. scandens var. 1***
      4 Perianth 10-15 mm long at maturity (measured from the pedicel joint to the tip); achenes 3.5-6 mm long ... ***F. scandens var. scandens***

* ***Fallopia baldschuanica*** (Regel) Holub, Silver-lace-vine, China Fleece-vine. Cp, Pd (SC, VA), Mt (NC): disturbed areas, roadsides; rare, native of Asia. [= FNA; > *Fallopia aubertii* (Henry) Holub – X; > *Polygonum aubertii* Henry – C, F, K]

Fallopia cilinodis (Michaux) Holub, Fringed Climbing Buckwheat, Fringed Black Bindweed. Mt (GA, NC, VA): around rock outcrops, in openings, glades, and open woodlands at high elevations; uncommon. June-September. [= FNA; = *Polygonum cilinode* Michaux – RAB, C, K, W, Y, Z; > *Polygonum cilinode* var. *cilinode* – F; > *Polygonum cilinode* var. *laevigatum* Fernald – F; = *Bilderdykia cilinodis* (Michaux) Greene – S; = *Tiniaria cilinodis* (Michaux) Small]

* ***Fallopia convolvulus*** (Linnaeus) Á. Löve, Bindweed, Climbing Buckwheat, Black Bindweed, Nimble-will. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): disturbed areas; common (rare in FL), native of Eurasia. May-September. [= FNA, X; = *Polygonum convolvulus* – RAB, GW, W, WH, Y, Z; > *Polygonum convolvulus* Linnaeus var. *convolvulus* – C, F, K; > *Polygonum convolvulus* var. *subulatum* Lejeune & Courtois – K; = *Bilderdykia convolvulus* (Linnaeus) Dumortier – S; = *Tiniaria convolvulus* (Linnaeus) Webb & Moquin-Tandon]

Fallopia scandens (Linnaeus) Holub *var. 1*, Crested Climbing Buckwheat. Mt, Pd (NC, SC, VA), Cp (FL, NC, SC, VA) {GA}: moist to wet open habitats; common (rare in NC). July-October. [= *Polygonum scandens* Linnaeus var. *cristatum* (Engelmann & A. Gray) Gleason – RAB, C, GW, K, WH, Y; = *Polygonum cristatum* Engelmann & A. Gray – F; = *Bilderdykia cristata* (Engelmann & A. Gray) Greene – S; < *Fallopia scandens* – X; < *Polygonum scandens* – Z; ? *Tiniaria cristata* (Engelmann & A. Gray) Small; = *Fallopia cristata* (Engelmann & A. Gray) Holub]

Fallopia scandens (Linnaeus) Holub *var. scandens*, Common Climbing Buckwheat. Mt, Pd (NC, SC, VA), Cp (FL, NC, SC, VA), {GA}: moist to wet open habitats; uncommon. July-October. [= *Polygonum scandens* Linnaeus var. *scandens* – RAB, C, GW, K, WH, Y; = *Polygonum scandens* – F, W, in the narrow sense; = *Bilderdykia scandens* (Linnaeus) Greene – S; < *Fallopia scandens* – X, infraspecific taxa not distinguished; < *Polygonum scandens* – Z; = *Tiniaria scandens* (Linnaeus) Small]

* *Fallopia dumetorum* (Linnaeus) Holub, is introduced at least as far south as scattered locations in c. and se. PA (Rhoads & Klein 1993), WV, KY, TN, and AL. [= FNA; = *Polygonum scandens* Linnaeus var. *dumetorum* (Linnaeus) Gleason – K] {not yet keyed; add to synonymy}

Persicaria P. Miller 1754 (Smartweed, Tearthumb, Jumpseed)

A genus of about 150 species, herbs, nearly cosmopolitan (primarily temperate Northern Hemisphere). Several components of this genus may belong elsewhere. References: Hinds & Freeman in FNA (2005); Park (1988)=X; Kim & Donoghue (2008); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993).

1 Stem, petioles, and lower surface of major leaf veins with abundant recurved prickles; [section *Echinocaulon*].
  2 Ocreae foliaceous, green, orbicular, perfoliate; tepals becoming fleshy and blue in fruit ..... ***P. perfoliata***
  2 Ocreae scarious, not as above; tepals not becoming fleshy or blue in fruit.
    3 Leaf blades triangular in outline, the larger 6-11 cm wide; perianth 4-parted ..... ***P. arifolia***

3 Leaf blades lanceolate to narrowly elliptic, the larger 0.8-3 cm wide; perianth 5-parted.
4 Inflorescence branches glandular-pubescent; stamens 5, in 1 whorl; leaves sessile (rarely shortly petiolate), usually cuneate or rounded at the base (rarely slightly cordate) ..... ***P. meisneriana** var. **beyrichiana***
4 Inflorescence branches glabrous; stamens 8, an outer whorl of 5 and an inner whorl of ; leaves petiolate, sagittate at the base ..... ***P. sagittata***
1 Stem, petioles, and lower surface of major leaf veins unarmed.
5 Styles exserted, persistent on achenes; inflorescences spikelike, interrupted; [section *Tovara*] ..... ***P. virginiana***
5 Styles included, rarely exserted, deciduous; inflorescences capitate, paniclelike, or spikelike, uninterrupted or interrupted.
6 Inflorescences capitate; [section *Cephalophilon*] ..... ***[P. chinensis]***
6 Inflorescences panicle-like or spikelike.
7 Inflorescence panicle-like; [section *Rubrivena*] ..... ***P. wallichii** var. **wallichii***
7 Inflorescence spike-like; [section *Persicaria*].
8
8
{not yet completed}
P. amphibia
P. careyi
P. glabra
P. hirsuta
P. hydropiper
P. hydropiperoides
P. lapathifolia
P. longiseta
P. maculosa
P. orientalis
P. pensylvanica
P. punctata
P. robustior
P. setacea

Persicaria amphibia (Linnaeus) S.F. Gray, Water Smartweed. Mt, Pd (NC, SC, VA), {GA}: marshes, wet disturbed areas; uncommon (GA Special Concern, NC Watch List). June-August. [= FNA; > *Polygonum coccineum* Muhlenberg ex Willdenow – RAB, G, Z; > *Polygonum amphibium* Linnaeus var. *emersum* Michaux – C, GW, K, Y; > *Polygonum amphibium* Linnaeus – W; > *Polygonum coccineum* var. *coccineum* – F; > *Polygonum natans* (Michaux) Eaton – G; > *Persicaria muhlenbergii* (S. Watson) Small – S; > *Persicaria amphibia* (Linnaeus) S.F. Gray var. *emersa* (Michaux) Hickman; > *Persicaria amphibia* (Linnaeus) S.F. Gray var. *stipulacea* (Coleman) Hara; > *Polygonum amphibium* Linnaeus var. *stipulaceum* Coleman – C, F, K, Y]

Persicaria arifolia (L.) Haraldson, Halberd-leaf Tearthumb. Cp (GA, NC, SC, VA), Pd (NC, VA), Mt (VA): marshes, wet thickets; common (GA Special Concern). July-November; August-December. Nova Scotia west to MN. south to se. GA w. NC, and w. TN. [= FNA; = *Polygonum arifolium* Linnaeus – RAB, C, GW, K, W, X, Y, Z; > *Polygonum arifolium* var. *arifolium* – F, G; > *Polygonum arifolium* var. *pubescens* (R. Keller) Fernald – F, G; = *Tracaulon arifolium* (Linnaeus) Rafinesque – S; = *Truellum arifolium* (Linnaeus) Sojak]

Persicaria careyi (Olney) Greene. {VA} , a native, occurs in scattered locations south to sc. PA (Rhoads & Klein 1993), DE, NJ, and MD (Kartesz 1999). [= FNA; = *Polygonum careyi* Olney – C, F, G, K] {synonymy incomplete}

Persicaria glabra (Willdenow) M. Gómez, Dense-flower Smartweed. Cp (GA, NC, SC, VA): swamp forests; uncommon, rare in VA. June-October. Nearly pantropical. [= FNA; > *Polygonum densiflorum* Meisner – RAB, C, F, G, GW, K, Z; > *Persicaria portoricensis* (Bertero ex Small) Small – S; > *Persicaria densiflora* (Meisner) Moldenke]

Persicaria hirsuta (Walter) Small, Hairy Smartweed. Cp (GA, NC, SC): pondcypress savannas, depression ponds in pinelands; uncommon, rare in NC (NC Rare). June-December. [= FNA, S; = *Polygonum hirsutum* Walter – RAB, GW, K, Z]

Persicaria hydropiper (Linnaeus) Opiz, Common Smartweed, Waterpepper, Marshpepper Smartweed. Pd (GA, NC, SC, VA), Cp (GA, NC, VA), Mt (NC, VA): wet pastures, barnyards, ditches; common. July-November. [= FNA, S; = *Polygonum hydropiper* Linnaeus – RAB, C, F, GW, K, W, Z]

Persicaria hydropiperoides (Michaux) Small, Waterpepper. Cp, Pd (GA, NC, SC, VA), Mt (GA, VA): swamp forests, streams, ditches; common (uncommon in VA Mountains). May-November. [= FNA; > *Polygonum hydropiperoides* var. *hydropiperoides* – RAB, C, F; > *Polygonum hydropiperoides* Michaux – GW, Y; = *Polygonum hydropiperoides* – K, W, Z; > *Polygonum hydropiperoides* var. *breviciliatum* Fernald – F; > *Polygonum hydropiperoides* var. *euronotorum* Fernald – F; > *Persicaria hydropiperoides* (Michaux) Small – S; > *Persicaria hydropiperoides* (Michaux) Small var. *opelousana* (Riddell ex Small) J.S. Wilson; > *Polygonum hydropiperoides* var. *opelousanum* (Riddell ex Small) Riddell ex W. Stone – RAB, C; > *Polygonum opelousanum* Riddell – GW, Y; > *Polygonum opelousanum* Riddell var. *opelousanum* – F; > *Persicaria opelousana* (Riddell ex Small) Small – S]

Persicaria lapathifolia (Linnaeus) S.F. Gray, Willow-weed, Dockleaf Smartweed, Pale Smartweed. Cp, Pd, Mt (GA, NC, SC, VA): bottomlands, bottomland fields, disturbed areas; uncommon. July-November. [= FNA, S; = *Polygonum lapathifolium* Linnaeus – RAB, C, GW, K, W, Y, Z; > *Polygonum lapathifolium* var. *lapathifolium* – G; > *Polygonum lapathifolium* var. *nodosum* (Rafinesque) Weinm. – G]

* ***Persicaria longiseta*** (de Bruijn) Kitagawa, Longbristle Smartweed. Cp, Pd, Mt (GA, NC, SC, VA): disturbed areas, ditches; common (uncommon in NC and SC), native of Asia. May-October. [= FNA; = *Polygonum cespitosum* Blume var. *longisetum* (de Bruijn) A.N. Steward – RAB, C, F, G, GW, K, W, Y, Z; = *Polygonum longisetum* de Bruijn]

* ***Persicaria maculosa*** S.F. Gray, Lady's-thumb, Heart's-ease. Cp, Pd, Mt (GA, VA), {NC, SC}: disturbed areas; common, native of Eurasia. June-December. [= FNA; = *Polygonum persicaria* Linnaeus – RAB, C, G, GW, K, W, Y, Z; > *Polygonum*

persicaria var. *persicaria* – F; > *Polygonum persicaria* var. *angustifolium* Beckh. – F; > *Polygonum persicaria* var. *ruderale* (Salisbury) Meisner – F; > *Polygonum dubium* Stein – F; = *Persicaria persicaria* (Linnaeus) Small – S]

Persicaria meisneriana (Chamisso & Schlechtendahl) M. Gómez *var.* ***beyrichiana*** (Chamisso & Schlechtendahl) C.C. Freeman, Mexican Tearthumb. Cp (GA, SC): wet savannas, ditches; rare (GA Special Concern), sometimes considered only introduced in southeastern North America, but probably native. E. SC south to FL, west to LA; Mexico and Central America south to n. South America; Brazil; se. Africa. See Mitchell (1970) and Freeman (2004). [= FNA; = *Polygonum meisnerianum* Chamisso & Schlechtendahl var. *beyrichianum* (Chamisso & Schlechtendahl) Meisner – GW, K; < *Polygonum meisnerianum* – Z, infraspecific taxa not distinguished; < *Truellum meisnerianum* (Chamisso & Schlectendahl) Sojak]

* ***Persicaria orientalis*** (Linnaeus) Spach, Kiss-me-over-the-garden-gate, Prince's-feather, Prince's-plume. Cp (NC, SC, VA), Pd, Mt (GA, NC, VA): barnyards, disturbed areas, garden edges; rare, native of Eurasia. July-November. [= FNA, S; = *Polygonum orientale* Linnaeus – RAB, C, F, K, W, Y, Z]

Persicaria pensylvanica (Linnaeus) M. Gómez, Pinkweed, Common Smartweed, Pennsylvania Smartweed. Cp, Pd, Mt (GA, NC, SC, VA): disturbed areas, bottomlands; common. July-December. [= FNA, S; = *Polygonum pensylvanicum* Linnaeus – RAB, C, GW, K, W, Z; > *Polygonum pensylvanicum* var. *pensylvanicum* – F; > *Polygonum pensylvanicum* var. *durum* Stanford – F; > *Polygonum pensylvanicum* var. *laevigatum* Fernald – F; > *Polygonum pensylvanicum* var. *rosaeflorum* J.B.S. Norton – F]

* ***Persicaria perfoliata*** (Linnaeus) H. Gross, Mile-a-minute-vine, Asiatic Tearthumb, Devil's-tail Tearthumb. Pd (VA): roadsides, banks, powerline rights-of-way; introduced and spreading rapidly in n. VA, MD, PA, DC, and WV. Adler (1999) reports it as occurring in PA, MD, VA, WV, DE, OH, NJ, and DC. [= FNA; = *Polygonum perfoliatum* Linnaeus – C, F, K, X; = *Ampelygonum perfoliatum* (Linnaeus) Roberty & Vautier]

Persicaria punctata (Elliott) Small, Dotted Smartweed. Cp, Pd, Mt (GA, NC, SC, VA): swamp forests, bottomlands, marshes; common. July-November. [= FNA; > *Persicaria punctata* (Elliott) Small var. *punctata* – S; = *Polygonum punctatum* – RAB, GW, W; > *Polygonum punctatum* Elliott var. *punctatum* – C, F, G, K, Y; > *Persicaria punctata* (Elliott) Small var. *leptostachya* (Meisner) Small – S; > *Polygonum punctatum* Elliott var. *leptostachyum* (Meisner) Small – F; > *Polygonum punctatum* var. *parvum* Marie-Victorin & Rousseau – F; > *Polygonum punctatum* Elliott var. *confertiflorum* (Meisner) Fassett – C, G, K, Y; < *Polygonum punctatum* – Z (also see *Persicaria robustior*)]

Persicaria robustior (Small) E.P. Bicknell, Water Smartweed. (VA). [= FNA; = *Polygonum robustius* (Small) Fernald – C, F, G, K, Y; < *Polygonum punctatum* – Z]

Persicaria sagittata (L.) Gross ex Nakai, Arrowleaf Tearthumb, Arrowvine, Scratch-grass. Cp, Pd, Mt (GA, NC, SC, VA): marshes, bogs, beaver impondments, wet thickets; common. May-December. Newfoundland west to Manitoba, south to Panhandle FL and e. TX; China, Manchuria, India, Siberia, Korea, and Japan. [= FNA; = *Polygonum sagittatum* Linnaeus – RAB, C, G, GW, K, W, Y, Z; > *Polygonum sagittatum* var. *gracilentum* Fernald – F; > *Polygonum sagittatum* var. *sagittatum* – F; = *Tracaulon sagittatum* (Linnaeus) Small – S; = *Truellum sagittatum* (Linnaeus) Soják]

Persicaria setacea (Baldwin) Small, Swamp Smartweed. Cp, Pd, Mt (GA, NC, SC, VA): swamp forests, bottomland forests; common (rare in Piedmont). July-November. [= FNA, S; = *Polygonum setaceum* Baldwin – RAB, GW, W, Y, Z; > *Polygonum setaceum* var. *interjectum* Fernald – F, K; > *Polygonum setaceum* var. *tonsum* Fernald – F, K; > *Polygonum setaceum* var. *setaceum* – F, K; = *Polygonum hydropiperoides* Michaux var. *setaceum* (Baldwin) Gleason – C, G]

Persicaria virginiana (Linnaeus) Gaertner, Jumpseed. Mt, Pd, Cp (GA, NC, SC, VA): floodplains, moist forests; common. Section *Tovara* consists of 3 species of e. North America and e. Asia; if recognized as genus, the correct name for this species is *Antenoron virginianum*. [= FNA; = *Tovara virginiana* (Linnaeus) Rafinesque – RAB, S; > *Tovara virginiana* var. *glaberrima* Fernald – F; > *Tovara virginiana* var. *virginiana* – F; = *Polygonum virginianum* Linnaeus – C, GW, K, W, Y; > *Polygonum virginianum* var. *virginianum* – G; > *Polygonum virginianum* var. *glaberrimum* (Fernald) Steyermark – G; = *Antenoron virginianum* (Linnaeus) Roberty & Vautier – Z]

* *Persicaria chinensis* (Linnaeus) H. Gross, Chinese Knotweed. Introduced in MD and NJ; native of Asia. [= FNA; = *Polygonum chinense* Linnaeus – K] {not yet keyed}

* ***Persicaria wallichii*** Greuter & Burdet *var.* ***wallichii***, Himalayan Knotweed, Kashmir Plume. Mt (NC): persistent and spreading from plantings; rare, native of Himalayan Asia. [= FNA; < *Polygonum polystachyum* Wallich ex Meisner – C, F, G (a later homonym); < ***Aconogonon polystachyum*** (Wallich ex Meisner) M. Král; < *Rubrivena polystachya* (Wallich ex Meisner) M.Král; < *Reynoutria polystachya* (Wallich ex Meisner) Moldenke] {not yet keyed}

Polygonella Michaux 1803 (Jointweed)

A genus of about 9 species, annual, perennial, and suffruticose herbs, of warm temperate e. North America. Ronse De Craene, Hong, & Smets (2004) suggest that *Polygonella* should be merged into *Polygonum*, as section *Duravia*, subsection *Polygonella*. References: Freeman in FNA (2005); Nesom & Bates (1984)=Q; Wunderlin (1981)=V; Horton (1961)=X; Ronse De Craene, Hong, & Smets (2004); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993).

1 Ocreae ciliate; inner perianth segments fimbriate; [subgenus *Thysanella*].
  2 Leaves not hyaline-bordered; stem (below the inflorescence) minutely but densely scabrous; [of e. GA south to Panhandle FL] ..... ***P. fimbriata***
  2 Leaves hyaline-bordered; stem (below the inflorescence) glabrous or slightly scabrous on the angles; [of e. FL Panhandle south into peninsular FL] ..... ***P. robusta***
1 Ocreae not ciliate; inner perianth segments not fimbriate; [subgenus *Polygonella*].
  3 Leaves (3-) 9-30 mm wide; [of sand pine scrub and coastal dunes in Panhandle FL and s. AL] ..... ***P. macrophylla***
  3 Leaves 0.3-6 mm wide; [collectively more widespread].

4 Style and stigma (0.4-) 0.5-0.8 (-1.0) mm long at anthesis; inner sepals (1.7-) 1.9-2.5 (-2.9) mm long in flower, (3.1-) 3.3-4.7 (-6.0) mm long in fruit; perennial; leaves very numerous, (4.0-) 5.2-12.0 (-19.0) mm long, 0.5-0.9 (-1.2) mm wide, nearly as thick as wide..... ***P. americana***

4 Style and stigma 0-0.1 (-0.2) mm long at anthesis; inner sepals (0.6-) 0.7-1.8 (-2.3) mm long at anthesis, (1.6-) 1.7-2.8 (-3.6) mm in fruit; annual or perennial; leaves (2.5-) 4.4-39.0 (-65.0) mm long, (0.3-) 0.6-5.0 (-8.0) mm wide, wider than thick.

5 Annual, simple to much-branched from above the base; leaves lacking hyaline margins, mostly deciduous before fruiting (or even flowering); ocreae obtuse; achenes 1.0-1.4 mm wide.

6 Leaves (0.4-) 0.6-1.0 (-1.2) mm wide; flowers exserted from the ocreolae on pedicels (0.9-) 1.3-1.7 (-2.1) mm long at anthesis; [of the outer Coastal Plain of ne. NC and e.VA northward]..... ***P. articulata***

6 Leaves (0.8-) 1.0-5.0 (-8.0) mm wide; flowers barely exserted from the ocreolae on pedicels ca. 0.1 mm long at anthesis; [of the outer Coastal Plain of se. SC southward]..... ***P. gracilis***

5 Perennial, much-branched from near the distinctly woody base; leaves with hyaline margins toward the tip, persistent through fruiting; ocreae obtuse, acute, acuminate, or aristate; achenes (0.7-) 0.8-1.0 (-1.2) mm wide.

7 Tips of the ocreae and ocreolae long-acuminate, (0.7-) 1.0-1.5 mm long; leaves mostly oblanceolate, 4-13 mm long, 0.5-1.2 (-2.1) mm wide..... ***P. polygama*** *var.* ***croomii***

7 Tips of the ocreae and ocreolae obtuse to acute, 0-0.5 mm long; leaves mostly spatulate, 7-30 mm long, 1.9-6.0 mm wide..... ***P. polygama*** *var.* ***polygama***

Polygonella americana (Fischer & Meyer) Small, Southern Jointweed. Cp (GA, NC*?, SC), Pd (GA): sandhills, other dry habitats; uncommon (rare in NC). June-September; August-November. Sc. NC south to s. GA west to TX and NM, north in the interior to ec. TN (Chester, Wofford, & Kral 1997), se. MO, and AR, perhaps adventive toward the northern part of the range. [= RAB, F, FNA, G, K, S, X; ***Polygonum***]

Polygonella articulata (Linnaeus) Meisner, Northern Wireweed. Cp (GA?, NC, VA): sandhills, dunes, and other dry, sandy habitats; rare. September-October; October-November. ME and s. Québec west to MN, south on the Coastal Plain to VA and ne. NC, otherwise south to se. PA, NY, s. Ontario, MI, n. IN, n. IL, and e. IA. *P. articulata* is the only northern member of an otherwise southern and predominantly Coastal Plain genus. Cited for GA in Jones & Coile (1988); the record seems curious. [= RAB, C, F, FNA, G, K, X; = *Delopyrum articulatum* (Linnaeus) Small – S; = ***Polygonum articulatum*** Linnaeus]

Polygonella fimbriata (Elliott) Horton, Sandhill Jointweed. Cp (AL, FL, GA): sandhills; uncommon (rare in AL and FL). E. GA (not far from SC) and se. AL south to panhandle FL. It differs from all our other species in having the inner sepals fimbriate. [= FNA, K, Q, WH; = *Thysanella fimbriata* (Elliott) A. Gray – S; = *Polygonella fimbriata* var. *fimbriata* – X; = ***Polygonum fimbriatum*** Elliott]

Polygonella gracilis (Nuttall) Meisner, Wireweed. Cp (FL, GA, NC, SC): sandhills; common (uncommon north of FL). Late August-October; October-November. Sc. NC south to s. FL, west to s. MS, perhaps adventive toward the northern part of the range. [= RAB, FNA, K, WH, X; = *Delopyrum gracile* (Nuttall) Small – S; = ***Polygonum gracile*** Nuttall]

Polygonella macrophylla Small, Largeleaf Wireweed. Cp (FL): sand pine scrub, coastal dunes; rare. S. AL and Panhandle FL. [= FNA, K, S, WH, X; ***Polygonum***]

Polygonella polygama (Ventenat) Engelmann & A. Gray *var.* ***croomii*** (Chapman) Fernald, Carolina October-flower. Cp (GA, NC, SC, VA): sandhills, primarily in the fall-line Sandhills and middle Coastal Plain; uncommon. August-October; October-November. Var. *croomii* ranges from se. and sc. NC south to SC and GA. Var. *croomii* occurs mainly in the fall-line Sandhills, scattered as well in the middle Coastal Plain (Robeson and Bladen counties, NC, Dillon and Darlington counties, SC) and rarely the outer Coastal Plain (New Hanover County, NC). In addition to our 2 varieties, var. *brachystachya* (Meisner) Wunderlin is endemic to peninsular FL; it resembles var. *croomii* in its narrow leaves, but has the ocrea and ocreola tips short and acute (more like var. *polygama*). I agree with Nesom & Bates (1984) that "intermediates occur ... that will have to be arbitrarily identified, but without recognition of the varieties an interesting pattern of variation is obscured." It may even prove that the taxa are valid biological species, and that confusion is only caused by herbarium identifications. [= FNA, Q, V; < *P. polygama* – RAB, K, X; = *P. croomii* Chapman – S; ***Polygonum***]

Polygonella polygama (Ventenat) Engelmann & A. Gray *var.* ***polygama***, Common October-flower. Cp (FL, NC, SC, VA?): sandhills, primarily in the outer Coastal Plain north of SC; common (rare in VA). August-October; October-November. Var. *polygama* ranges from se. VA (?) south to s. FL, west to se. TX (perhaps absent in GA). In our area, var. *polygama* occurs in the outer Coastal Plain of VA and NC, extending into the middle Coastal Plain and fall-line Sandhills in SC (Richland, Lexington, and Aiken counties, SC). [= FNA, Q, V, WH; < *P. polygama* – RAB, C, F, G, K, X; = *P. polygama* – S; = ***Polygonum polygamum*** Ventenat]

Polygonella robusta (Small) Nesom & Bates. Cp (FL): sandhills, scrub; rare. E. FL Panhandle south to c. peninsular FL. [= K, Q, WH; = *Polygonella fimbriata* (Elliott) Horton var. *robusta* (Small) Horton – X; = *Thysanella robusta* Small – S; ***Polygonum***]

Polygonum Linnaeus 1753 (Knotweed)

A genus of about 20 species, herbs, of temperate regions of the Northern Hemisphere. References: Costea, Tardif, & Hinds in FNA (2005); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993); Costea & Tardif (2003a)=X. [also see *Fallopia, Persicaria, Reynoutria*]

* ***Polygonum argyrocoleon*** Steudel ex Kunze. Cp (NC): disturbed areas; rare, native of western North America. May-August? Reported for NC by Burk (1961). [= RAB, K, Z]

* ***Polygonum aviculare*** Linnaeus *ssp.* ***aviculare***, Knotweed. Mt, Pd, Cp (NC, SC, VA), {GA}: disturbed areas; common. March-November. [= FNA, X; *P. aviculare* – RAB, C, K, S, W, Y; > *Polygonum aviculare* var. *aviculare* – F; > *P. aviculare* var. *vegetum* Ledebour – F; > *P. monspeliense* Persoon; < *P. aviculare* – G, Z, in the broad sense]

Polygonum aviculare Linnaeus *ssp.* ***buxiforme*** (Small) Costea & Tardif, Small's Knotweed. (SC, VA). [= FNA, X; = *Polygonum buxiforme* Small – C, K, S, Y; *P. aviculare* Linnaeus var. *littorale* (Link) Mertens – F; < *P. aviculare* – G; *P. littorale* Link]

* ***Polygonum aviculare*** Linnaeus *ssp.* ***depressum*** (Meisner) Arcangeli, Dooryard Knotweed. {GA, NC, SC, VA}. [= FNA, X; *Polygonum arenastrum* Boreau – C, K; < *P. aviculare* – G]

* ***Polygonum aviculare*** Linnaeus *ssp.* ***neglectum*** (Besser) Arcangeli, Needle-leaf Knotweed. Cp (VA): fields, disturbed areas; rare, introduced. Also documented from scattered locations in s. PA (Rhoads & Klein 1993); DE, NJ, and MD (Kartesz 1999); and WV (as *P. aviculare* ssp. *rurivagum*) (Costea & Tardif 2003). [= FNA; *P. bellardii* Allioni – K; *Polygonum aviculare* var. *aviculare* – F, in part; < *P. aviculare* – G; *Polygonum aviculare* Linnaeus var. *rurivagum* (Jord. ex Boreau) Berher; *Polygonum aviculare* Linnaeus var. *angustissimum* Meisner]

Polygonum erectum Linnaeus, Erect Knotweed. Mt, Pd (NC, SC, VA), Cp (VA), {GA}: disturbed areas, open places; rare (NC Watch List). June-October; July-October. [= RAB, C, F, FNA, K, S, W, Y, Z]

Polygonum glaucum Nuttall, Seabeach Knotweed. Cp (GA, NC, SC, VA): ocean beaches, sound-side sandy shores, dune bases; rare (GA Special Concern, NC Rare, VA Rare). May-October; June-November. [= RAB, C, F, FNA, K, S, Y, Z]

Polygonum ramosissimum Michaux *var.* ***prolificum*** Small, Longfruit Knotweed, Bushy Knotweed, Prolific Knotweed. Cp (NC?, VA): {habitat}; rare (VA Watch List). Also reported for NC (Kartesz 1999). [= K, Y; = *P. prolificum* (Small) B.L.Robinson – C, G; > *P. prolificum* – F; > *P. exsertum* Small – F; < *P. ramosissimum* – Z; = *P. ramosissimum* ssp. *prolificum* (Small) Costea & Tardif – FNA, X]

Polygonum ramosissimum Michaux *var.* ***ramosissimum***. Reported for SC (Kartesz 1999); {investigate} [= K, Y; = *P. ramosissimum* Michaux ssp. *ramosissimum* – FNA, X; = *P. ramosissimum* – C, F, G] {not yet keyed; synonymy incomplete}

Polygonum tenue Michaux, Glade Knotweed, Slender Knotweed. Pd (GA, NC, SC, VA), Mt (GA, NC, VA), Cp (VA): glades, barrens, and thin, rocky soils, over various rock types (including granite, diabase, amphibolite, greenstone, and metagabbro); uncommon, rare in NC (NC Watch List). July-September; August-October. [= RAB, C, FNA, S, W, Y, Z; > *Polygonum tenue* var. *protrusum* Fernald – F, K; > *Polygonum tenue* var. *tenue* – F, K]

Polygonum achoreum Blake. South to WV (Kartesz 1999). [= C, F, FNA, G, K] {not yet keyed}

Reynoutria Houttuyn 1777

A genus of about 15 species, perennial herbs, of temperate e. Asia. Ronse Decraene & Akeroyd (1988) and most other recent workers in Polygonaceae treat this group as *Fallopia* section *Reynoutria* (Houttuyn) Ronse Decraene. This treatment may prove to be better than the recognition of *Reynoutria* as a genus; either course is compatible with molecular phylogenetic analyses completed to date (Lamb Frye & Kron 2003). References: Freeman & Hinds in FNA (2005); Ronse Decraene & Akeroyd (1988)=X; Brandbyge in Kubitzki, Rohwer, & Bittrich (1993); Zika & Jacobson (2003). Key based on Zika & Jacobson (2003).

1 Veins of leaf underside with multicellular hairs (as seen at 20× magnification); mid-stem leaves with deeply cordate bases; inflorescence much shorter than the subtending mid-branch leaf..... ***R. sachalinensis***
1 Veins of leaf underside with simple hairs, or merely minutely bumpy-scabrous; mid-stem leaves with truncate to slightly cordate or very broadly V-shaped bases; inflorescence shorter or longer than the subtending mid-stem leaf.
  2 Veins of leaf underside with scattered simple, stout-based hairs; mid-branch leaf bases usually slightly cordate; well-developed stem leaves usually > 20 cm long..... ***R. ×bohemica***
  2 Veins of leaf underside minutely scabrous with scattered bumps; mid-branch leaves truncate (to very broadly V-shaped); well-developed stem leaves <18 cm long..... ***R. japonica***

* ***Reynoutria ×bohemica*** J. Chrtek & A. Chrtková [***Reynoutria japonica × sachalinensis***], Bohemian Knotweed, Hybrid Japanese Knotweed. Mt (NC), Pd (VA): disturbed areas, sandbars; rare, native of e. Asia. [= *Polygonum ×bohemica* (J. Chrtek & A. Chrtková) P.F. Zika & A.L. Jacobson – Z; = ***Fallopia ×bohemica*** (J. Chrtek & A. Chrtková) J.P. Bailey – FNA]

* ***Reynoutria japonica*** Houttuyn, Japanese Knotweed, Japanese Bamboo, Japanese Buckwheat. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA); roadsides, disturbed areas, river banks and sandbars, often forming dense thickets; uncommon, native of e. Asia. May-September; August-October. [= *Polygonum cuspidatum* Siebold & Zuccarini – RAB, C, F, K, W, Y, Z; = ***Fallopia japonica*** (Houttuyn) Ronse Decraene *var.* ***japonica*** – FNA; = *Pleuropterus zuccarinii* Small – S; = *Fallopia japonica* (Houttuyn) Ronse Decraene – X]

* ***Reynoutria sachalinensis*** (F. Schmidt ex Maximowicz) Nakai, Giant Knotweed, Sachaline. Pd, Cp (VA), Mt (NC): disturbed areas, roadsides; rare, native of e. Asia. July-August; August-October. [= *Polygonum sachalinense* F. Schmidt ex Maximowicz – RAB, C, F, K, W, Y, Z; = ***Fallopia sachalinensis*** (F. Schmidt ex Maximowicz) Ronse Decraene – FNA, X]

Rheum Linnaeus 1753 (Rhubarb)

A genus of about 30-60 species, perennial herbs, of temperate and subtropical Asia and Europe. References: Freeman in FNA (2005); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993).

* ***Rheum rhabarbarum*** Linnaeus, Rhubarb, Pie-plant. Mt (NC, VA): uncommonly cultivated (primarily in gardens in the cooler portions of our area), rarely persistent or escaped; rare, native of Europe (though originally native of Asia). July-September. [= K; = *Rh. rhabarbicum* – C, misspelled; = *Rh. rhaponticum* – G, misapplied]

Rumex Linnaeus 1753 (Dock)

A genus of about 200 species, perennial and annual herbs (and a few shrubs), of cosmopolitan distribution. References: Mosyakin in FNA (2005); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993).

subgenus *Acetosella*: acetosella
subgenus *Acetosa*: acetosa, hastatulus
subgenus *Rumex*: the rest

* ***Rumex acetosella*** Linnaeus, Red Dock, Sheep Sorrel, Sourgrass. Mt, Pd, Cp (GA, NC, SC, VA). [= RAB, C, FNA, G, GW, K, W; > *R. acetosella* var. *acetosella* – F; > *R. acetosella* var. *pyrenaeus* (Pouret) Timbal-Lagrave – F; = *Acetosella acetosella* (Linnaeus) Small – S; > *Acetosella vulgaris* (Koch) Fourreau ssp. *pyrenaica* (Pourret ex Lapeyrouse) Á. Löve]

Rumex altissimus A. Wood, Pale Dock, Tall Dock, Peachleaf Dock. Mt, Pd (GA, NC, SC, VA), Cp (NC): roadsides, disturbed areas; uncommon. ME and MN south to FL, TX, AZ, and n. Mexico. [= RAB, C, F, FNA, G, GW, K, S, W]

Rumex brittanica Linnaeus, Great Water Dock, native species south to VA, PA, NJ, KY (FNA). [= FNA; > *R. orbiculatus* A. Gray – C, F, G, W; > *R. orbiculatus* var. *orbiculatus* – K]

* ***Rumex brownii*** Campderá, Brown's Dock. Cp (SC), Pd (NC): disturbed areas, floodplains, wool-combing waif; rare, native of Australia. [= FNA; = *R. brownei* – K, orthographic variant]

* ***Rumex conglomeratus*** Murray, Clustered Dock. Cp, Pd (GA, NC, SC), Mt (GA), {VA}: [= RAB, C, F, FNA, G, GW, K, S]

* ***Rumex crispus*** Linnaeus *ssp.* ***crispus***, Curly Dock. Mt, Pd, Cp (GA, NC, SC, VA): common. [= FNA, K; < *R. crispus* – RAB, C, F, G, GW, S, W]

Rumex fascicularis Small. Cp (NC?): swamps and marshes; rare (if present). Peninsular FL, and perhaps north to se. NC. [= FNA, S; < *R. verticillatus* Linnaeus – F, G; = *R. verticillatus* ssp. *fascicularis* (Small) Á. Löve]

Rumex floridanus Meisner, Florida Dock. Cp (GA, NC, SC): swamps and marshes; uncommon. NJ south to FL, west to LA. Orangeburg Co. SC (fide Steve Leonard). [= FNA, G, S; < *R. verticillatus* – RAB, C, F, GW; = *R. verticillatus* Linnaus ssp. *floridanus* (Meisner) Á. Löve; > *R. chrysocarpus* Moris – GW, K, misapplied]

Rumex hastatulus Baldwin, Wild Dock. Cp, Pd (GA, NC, SC, VA), Mt (GA, SC). [= RAB, C, F, FNA, G, GW, K, S, W; *Acetosa hastatula* (Baldwin) Á. Löve]

* ***Rumex obtusifolius*** Linnaeus, Bitter Dock. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): common, introduced. [= RAB, C, F, FNA, G, GW, K, S, W]

* ***Rumex patientia*** Linnaeus, Patience Dock, Monk's-rhubarb. Mt, Pd (NC, VA): rare, introduced. [= RAB, C, F, FNA, G, K]

* ***Rumex pulcher*** Linnaeus, Fiddle Dock. Cp, Pd (GA, NC, SC), Mt (SC), {VA}: native of Eurasia. [= RAB, C, F, FNA, G, GW, K, S, W]

* ***Rumex stenophyllus*** Ledebour, Narrowleaf Dock. Cp (SC), native of Eurasia. [= FNA, K]

Rumex verticillatus Linnaeus, Swamp Dock. Cp (GA, NC, SC, VA), Pd (NC): tidal freshwater marshes and swamps; common (rare in Piedmont). [= FNA, S; < *R. verticillatus* – RAB, C, F, G, GW, K, W, in part]

* *Rumex acetosa* Linnaeus, Green Sorrel, introduced and naturalized as a weed at least far south as se. PA (Rhoads & Klein 1993). [= C, F, FNA, G; = *R. acetosa* ssp. *acetosa* – K; = *Acetosa pratensis* Miller]

* *Rumex cuneifolius* Campderá. A rare introduction from South America in AL, FL. [= FNA, S; *R. frutescens* Thouars – K, misapplied]

*? *Rumex fueginus* Philippi, American Golden Dock. (NC?). MD, DE, PA. [= FNA; < *R. maritimus* Linnaeus – G, K; = *R. maritimus* var. *fueginus* (Philippi) Dusen – F; *R. maritimus* var. *persicarioides* (Linnaeus) R.S. Mitchell – C, misapplied; *R. persicarioides* Linnaeus – S, misapplied]

* *Rumex paraguayensis* Parodi, Paraguayan Dock. {distribution}. See Brown & Marcus (1998). [= FNA, GW, K]

* *Rumex sanguineus* Linnaeus, Bloody Dock, Red-veined Dock, is introduced at least as far south as se. PA (Rhoads & Klein 1993), MD, NJ, and AL (Kartesz 1999). [= C, FNA, G, K, S]

Rumex triangulivalvis (Danser) Rechinger f. South to WV, DE, PA, KY. [= FNA; < *Rumex salicifolius* Weinmann var. *mexicanus* (Meisner) C.L. Hitchcock – K; = *R. salicifolius* var. *triangulivalvis* (Danser) C.L. Hitchcock – C; < *R. mexicanus* Meisner – F, G]

PORTULACACEAE A.L. de Jussieu 1789 (Purslane Family)

A family of about 29 genera and 450-500 species, trees, vines, shrubs, and herbs, primarily of the Southern Hemisphere, but also occurring in North America and e. Asia. References: Packer in FNA (2003b); Carolin in Kubitzki, Rohwer, & Bittrich (1993).

1 Flowers sessile or subsessile; capsule circumscissile ..... ***Portulaca***
1 Flowers pedicelled; capsule opening longitudinally.
  2 Flowers borne on a scape, with cymose branching
    3 Leaves linear, terete, 1-2 mm wide; plants to 5 dm tall; [native] ..... ***Phemeranthus***
    3 Leaves obovate or elliptic, 20 mm or more wide; plants to 8 dm tall; [alien, persistent or escaped] ..... ***Talinum***

2 Flowers solitary or in racemes.
  4 Stems with 2 opposite cauline leaves; petals 6-14 mm long ..... ***Claytonia***
  4 Stems with > 2 leaves, opposite or alternate; petals 1-6 mm long ..... ***Montia***

Claytonia Linnaeus 1753 (Spring-beauty)

A genus of about 30 species, perennial herbs, of North America and e. Asia. References: Miller & Chambers (2006)=Y; Miller in FNA (2003b); Davis (1966)=Z; Lewis & Suda (1968); Lewis, Oliver, & Suda (1967); Carolin in Kubitzki, Rohwer, & Bittrich (1993).

1 Cauline leaves 3-6 (-11) cm long (including the evident petiole), the blade narrowly diamond-shaped, 2.5-6 (-8)× as long as wide; leaves 10-15 (-30) mm wide ..... ***C. caroliniana***
1 Cauline leaves (5-) 7-20 cm long (including the poorly differentiated petiole), the blade > 8× as long as wide; leaves 1-10 (-20) cm wide.
  2 Broadest leaves on a plant 1-2 (-4) mm wide ..... ***C. virginica var. acutiflora***
  2 Broadest leaves on a plant 5-10 (-20) mm wide ..... ***C. virginica var. virginica***

Claytonia caroliniana Michaux, Carolina Spring-beauty. Mt (GA, NC, VA): moist forests, especially northern hardwood forests and cove forests at moderate to high elevations; common. March-May. Nova Scotia west to MN, south to w. NC, e. TN, and n. GA. [= RAB, C, F, FNA, G, S, W, Y, Z; > *C. caroliniana* var. *caroliniana* – K; > *C. caroliniana* Michaux var. *lewisii* McNeill – K]

Claytonia virginica Linnaeus *var.* ***acutiflora*** A.P. de Candolle, Southern Spring-beauty. Mt, Pd, Cp (GA, NC, SC, VA): moist forests; common. (January-) February-April. VA west to IL, south to sw. GA and TX. This variety has chromosome numbers of n=6, n=7, and polyploid and polyploid/aneuploid derivatives of those numbers. [= C, K; < *C. virginica* – RAB, F, FNA, G, W, Y; = *C. virginica* – S; = *C. virginica* var. *simsii* (Sweet) R.J. Davis – Z; = *C. simsii* Sweet]

Claytonia virginica Linnaeus *var.* ***virginica***, Eastern Spring-beauty. Mt (GA, NC, SC, VA), Pd, Cp (NC, SC, VA): moist forests. (January-) February-April. Nova Scotia west to MN, south to GA and TX. This variety has chromosome numbers of n=8 and polyploid and polyploid/aneuploid derivatives of that number. [= K, Z; < *C. virginica* – RAB, F, FNA, G, W, Y; < *C. virginica* var. *virginica* – C; = *C. media* (A.P. de Candolle) Link – S]

Montia Linnaeus 1753 (Blinks, Montia)

A genus of about 10 species, annual herbs, of nearly cosmopolitan distribution in temperate regions. References: Miller in FNA (2003b); Carolin in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves opposite ..... ***M. fontana***
1 Leaves alternate ..... ***M. linearis***

* ***Montia fontana*** Linnaeus, Water Blinks. Cp (VA): wet places; rare, native of northern North America and Eurasia. [= FNA; > *M. fontana* var. *fontana* – C; > *M. fontana* ssp. *fontana* – K]

* ***Montia linearis*** (Douglas ex Hooker) Greene, Narrow-leaved Montia. Pd (NC), Cp (VA): lawns, disturbed areas; rare, native of western North America. Also in c. TN (Chester, Wofford, & Kral 1997). [= FNA, K]

Phemeranthus Rafinesque 1814 (Rock-pink, Fameflower)

A genus of about 20 species, herbs and dwarf shrubs, of America. Our North American "Talinums" are not closely related to the broad-leaved type of *Talinum* and are transferred to *Phemeranthus* (Kiger 2001). Adaptation of our native species of *Phemeranthus* to different rock substrates is discussed by Ware & Pinion (1990). References: Kiger in FNA (2003b); Wilson (1932)=X; Ware (1967)=Y; Kiger (2001)=Z; Murdy & Carter (2001)=Q; Carter & Murdy (1985); Rose & Standley (1911); Carolin in Kubitzki, Rohwer, & Bittrich (1993); Hershkovitz & Zimmer (2000).

1 Leaves obovate or elliptic, 20 mm or more wide; [an introduction, persistent or escaped] ..... *[see **Talinum**]*
1 Leaves linear, terete, 1-2 mm wide; [native].
  2 Stamens 4-8; flowers open in late afternoon ..... ***[Ph. parviflorus]***
  2 Stamens 12-80; flowers variously open from early or late afternoon.
    3 Style 2-3.5 mm long, shorter than or about the same length as the stamens; stamens 12-30; flowers open from (3-) 3:30 to 7 p.m. E.D.S.T. ..... ***Ph. teretifolius***
    3 Style 3.8-7 mm long; stamens 25-80; flowers open from about 1 to 7 p.m. E.D.S.T.
      4 Stigma distinctly 3-lobed; mature seeds covered with a dull gray coating; [of calcareous rock outcrops] ..... ***[Ph. calcaricus]***
      4 Stigma subcapitate; mature seeds brown-black and lustrous; [of noncalcareous rocks].
        5 Stamens (40-) 50-80 (-90); [of granite and sandstone from SC southward] ..... ***Ph. mengesii***
        5 Stamens 25-42; [of mafic and ultramafic rocks, known from nc. NC and sc. VA] ..... ***Ph. species 1***

Phemeranthus mengesii (W. Wolf) Kiger, Large-flowered Rock-pink. Pd (GA, SC), Cp (GA): in shallow soil over felsic rocks (granite) or sandstone (in GA and AL), or Altamaha Grit (GA), where periodically wet by seepage; rare (locally common in GA). June-September. C. SC south to c. GA (where it extends into the Coastal Plain on outcrops of Altamaha Grit), west to n.

AL and sc. TN. *Ph. mengesii* and *Ph. parviflorus* Nuttall of the midwestern United States (and disjunct as far east as AL) are apparently the parents of the allotetraploid *Ph. teretifolius*. Diploid and tetraploid populations are known of this taxon; further investigation is needed to determine if the tetraploids are allotetraploids or autotetraploids. [< *Phemeranthus mengesii* – FNA, Z (also see *Ph. species 1*); = *Talinum mengesii* W. Wolf – Q, S, X, Y; < *Talinum mengesii* – K (also see *Ph. species 1*)]

Phemeranthus species 1. Pd (NC, VA): in periodic seepage on mafic or ultramafic rocks; rare (NC Proposed Endangered). (June?) July-September. This taxon was discovered at a diabase glade in Granville County, NC and ultramafic barrens in Franklin County, VA, floristically rich in other species of disjunct and relict distribution. Further investigations are needed to confirm its chromosome complement and relationship to *Ph. teretifolius* of nearby granite flatrocks, and to the more southerly *Ph. mengesii*. It is possible that it is only an unusual form of *Ph. mengesii*. [< *Talinum mengesii* – K; < *Phemeranthus mengesii* – FNA, Z]

Phemeranthus teretifolius (Pursh) Rafinesque, Appalachian Rock-pink. Mt, Pd (GA, NC, SC, VA), Cp (GA): in shallow soil over felsic or mafic rocks (granite, gneiss, schist, granite, diabase, greenstone, metabasalt, sandstone, Altamaha grit), especially where periodically wet by seepage (often in mats of the moss *Grimmia*); common. June-September. DE, se. PA, and WV, south to se. TN, GA (where it extends into the Coastal Plain on outcrops of Altamaha Grit), and AL, in the Appalachians and adjacent provinces. *Ph. teretifolius* is an allotetraploid, probably derived from hybridization followed by polyploidization of the diploids *Ph. mengesii* and *Ph. parviflorus*. [= FNA, Z; = *Talinum teretifolium* Pursh – RAB, C, F, G, K, Q, S, W, X, Y]

Phemeranthus calcaricus (S. Ware) Kiger, Cedar-glade Rock-pink. Calcareous glades, from c. TN south to n. AL. A tetraploid species, probably derived from *Ph. calycinus* Engelmann. [= FNA, Z; = *Talinum calcaricum* S. Ware – K, Q, Y]

Phemeranthus parviflorus (Nuttall) Kiger, Small-flowered Rock-pink. More western, occurs as an eastern disjunct in n. AL. A diploid species. [= FNA, Z; = *Talinum parviflorum* Nuttall – C, F, G, K, Q, X; > *Talinum parviflorum* – Y; > *Talinum appalachianum* W. Wolf – Y]

Portulaca Linnaeus 1753 (Purslane, Portulaca)

A genus of about 40 species, annual and perennial herbs, nearly cosmopolitan, but especially in tropical, subtropical, and warm temperate regions. *Portulaca* flowers open only for a few hours each on sunny days (Matthews & Levins 1985). References: Matthews in FNA (2003b); Matthews & Levins (1985)=Z; Matthews, Faircloth, & Allison (1991); Matthews & Levins (1986); Matthews, Ketron, & Zane (1992a, 1992b, 1993); Matthews & Ketron (1991); Carolin in Kubitzki, Rohwer, & Bittrich (1993). Key based closely on Matthews in FNA (2003b).

1 Plants in flower.
- 2 Petals yellow, orange, copper, bronze, or white.
  - 3 Flowers > 25 mm across (single petals > 15 mm long).
    - 4 Leaves terete; capsule not encircled by an expanded, membranaceous wing ..... ***P. grandiflora***
    - 4 Leaves flat; capsule encircled by an expanded, membranaceous wing ..... ***P. umbraticola***
  - 3 Flowers < 20 mm across (single petals < 12 mm long).
    - 5 Leaf blades terete or hemispheric in cross-section, linear, usually < 2 mm wide; [rare waif] ..... ***P. halimoides***
    - 5 Leaf blades flattened in cross-section, obovate or spathulate, > 2.5 mm wide; [collectively common].
      - 6 Capsule encircled by an expanded membranaceous wing; [native to granitic and sandstone outcrops in SC and GA] ..... ***P. coronata***
      - 6 Capsule not encircled by an expanded membranaceous wing; [exotic weed, usually seen in disturbed soils] ..... ***P. oleracea***
- 2 Petals pink to purple.
  - 7 Flowers > 25 mm across (single petals > 15 mm long) ..... ***P. grandiflora***
  - 7 Flowers < 20 mm across (single petals < 12 mm long).
    - 8 Leaves flattened in cross-section, > 2.5 mm wide, obovate to spatulate ..... ***P. amilis***
    - 8 Leaves terete to hemispherical in cross-section, usually < 2 mm wide, linear to lanceolate.
      - 9 Petals deeply bilobed; stamens > 40; [of sandstone (Altamaha Grit) outcrops in s. GA] ..... ***P. biloba***
      - 9 Petals not bilobed; stamens usually < 30; [collectively widespread and of various habitats].
        - 10 Petals dark pink to purple; seeds < 0.6 mm wide, round ..... ***P. pilosa***
        - 10 Petals medium to pale pink; seeds > 0.6 mm wide, elongate ..... ***P. smallii***

1 Plants in fruit.
- 11 Capsule encircled by an expanded membranaceous wing.
  - 12 [Native in our area, in thin soil on granitic and sandstone outcrops in SC and GA] ..... ***P. coronata***
  - 12 [Introduced cultivar, persistent to weakly spreading from plantings] ..... ***P. umbraticola***
- 11 Capsule not encircled by an expanded membranaceous wing.
  - 13 Leaves flattened in cross-section, > 2.5 mm wide, obovate to spatulate.
    - 14 Trichomes at nodes conspicuous; seeds round, < 0.6 mm wide ..... ***P. amilis***
    - 14 Trichomes at nodes inconspicuous; seeds elongate, > 0.6 mm long ..... ***P. oleracea***
  - 13 Leaves terete to hemispherical in cross-section, usually < 2 mm wide, linear to lanceolate.
    - 15 Nodes and inflorescences with inconspicuous trichomes ..... ***P. biloba***
    - 15 Nodes and inflorescences with conspicuous trichomes
      - 16 Seeds > 0.65 mm wide.
        - 17 Longest leaves mostly > 20 mm long; capsules mostly > 4 mm in diameter; [introduced, usually in obviously disturbed sites] ..... ***P. grandiflora***
        - 17 Longest leaves mostly < 17 mm long; capsules mostly < 3.5 mm in diameter; [native, on granitic or diabase flatrocks] ..... ***P. smallii***
      - 16 Seeds < 0.65 mm wide
        - 18 Capsules 1.1-2.0 mm in diameter; seeds 0.3-0.5 mm in diameter ..... ***P. halimoides***
        - 18 Capsules 1.5-5 mm in diameter; seeds (0.4-) 0.5-0.6 mm in diameter ..... ***P. pilosa***

* ***Portulaca amilis*** Spegaz., Broadleaf Pink Purslane. Cp (FL, GA, NC, SC, VA), Pd (NC, SC): sandy fields, and other dry, sandy, disturbed habitats; rare, native of South America. May-September. Matthews & Levins (1985) describe the spread of this alien species in North America, apparently from an introduction in North Carolina (the earliest North American collection in 1932 in Robeson County, NC). [= FNA, K, WH, Z]

Portulaca biloba Urban, Grit Purslane. Cp (GA): outcrops of Altamaha Grit; rare. This species has been collected repeatedly on outcrops of the Altamaha Grit in s. GA (Matthews, Faircloth, & Allison 1991); it also occurs in Cuba. Matthews, Faircloth, & Allison (1991) hypothesize introduction to the United States by hurricane. [= FNA, K; < *Portulaca teretifolia* ssp. *cubensis* (Urban) Ortega]

Portulaca coronata Small, Flatrock Portulaca. Pd (GA, SC), Cp (GA): on or around granitic flatrocks, usually under *Juniperus virginiana*, and on Altamaha Grit outcrops; rare. June-September. SC south to GA, endemic to granitic and sandstone outcrops in the Piedmont and rarely Altamaha grit (sandstone outcrops in the upper Coastal Plain. Matthews & Levins (1985) includes this taxon in *P. umbraticola*. Later, Matthews & Ketron (1991) and Matthews, Ketron, & Zane (1992) treated our southeastern material as *P. umbraticola* ssp. *coronata*. While the distinctive nature of the capsule unifies the southeastern "*coronata*," southwestern "*lanceolata*," and Central and South and Central American "*umbraticola*," the difference in chromosome number and flower color, associated with disjunctly allopatric distributions renders specific recognition equally plausible. [= RAB, S; < *P. umbraticola* Kunth – Z; = *P. umbraticola* Kunth ssp. *coronata* (Small) J.F. Matthews & Ketron – FNA, K]

* ***Portulaca grandiflora*** Hooker, Rose-moss. Cp (NC, SC, VA), Pd (NC, SC), {GA): in sandy soil or around granitic flatrocks; rare, native of Argentina. [= RAB, C, FNA, G, K, S, Z]

* ***Portulaca halimoides*** Linnaeus. Cp (VA): waste area along railroad; rare, probably only a waif, native of sw. North America. Reported by Reed (1964). [= FNA, K; > *P. parvula* A. Gray]

* ***Portulaca oleracea*** Linnaeus, Common Purslane, Garden Purslane, Pussley. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): gardens, disturbed areas, cracks in sidewalks; common (uncommon in FL), originally native (apparently) of Asia, probably introduced to North America from Europe. May-October. The various subspecies recognized may or may not be taxonomically significant; a decision awaits an analysis of variation worldwide, or, at least, in the native range of the species. In North America, *P. oleracea* is a widespread, sometimes noxious weed, probably representing numerous introductions of various genotypes, treated as multiple subspecies by some authors. In North America, these genotypes appear to have intermixed; in our area (at least), the recognition of infraspecific taxa has been considered unwarranted, difficult, and unmeaningful (see Matthews, Ketron, & Zane 1993); see Danin & Anderson (1986) for a contrasting opinion. During the Great Depression, *P. oleracea* was eaten extensively in the Valley of Virginia as a potherb. [= RAB, C, F, FNA, G, K, S, W, WH, Z]

Portulaca pilosa Linnaeus, Kiss-me-quick. Cp (FL, GA, NC, SC), Pd (NC, SC): disturbed sandy soils; uncommon. June-October. NC south to s. FL, west to NM, north in the interior to c. TN, AR, and OK, and in Central America; the native range perhaps obscure. See Matthews, Ketron, & Zane (1992a) for a further discussion of this species. [= RAB, FNA, K, S, WH, Z]

Portulaca smallii P. Wilson, Small's Portulaca. Pd (GA, NC, SC, VA): in thin soils on granitic and diabase flatrocks, sometimes locally spreading to adjacent fields, mowed areas, or other disturbed areas; rare (NC Threatened, SC Rare, VA Rare). June-October. Sc. VA south to c. GA. Generally considered an endemic limited to granitic flatrocks, *P. smallii* also occurs on a diabase flatrock, growing with an interesting mixture of granite flatrock and limestone cedar glade species (LeGrand 1987, Schafale & Weakley 1990). [= RAB, FNA, K, S, Z]

* ***Portulaca umbraticola*** Kunth. Pd, Cp (GA?, NC, SC): disturbed areas, spreading weakly or persistent following cultivation; rare, native of South America and the West Indies. See *P. coronata* for further discussion. [< *P. umbraticola* Kunth – Z; = *P. umbraticola* Kunth ssp. *umbraticola* – K]

Talinum Adanson 1763 (Jewels-of-Opar)

A genus of about 15 species, herbs, and dwarf shrubs, mainly of Africa but with 2 species of the New World tropics). References: Kiger in FNA (2003b); Wilson (1932)=X; Carolin in Kubitzki, Rohwer, & Bittrich (1993). [also see *Phemeranthus*]

* ***Talinum paniculatum*** (Jacquin) Gaertner, Jewels-of-Opar. Pd (GA, NC, SC), Cp (GA): fairly commonly cultivated, locally escaped to disturbed areas and garden edges; rare, native of the West Indies. June-September. [= FNA, S, X; *T. paniculatum* var. *paniculatum* – K]

PRIMULACEAE Ventenat 1799 (Primrose Family)

As reconstituted, a family of 12-13 genera and about 600 species, herbs, primarily north temperate. Källersjö, Bergqvist, & Anderberg (2000) and Martins, Oberprieler, & Hellwig (2003) suggest that the traditional Primulaceae is polyphyletic, and recommend the transfer of several genera to other families, including *Lysimachia*, *Anagallis*, *Centunculus*, *Trientalis*, and *Glaux* to Myrsinaceae and *Samolus* to Theophrastaceae. *Dodecatheon* and *Hottonia* remain in Primulaceae s.s. References: Channell & Wood (1959); Källersjö, Bergqvist, & Anderberg (2000); Martins, Oberprieler & Hellwig (2003); Anderberg in Kubitzki (2004). [also see *MYRSINACEAE* and *SAMOLACEAE*]

1 Aquatic; leaves pectinate (deeply pinnatifid into linear segments) ..... ***Hottonia***
1 Terrestrial (though sometimes in wetlands or submersed for short periods of time); leaves entire or shallowly toothed.
  2 Leaves strictly in a basal rosette or basally disposed (with a basal rosette and smaller stem leaves).
    3 Inflorescence an umbel; leaves strictly basal ..... ***Primula***

3 Inflorescence a raceme or a panicle of racemes; larger leaves basal and smaller leaves on the stem ..... *[see **Samolus** in SAMOLACEAE]*
2 Leaves all or chiefly cauline ..... *[see **Anagallis, Centunculus, Lysimachia, Trientalis** in MYRSINACEAE]*

Hottonia Linnaeus 1753 (Water-violet)

A genus of 2 species, aquatic herbs, of North America and Eurasia. References: Anderberg in Kubitzki (2004).

Hottonia inflata Elliott, Featherfoil, Water-violet. Cp (NC, SC, VA), Pd (GA, NC): slow-moving or stagnant waters of swamps, millponds, beaverponds, sag ponds, oxbows, rivers, probably dispersed by waterfowl, primarily in the Coastal Plain, very rarely in the Piedmont; rare (GA Special Concern, NC Watch List). April-May; May-June. ME south to FL, west to TX, inland up the Missisippi Embayment to IL, and at other scattered locations inland (as WV, and especially around the Great Lakes). The species shows large population fluctuations, and may be essentially ephemeral at many locations. Townsend (1995) documents its first SC record. [= RAB, C, F, G, GW, K, S]

Primula Linnaeus 1753 (Shooting star)

A genus of {}. Mast et al. (2004) show that *Dodecatheon* is nested within *Primula*, and is closely related to (and derived from) *Primula* subgenus *Auriculastrum*, apparently via a relatively simple alteration of the corolla for buzz-pollination. References: Mast & Reveal (2007)=Y; Fassett (1944)=Z; Mast et al. (2004).

1 Leaves cordate, subcordate, or abruptly narrowed to the petiole ..... ***[P. frenchii]***
1 Leaves long-cuneate at the base, gradually narrowed to the petiole ..... ***P. meadia***

Primula meadia (Linnaeus) A. R. Mast & Reveal, Eastern Shooting Star. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, SC): rich forests, woodlands, and rock outcrops (primarily calcareous or mafic), especially with nutrient-rich seepage; uncommon, rare in NC. Late March-early June; late May-June. MD and PA west to s. WI, se. MN, IA, and OK, south to n. GA, n. FL (Gadsden County), AL, and TX. [= Y; = *Dodecatheon meadia* – RAB, W; > *D. meadia* Linnaeus var. *meadia* – C, F, G, Z; > *Dodecatheon meadia* Linnaeus var. *brachycarpum* (Small) Fassett – C, F, G, Z; > *D. meadia* ssp. *meadia* – K; > *D. meadia* ssp. *brachycarpum* (Small) R. Knuth – K; > *D. brachycarpa* Small – S; > *D. meadia* – S; > *D. hugeri* Small – S; > *D. meadia* var. *genuinum* – Z; > *D. meadia* var. *obesum* Fassett – Z]

Primula frenchii (Vasey) A.R. Mast & Reveal, French's Shooting-star. IN, IL, and MO south to AL and AR. [= Y; = *Dodecatheon meadia* Linnaeus var. *frenchii* Vasey – C, F, G, Z; = *D. frenchii* (Vasey) Rydberg – K]

RANUNCULACEAE A.L. de Jussieu 1789 (Buttercup Family)

A family of about 62 genera and 2450 species, herbs, shrubs, and vines, primarily of temperate and boreal regions. References: Whittemore & Parfitt in FNA (1997); Keener (1977); Tamura in Kubitzki, Rohwer, & Bittrich (1993). [also see *HYDRASTIDACEAE*]

1 Shrub or vine; leaves compound (or sometimes some to most of them simple in *Clematis*).
  2 Leaves opposite, distributed along the usually branched, clambering stem; sepals 4, white to blue or purplish, 10-50 mm long; wood not yellow; [subfamily *Ranunculoideae*, tribe *Anemoneae*] ..... ***Clematis***
  2 Leaves alternate, clustered together at the top of the usually unbranched, erect stem; sepals 5, maroon, 2-5 mm long; wood yellow; [subfamily *Isopyroideae*, tribe *Coptideae*] ..... ***Xanthorhiza***
1 Herb; leaves compound or simple.
  3 Leaves simple, sometimes deeply cleft or lobed into rounded or elongate segments.
    4 Plants in flower ..... **Key A**
    4 Plants in fruit ..... **Key B**
  3 Leaves compound, the leaflets either linear or more-or-less petiolulate.
    4 Plants in flower ..... **Key C**
    4 Plants in fruit ..... **Key D**

Key A

1 Flowers bilaterally symmetrical, the upper sepal hooded or spurred; [subfamily *Helleboroideae*, tribe *Delphinieae*].
  2 Upper sepal hooded or helmet-shaped; petals hidden by the sepals; perianth blue or creamy white; stems weak, clambering, reclining, vining, or ascending in a curve ..... ***Aconitum***
  2 Upper sepal spurred; petals at least partly exserted from the sepals; perianth blue, pink, white, or greenish; stems strong, erect, normally straight
    3 Annual; pistil 1; petals 2, connate; leaf lobes < 1.5 mm wide ..... ***Consolida***
    3 Perennial; pistil 3 (-5); petals 4, separate; leaf lobes > 2 mm wide ..... ***Delphinium***
1 Flowers radially symmetrical, no perianth parts spurred or hooded (except the 5 sepals spurred in *Myosurus*).

3 Petals present, white or yellow, larger and more conspicuous than the sepals; sepals present, green; [in other words, **with** a second, green, less conspicuous perianth whorl below the largest and colored perianth whorl; note that some *Anemone* have a calyx-like involucre of 3 bracts subtending each flower]; [subfamily *Ranunculoideae*, tribe *Ranunculeae*].
  4 Basal leaves linear to linear-spatulate, mostly 4-8 cm long, 1-3 mm wide; receptacle elongate, 1-6 cm long (superficially resembling a *Plantago* inflorescence)..... ***Myosurus***
  4 Basal leaves various, but not as above; receptacle globose to sub-cylindric, mostly < 1 cm long
    5 Sepals 3 (-4); petals 7-12; achenes pubescent, beakless; leaves simple, cordate, unlobed; [introduced garden plants]..... ***Ficaria***
    5 Sepals (3-) 5 (-6); petals typically 5-9 (10 in some "doubled" forms); achenes smooth or variously ornamented with spines, papillae, or tubercles, sometimes also pubescent; leaves various, usually not at once simple, cordate, and unlobed; [native or introduced]..... ***Ranunculus***
3 Petals absent (or modified into relatively inconspicuous nectaries or staminodia); sepals present and petaloid (white, yellow, yellow-green, cream, or blue).
  6 Sepals 3-5 mm long, caducous; stamens white and showy; [subfamily *Ranunculoideae*, tribe *Ranunculeae*]..... ***Trautvetteria***
  6 Sepals 6-40 mm long, not caducous; stamens not notably white and showy.
    7 Leaves opposite, distributed along the stem; style plumose; [subfamily *Ranunculoideae*, tribe *Anemoneae*]..... ***Clematis***
    7 Leaves all basal, or with a few alternate or whorled involucrate leaves on the stem; style not plumose.
      8 Sepals white, bluish, or blue; basal leaves 3-5 (-7)-lobed; [subfamily *Ranunculoideae*, tribe *Anemoneae*]..... ***Anemone***
      8 Sepals yellow, green, or whitish (sometimes marked with purple); basal leaves unlobed, or palmately cleft into 5-11 (-many) segments; [subfamily *Helleboroideae*, tribe *Helleboreae*].
        9 Leaves cordate-reniform, unlobed; sepals bright yellow; petals absent; [native, of bogs and marshes]..... ***Caltha***
        9 Leaves palmately or pedately lobed or divided; sepals green, greenish, dull yellow, or whitish; petals modified into tubular nectaries; [introduced, rarely persistent or escaped from cultivation].
          10 Sepals 5-8, much longer than wide, yellow; cauline leaves absent, except for the involucre which immediately subtends the flower..... ***Eranthis***
          10 Sepals 5, nearly as wide as long, green or maroon; cauline leaves present..... ***Helleborus***

Key B

1 Fruit a follicle, each carpel with 2 or more ovules; [subfamily *Helleboroideae*].
  2 Leaves cordate-reniform, toothed, not lobed or divided; [tribe *Helleboreae*]..... ***Caltha***
  2 Leaves variously palmately or pedately lobed or divided.
    3 Carpels 1-3; plants 3-30 dm tall; [native, except *Consolida*]; [tribe *Delphinieae*].
      4 Stems weak, clambering, reclining, or vining..... ***Aconitum***
      4 Stems strong, erect
        5 Annual; leaf lobes < 1.5 mm wide; [exotic]..... ***Consolida***
        5 Perennial; leaf lobes > 2 mm wide; [native]..... ***Delphinium***
    3 Carpels 3-6; plants 1-5 dm tall; [introduced, rarely persistent or escaping]; [tribe *Helleboreae*].
      6 Cauline leaves absent, except for the involucre which immediately subtends the fruit..... ***Eranthis***
      6 Cauline leaves present..... ***Helleborus***
1 Fruit an achene (or dehiscent utricle in *Trautvetteria*), each carpel with 1 ovule; [subfamily *Ranunculoideae*].
  7 Leaves opposite, distributed along the stem; style plumose; [tribe *Anemoneae*]..... ***Clematis***
  7 Leaves all basal, or with a few alternate or whorled involucrate leaves on the stem; style not plumose.
    8 Basal leaves linear to linear-spatulate, mostly 4-8 cm long, 1-3 mm wide; receptacle elongate, 1-6 cm long (superficially resembling a *Plantago* inflorescence); [tribe *Ranunculeae*]..... ***Myosurus***
    8 Basal leaves various, but not as above, generally long-petiolate, with an expanded, cordate, 3-lobed, or palmately-lobed blade; receptacle globose to sub-cylindric, mostly < 1 cm long.
      9 Fruit a dehiscent utricle; cauline leaves alternate; [tribe *Ranunculeae*]..... ***Trautvetteria***
      9 Fruit an achene; cauline leaves opposite or whorled (or alternate in *Ranunculus*).
        10 Cauline leaves opposite or whorled, or reduced to 3 sepal-like involucral bracts immediately subtending the flower; sepals absent (but in *"Hepatica"* mimicked by the bracts); [tribe *Anemoneae*]..... ***Anemone***
        10 Cauline leaves alternate; sepals present; [tribe *Ranunculeae*]
          11 Achenes pubescent, beakless; leaves simple, cordate, unlobed; [introduced garden plants]..... ***Ficaria***
          11 Achenes smooth or variously ornamented with spines, papillae, or tubercles, sometimes also pubescent; leaves various, usually not at once simple, cordate, and unlobed; [native or introduced]..... ***Ranunculus***

Key C

1 Leaflets linear, < 1.5 mm wide.
  2 Flowers bilaterally symmetrical..... ***Consolida***
  2 Flowers radially symmetrical.
    3 Aquatic; [native]..... ***Ranunculus***
    3 Terrestrial; [alien].
      4 Flower lacking involucre; pistils simple..... ***[Adonis]***
      4 Flower closely subtended by a finely dissected involucre; pistils compound..... ***Nigella***
1 Leaflets broader, rounded, lobed, or toothed.
  5 Leaves all cauline, opposite; stems somewhat woody at base..... ***Clematis***
  5 Leaves basal and cauline, the cauline alternate (or with opposite or whorled involucral bracts).
    6 Petals present, conspicuous
      7 Flowers dangling; petals red, orange with yellow, or blue, spurred..... ***Aquilegia***
      7 Flowers not dangling; petals yellow, not spurred..... ***Ranunculus***

6 Petals absent or inconspicuous (soon deciduous or altered into a nectary-bearing clavate structure); sepals sometimes petaloid and conspicuous.
8 Sepals petaloid, conspicuous, white (or tinged with pink or green).
9 Involucre absent, all leaves on the stem alternate; petaloid sepals 5-10, white ..... ***Enemion***
9 Involucre of opposite or whorled, leaflike bracts present; peatloid sepals (4-) 5-20 (-30), white, cream, rose, or green.
10 Basal leaves with 3-5 leaflets, these toothed or incised; petaloid sepals white, cream, rose, or green ..... ***Anemone***
10 Basal leaves with > 5 leaflets; these with 0-3 rounded lobes at the tip; petaloid sepals white to pale pink ..... ***Anemonella***
8 Sepals absent, or inconspicuous in comparison to the stamens or pistils.
11 Leaflets 3; flower solitary ..... ***Coptis***
11 Leaflets many; flowers many, in a panicle or raceme.
12 Inflorescence a raceme ..... ***Actaea***
12 Inflorescence a panicle ..... ***Thalictrum***

Key D

1 Fruit a follicle or capsular (or fleshy and berrylike in some *Actaea*).
2 Mature leaves > 4 dm wide ..... ***Actaea***
2 Mature leaves < 3 dm wide.
3 Leaflets linear; [aliens].
4 Flowers in a raceme, not subtended by an involucre; fruit follicular, each with a 1-2 mm long beak ..... ***Consolida***
4 Flower solitary, subtended by a finely divided involucre; fruit a spherical capsule-like structure composed of 5 or 10 partially connate follicles, each follicle terminated by a linear beak 13-20 mm long ..... ***Nigella***
3 Leaflets broad, rounded; [mostly natives].
5 Follicles borne on stipes, forming an umbel-like cluster; rhizomes yellow or orange ..... ***Coptis***
5 Follicles sessile; rhizomes brown or tan.
6 Follicles 15-31 mm long, with beaks 7-18 mm long ..... ***Aquilegia***
6 Follicles 3.5-6.5 mm long, with beaks 1.5-3 mm long ..... ***Enemion***
1 Fruit an achene.
7 Leaves divided into numerous linear segments, all of which are < 1 mm wide.
8 Plant terrestrial ..... ***[Adonis]***
8 Plant aquatic (if leaves divided into numerous linear segments) ..... ***Ranunculus***
7 Leaf segments rounded or cleft, > 1 mm wide.
9 Leaves cauline, opposite ..... ***Clematis***
9 Leaves basal and/or cauline, cauline leaves (if present) alternate (leaflike involucral bracts sometimes present and opposite or whorled).
10 Leaflike involucral bracts present, opposite or whorled.
11 Achenes not ribbed or veined on lateral surfaces; leaf texture moderate to distinctly thick and leathery ..... ***Anemone***
11 Achenes conspicuously ribbed or veined on lateral surfaces; leaf texture thin, delicate ..... ***Anemonella***
10 Leaflike involucral bracts not present.
12 Leaflets 3-many, if many the leaflets typically with teeth, or sharp lobes ..... ***Ranunculus***
12 Leaflets many, unlobed or typically with 3-9 rounded lobes ..... ***Thalictrum***

Aconitum Linnaeus 1753 (Monkshood, Aconite)

A genus of about 300 species, herbs, of Eurasia, n. Africa, and North America. References: Brink & Woods in FNA (1997); Hardin (1964b)=Z; Tamura in Kubitzki, Rohwer, & Bittrich (1993).

1 Flowers white, creamy white, or yellowish; basal leaves numerous, large, usually 10-20 cm across, on long, stout petioles; roots fascicled; [section *Lycoctonum*] ..... ***A. reclinatum***
1 Flowers pale to medium blue (rarely white); basal leaves fewer, smaller, rarely over 10 cm across, on shorter and wirier petioles; root thickened, tuberous ..... ***A. uncinatum***

Aconitum reclinatum A. Gray, White Monkshood, Trailing Wolfsbane, White Aconite. Mt (NC, VA): rich cove forests, particularly along brookbanks, in seepages, and in periglacial boulderfields with seepage, primarily over mafic rocks (such as amphibolite, metagabbro, or greenstone), rarely over sandstone or granitic rocks; rare (NC Rare, VA Watch List). June-September. A Southern and Central Appalachian endemic: sw. PA, w. VA and e. WV south to w. NC and ne. TN. It is more restricted in distribution and habitat than *A. uncinatum*, but the two species sometimes occur together, even intertwined! [= RAB, C, F, FNA, G, K, S, W, Z; *A. vaccarum* Rydberg]

Aconitum uncinatum Linnaeus, Eastern Blue Monkshood, Appalachian Blue Monkshood. Mt (GA, NC, SC, VA), Pd, Cp (GA, NC, VA): seepages, cove forests, other moist forests; uncommon (rare in Coastal Plain) (SC Rare). August-September. C. MD and sw. PA south to e. VA, e. NC, wc. GA, and c. TN. Two varieties or subspecies have sometimes been recognized, but characters seem ambiguous, poorly correlated with one another, and geographically incoherent. [= RAB, FNA, S, W; > *A. uncinatum* var. *muticum* Alphonse de Candolle – C; > *A. uncinatum* var. *uncinatum* – C, F; > *A. uncinatum* var. *acutidens* Fernald – F; > *A. uncinatum* Linnaeus ssp. *muticum* (A.P. de Candolle) Hardin = K, Z; > *A. uncinatum* ssp. *uncinatum* – K, Z]

Actaea Linnaeus 1753 (Baneberry)

A genus of about 28 species, perennial herbs, of temperate regions of the Northern Hemisphere. Compton, Culham, & Jury (1998) support the inclusion of *Cimicifuga* in *Actaea*, based on analyses of morphology and DNA sequences. References: Ford in FNA (1997); Compton, Culham, & Jury (1998)=Z; Tamura in Kubitzki, Rohwer, & Bittrich (1993); Park & Lee 1996). References: Ramsey in FNA (1997); Compton, Culham, & Jury (1998)=Z; Ramsey (1987, 1988); Tamura in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: In rich coves, *Actaea* occurs with and is sometimes mistaken for (especially when in vegetative condition) various other genera, including *Astilbe* (Saxifragaceae), *Aruncus* (Rosaceae), *Caulophyllum* (Berberidaceae), *Angelica* and *Ligusticum* (Apiaceae), *Aralia* (Araliaceae) and others. The curious evolutionary convergence of leaf morphology (to a 2-3-ternately compound form) of a large number of unrelated genera of Appalachian cove forests is interesting.

1 Plant with leaves only present.
  2 Terminal leaflet deeply cordate, mostly > 12 cm wide, with 7-9 major veins arising palmately from the base; principal leaves with 3-9 (-17) leaflets; [section *Oligocarpae*] ..... ***A. rubifolia***
  2 Terminal leaflet broadly cuneate, rounded, truncate, or subcordate, mostly < 12 cm wide, with 3 major veins arising from the base; principal leaves with (15-) 20-70 leaflets.
    3 Petiole of basal leaves with a deep, broad groove (ca. 1 mm wide and 1 mm deep), persistent on fully expanded leaves; roots with vascular tissue in lunate bundles arranged in a circle; flowering July-September; [section *Podocarpae*] ..... ***A. podocarpa***
    3 Petiole of basal leaves terete, not grooved (or with a shallow, narrow groove early, obscure or absent on fully expanded leaves); roots with vascular tissue in a central (3-) 4 (-5)-armed cross or star; flowering April-August; [section *Actaea*] ..... ***A. pachypoda, A. racemosa, or [A. rubra]***
1 Plant in flower or fruit.
  4 Carpels 3-8, on a short stipe elongating to 5-8 mm long; flowering July-September; roots with vascular tissue in lunate bundles arranged in a circle; [section *Podocarpae*] ..... ***A. podocarpa***
  4 Carpels 1 (-3), sessile; flowering April-October; roots with vascular tissue in a central (3-) 4 (-5)-armed cross or star.
    5 Fruit fleshy, indehiscent; flowering April-May; [section *Actaea*].
      6 Fruiting pedicels thick, 1-2 mm in diameter; fruit white (rarely red) ..... ***A. pachypoda***
      6 Fruiting pedicels slender, 0.4-0.7 mm in diameter; fruit red (rarely white) ..... ***[A. rubra]***
    5 Fruit dry, follicular, dehiscent; flowering May-October.
      7 Staminodes present; principal leaves with (15-) 20-70 leaflets; follicles 6-9 mm long; terminal leaflet broadly cuneate, rounded, truncate, or subcordate, with 3 major veins arising from the base; flowering May-August; [section *Actaea*] ..... ***A. racemosa***
      7 Staminodes absent; principal leaves with 3-9 (-17) leaflets; follicles 12-17 mm long; terminal leaflet deeply cordate, with 7-9 major veins arising palmately from the base; flowering August-October; [section *Oligocarpae*] ..... ***A. rubifolia***

Actaea pachypoda Elliott, White Baneberry, Dolls'-eyes, White Cohosh. Mt, Pd (GA, NC, SC, VA), Cp (FL, VA): rich cove forests and slopes; common (rare in Piedmont and Coastal Plain). April-May; August-October. Québec and MN south to c. GA, FL Panhandle, s. AL, s. MS, e. LA, and OK. [= RAB, F, FNA, K, W, Z; = *A. alba* (Linnaeus) P. Miller – C, G, S, probably misapplied; > *A. pachypoda* f. *pachypoda* – Z; > *A. pachypoda* f. *rubrocarpa* (Killip ex House) Fernald – Z]

Actaea podocarpa A.P. de Candolle, Mountain Black-cohosh, Late Black-cohosh. Mt (GA, NC, SC, VA): rich cove forests and slopes, at moderate to high elevations; uncommon (rare in SC). July-September. Endemic to the Southern and Central Appalachians: s. PA to w. NC, ne. GA, and e. TN. Most closely related to *Actaea laciniata* (S. Watson) J. Compton of OR and WA. [= K, Z; = ***Cimicifuga americana*** Michaux – RAB, C, F, FNA, G, S, W]

Actaea racemosa Linnaeus, Common Black-cohosh, Early Black-cohosh. Mt, Pd (GA, NC, SC, VA), Cp (NC, VA): rich cove forests, other mesic and moderately to very fertile forests; common (uncommon in SC, rare in Coastal Plain of NC). May-August. Primarily Appalachian: w. MA south to SC and c. GA, but extending e. into the Coastal Plain and west to OH, IN, and MO. Var. *dissecta* appears to be a sporadically occurring form, apparently always occurring in small numbers associated with typic material; McCoy (2004) reports its collection in NC. [= ***Cimicifuga racemosa*** (Linnaeus) Nuttall – RAB, C, F, FNA, S, W; >< *C. racemosa* var. *cordifolia* (Pursh) Gray – F, misapplied in part; > *C. racemosa* var. *racemosa* – F; < *C. racemosa* – G (also see *C. rubifolia*); > *Actaea racemosa* Linnaeus var. *racemosa* – K, Z; > *Actaea racemosa* Linnaeus var. *dissecta* (A. Gray) J. Compton – K, Z]

Actaea rubifolia (Kearney) Kartesz, Appalachian Black-cohosh. Mt (VA): rich cove forests over calcareous rocks (limestone or dolostone); rare. August-October. Sw. VA south to e. TN; disjunct in s. IL, w. KY, and nw. TN. This species is alleged by C (1991) to occur in NC, but this is probably an error, based on confusion with *Cimicifuga cordifolia* Pursh, now considered a form of *Actaea racemosa*. For this reason, the name *Actaea cordifolia* used by Compton, Culham, & Jury (1998) does not apply to this taxon. *Actaea rubifolia* is related to *Actaea elata* (Nuttall) Prantl of nw. North America. [= K; = ***Cimicifuga rubifolia*** Kearney – C, FNA, S, W; >< *C. racemosa* var. *cordifolia* (Pursh) A. Gray – F, misapplied in part; < *C. racemosa* – G; = *Actaea cordifolia* A.P. de Candolle – Z, misapplied]

Actaea rubra (Aiton) Willdenow, Red Baneberry. South to c. PA (Rhoads & Klein 1993) and n. NJ. [= C, F, FNA, G, Z; ? *A. rubra* ssp. *rubra* – K]

Adonis Linnaeus 1753 (Adonis)

A genus of about 26 species, annual and perennial herbs, of Eurasia. References: Tamura in Kubitzki, Rohwer, & Bittrich (1993).

* *Adonis annua* Linnaeus, Autumn Adonis, Bird's-eye, is naturalized in n. AL and sc. TN (Parfitt in FNA 1997). [= C, FNA, G, K]

Anemone Linnaeus 1753 (Anemone)

A genus of about 140-200 species (depending on circumscription), perennial herbs (rarely shrubs), of Eurasia, North America, Central America, South America, and Africa. Hoot, Reznicek, & Palmer (1994) discuss the phylogeny of *Anemone*, and also suggest that *Hepatica* be included within it. References: Dutton, Keener, & Ford in FNA (1997); Keener, Dix, & Dutton (1996); Tamura in Kubitzki, Rohwer, & Bittrich (1993); Steyermark & Steyermark (1960)=Z; Ziman et al. (2004)=Y.

1 Basal leaves lobed but not fully divided into 3 or more leaflets; [subgenus *Anemonidium*].
  2 Leaves lobed, and also toothed and variously cleft; leaves not variegated; [section *Anemonidium*] ..... ***A. canadensis***
  2 Leaves lobed, the margins of the lobes entire; leaves often prominently variegated; [section *Hepatica*].
    3 Leaves 3 (-7) lobed, the lobes acute, the primary sinuses deep, over halfway to the petiole (the middle lobe 70-90% of the total length of the leaf blade); involucral bracts acute ..... ***A. acutiloba***
    3 Leaves 3-lobed, the lobes broadly rounded, the primary sinuses less deep, about halfway to the petiole (the middle lobe 50-70% of the total length of the leaf blade); involucral bracts obtuse ..... ***A. americana***
1 Basal leaves compound, fully divided into 3 or more leaflets.
  4 Stem branched, 4-11 dm tall, bearing 2 or more flowers; involucral bracts petiolate; [subgenus *Anemone*; section *Anemone*; group *Multifida*].
    5 Base of involucral bracts usually truncate to subtruncate, sometimes reniform or cordate, terminal leaflets deep green, margins proximally concave- to straight-sided, distally incised, thinly pubescent; anthers typically < 0.8-1.2 (-1.5) mm long; heads of achenes more or less ovoid-cylindric, 8-10 (-11) mm in diameter ..... ***[A. virginiana** var. **alba]***
    5 Base of involucral bracts cordate or reniform, rarely subtruncate, terminal leaflets light green, margins proximally mostly straight- to convex-sided, variously lobed or serrate, variously pubescent; anthers typically > (0.9-) 1.1-1.5 (-1.7) mm long; heads of achenes ovoid to ovoid-cylindric, (9-) 10-12 (-14) mm in diameter ..... ***A. virginiana** var. **virginiana***
  4 Stem unbranched, 0.5-4 dm tall, bearing 1 flower.
    6 Sepals (5-) 8-20, cream-white, violet, blue, pink, or green; involucral leaves sessile; [subgenus *Anemone*; section *Anemone*; group *Coronaria*].
      7 Stem densely pubescent above and below the involucre; involucre above the midpoint of the stem at anthesis; plant from a globose, vertically oriented bulb; involucral leaflets linear, (1.5-) 3-6 cm long, 1-4 (-6) mm wide; achene bodies > 2.7-3.5 mm long ..... ***A. berlandieri***
      7 Stem densely pubescent above the involucre, glabrous to very sparsely pubescent beneath the involucre; involucre at or below the midpoint of the stem at anthesis; plant with horizontal rhizomes; involucral leaflets oblanceolate, 1-2.5 cm long; achene bodies < 1.5-2.5 (-3.0) mm long ..... ***A. caroliniana***
    6 Sepals 5 (-8), white; involucral leaves petiolate, the leaflets ovate, obovate, elliptic, lanceolate, or oblanceolate 2-8 cm long, 8-30 mm wide; [subgenus *Anemonanthea*, section *Anemonanthea*, series *Quinquefoliae*].
      8 Ovaries and achenes with hairs 0.1-0.2 mm long; terminal leaflet broadest at or below the middle (lanceolate or ovate), serrate to below the middle; sepals 15 mm or more long ..... ***A. lancifolia***
      8 Ovaries and achenes with hairs 0.5-1.0 mm long; terminal leaflet broadest at or above the middle (elliptic, oblanceolate, or obovate), serrate only above the middle; sepals < 15 mm long.
        9 Achene bodies 2.5-3.0 mm long; lateral leaflets of radical leaves toothed only (rarely lobed); terminal leaflet usually broadest at the middle; styles 0.5-1 mm long; sepals about 8 mm long ..... ***A. quinquefolia** var. **minima***
        9 Achene bodies 3.0-4.5 mm long; lateral leaflets of radical leaves lobed or cleft (sometimes only toothed); terminal leaflet usually broadest above the middle; styles 1-2 mm long; sepals 6-15 mm long ..... ***A. quinquefolia** var. **quinquefolia***

Anemone acutiloba (A.P. de Candolle) G. Lawson, Sharp-lobed Hepatica, Sharp-lobed Liverleaf. Mt (GA, NC, SC, VA), Pd (GA?, NC): moist forests, especially over calcareous or mafic rocks; uncommon (rare in SC). March-April. Widespread in e. North America. See comments under *A. americana* about the taxonomy of the two taxa of "Hepatica." [= FNA; = *Hepatica acutiloba* A.P. de Candolle – RAB, C, F, G, W; = *Hepatica nobilis* P. Miller var. *acuta* (Pursh) Steyermark – K, Z; = *Hepatica acuta* (Pursh) Britton – S]

Anemone americana (A.P. de Candolle) H. Hara, Round-lobed Hepatica, Round-lobed Liverleaf. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests; common (uncommon in Coastal Plain of NC and GA, rare in FL and Coastal Plain of SC). February-April. Widespread in e. North America. The two taxa of "Hepatica" seem entirely distinct in our area; they are described as hybridizing freely or merging indistinguishably in other parts of their ranges. They are also both closely related to the European *H. nobilis* P. Miller. Steyermark & Steyermark (1960) chose to treat the three entities as varieties of *H. nobilis*; I prefer to retain them at the specific level. [= FNA, WH; = *Hepatica americana* (A.P. de Candolle) Ker-Gawler – RAB, C, F, G, W; = *Hepatica nobilis* P. Miller var. *obtusa* (Pursh) Steyermark – K, Z; < *Hepatica hepatica* (Linnaeus) Karsten – S]

Anemone berlandieri Pritzel, Eastern Prairie Anemone, Tenpetal Anemone. Pd (GA, NC, SC, VA), Cp (FL): thin, circumneutral soils around rock outcrops, calcareous hammocks (in FL); rare. March-April. *A. berlandieri* and *A. caroliniana* have been much confused in floras; see Joseph & Heimburger (1966) for clarification. *A. berlandieri* is primarily a species of midwestern prairies, occurring in KS, OK, and TX east to AR, MS, and AL; disjunct in e. Panhandle FL, c. GA, c. NC, and sc. VA. It reaches its northeastern limit (and only VA occurrence) at calcareous mudstone cliffs on the Banister River in Pittsylvania County, VA; it is scattered in the Piedmont of NC on a variety of rock types, including mafic meta-argillite and plagioclase-rich granite. [= FNA, K, WH; < *A. caroliniana* Walter – RAB, C, F, G, S, W; ? *A. heterophylla* Nuttall ex Torrey & Gray; < *A. decapetala* Arduino, misapplied (a South American species)]

Anemone canadensis Linnaeus, Canada Anemone. Mt, Pd (VA): moist forests; rare. May-August. Québec west to Alberta, south to MD, w. VA, s. WV, e. TN (Chester, Wofford, & Kral 1997), KY, MO, and NM. [= C, F, FNA, G, K, W]

Anemone caroliniana Walter, Prairie Anemone, Carolina Anemone. Pd (GA, NC, SC): clayey soils of post oak and blackjack oak woodlands (Iredell soils), wet meadows; rare. Ranging primarily in the Midwest, north in the Southeast to disjunct

locations in c. and sc. GA, c. SC, c. TN (Chester, Wofford, & Kral 1997), and sc. NC. [= FNA, K; < *A. caroliniana* Walter – RAB, C, F, G, S, W (also see *A. berlandieri*)]

Anemone lancifolia Pursh, Lanceleaf Anemone. Pd, Mt, Cp (NC, SC, VA): rich, moist soils on slopes or in bottomlands; common (uncommon in NC and SC Mountains, rare in VA Piedmont, rare in Coastal Plain). March-May. Appalachian: s. PA south to GA (?), in and near the Appalachians. It is a somewhat larger plant than the closely related *A. quinquefolia*. [= RAB, C, F, FNA, G, K, S, W; = *A. quinquefolia* var. *lancifolia* (Pursh) Fosberg]

Anemone quinquefolia Linnaeus *var.* ***minima*** (A.P. de Candolle) Frodin ex Dutton & Keener, Tiny Anemone. Mt (NC, VA), Pd (VA): acidic forests, especially under *Alnus serrulata* along small streams; rare. March-May. A Southern Appalachian endemic: VA and WV south to NC and TN. See Dutton & Keener (1994). [= FNA, K; = *A. minima* A.P. de Candolle – C, F, G, W]

Anemone quinquefolia Linnaeus *var.* ***quinquefolia***, Wood Anemone. Mt (GA, NC, SC, VA), Pd (GA, NC, VA), Cp (NC, VA): rich, moist forests, grassy balds, often abundant at high elevations; common (rare in upper Piedmont and outer Coastal Plain of NC and VA). March-May. The species is widespread in ne. North America, south to MD, IN, IL, and IA, and south in the mountains to nc. GA. [= FNA; = *A. quinquefolia* – RAB, S, W; > *A. quinquefolia* var. *quinquefolia* – C, F, K; > *A. quinquefolia* var. *bifolia* Farwell – C, G, K; > *A. quinquefolia* var. *interior* Fernald – F, G]

Anemone virginiana Linnaeus *var.* ***virginiana***, Tall Anemone, Thimbleweed. Mt, Pd, Cp (GA, NC, SC, VA): rich forests and woodlands, especially prevalent on circumneutral soils; common (uncommon in Coastal Plain, especially south of VA). May-July. The species is widespread in e. North America. Two other varieties are more northern; see discussion of var. *alba* below. [= C, FNA, K; < *A. virginiana* – RAB, W; = *A. virginiana* – F, G, S; > *A. virginiana* – S; > *A. riparia* Fernald – S, misapplied]

* *Anemone blanda* Schott & Kotschy is reported by Harvill et al. (1992) from Madison County, VA and for Fauquier County, VA by Shetler & Orli (). It is not known whether this species is established in our area. {make sure this is not a misidentified specimen of *A. berlandieri* – see FNA p. 140} [= FNA, K] {not yet keyed}

Anemone virginiana Linnaeus var. *alba* (Oakes) A. Wood ranges south to se. NY and NJ (Kartesz 1999) and has been reported for our area. Keener, Dix, & Dutton (1996) discuss the intergrading varieties of *A. virginiana*. This variety might be expected in n. VA, especially in river scour situations. [= C, FNA; = *A. virginiana* var. *riparia* (Fernald) Boivin – K; = *A. riparia* Fernald – F, G]

Anemonella Spach (Rue-anemone, Windflower)

A monotypic genus, a perennial herb, of temperate e. North America. *Anemonella* is often united with *Thalictrum* (as section *Anemonella*); this may prove to be the more appropriate treatment. References: Park & Festerling in FNA (1997); Tamura in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: *Anemonella thalictroides* is superficially similar to *Enemion biternatum*, but can be distinguished by the following characters: fruit an achene (vs. fruit a follicle), petaloid sepals 5-10 (vs. 5).

Anemonella thalictroides (Linnaeus) Spach, Rue-anemone, Windflower. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests; common (rare in Coastal Plain). March-May. ME, MN, and KS, south to Panhandle FL, MS, AR, and OK. [= C, F, G; = *Thalictrum thalictroides* (Linnaeus) Eames & Boivin – RAB, FNA, K, W, WH; = *Syndesmon thalictroides* (Linnaeus) Hoffmannsegg ex Britton – S]

Aquilegia Linnaeus 1753 (Columbine)

A genus of about 80 species, perennial herbs, of the Northern Hemisphere. References: Whittemore in FNA (1997); Munz (1946)=Z; Tamura in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: When in leaf, easily mistaken for *Thalictrum*, *Anemonella*, or *Enemion*; look for old fruits.

1 Flowers red and yellow ..... ***A. canadensis***
1' Flowers blue or purple ..... ***A. vulgaris***

Aquilegia canadensis Linnaeus, Canada Columbine, Eastern Columbine. Mt, Pd, Cp (GA, NC, SC, VA): forests, woodlands, rock outcrops, especially (though by no means entirely) on calcareous or mafic substrates; common (rare in Coastal Plain of GA, NC, and SC, where restricted to coquina limestone outcrops, Indian shell middens, and other calcareous sites). March-May. Widespread in e. North America, one of our most familiar wildflowers. Disjunct populations in the deep South, on limestone in sw. GA and FL Panhandle, have been described as *A. australis* or *A. canadensis* var. *australis*; they need additional study. [= RAB, C, FNA, G, K, S, W; > *A. canadensis* var. *canadensis* – F, Z; > *A. canadensis* var. *coccinea* (Small) Munz – F, Z; > *A. canadensis* – S; > *A. australis* Small – S; > *A. coccinea* Small – S; > *A. canadensis* var. *australis* (Small) Munz – Z]

* ***Aquilegia vulgaris*** Linnaeus, European Columbine. Pd, Mt (NC), {GA}: disturbed areas; rare, native of Europe. Many varieties have been named; there seems little utility in trying to apply these names to the cultivated plants rarely persistent in our area. [= RAB, C, FNA, G, K; > *A. vulgaris* varieties – Z]

Caltha Linnaeus 1753 (Marsh Marigold, Cowslip)

A genus of about 12 species, perennial herbs, of the Northern and Southern Hemispheres (sometimes further divided). References: Ford in FNA (1997); Tamura in Kubitzki, Rohwer, & Bittrich (1993).

Caltha palustris Linnaeus *var.* ***palustris***, Marsh Marigold, Cowslip. Mt (NC, VA), Pd, Cp (VA): bogs, wet meadows, seepage swamps, brookbanks; uncommon, rare south of VA (rare in NC). April-June. *Caltha palustris* is circumboreal, widespread in n. Eurasia and n. North America, south in e. North America to w. NC, ne. TN, WV, IN, IL, and IA. *Caltha palustris* is polymorphic; one or more additional varieties (some of them sometimes recognized as separate species) are more northern. Eastern North American material is apparently uniformly 2n=32 (Keener 1977). [= G, GW, K; < *C. palustris* – RAB, C, F, FNA, S, W; *C. palustris* var. *flabellifolia* (Pursh) Torrey & A. Gray]

Clematis Linnaeus 1753 (Clematis, Virgin's-bower)

A genus of about 295 species, shrubs, vines, and suffruticose herbs, of Eurasia, North America, South America, Africa, Madagascar, and Oceania. W.A. Weber (1995) proposes generic status (as *Coriflora* W.A. Weber) for the leatherflowers, here treated as *Clematis*, subgenus *Viorna*. References: Pringle in FNA (1997); Moreno & Essig in FNA (1997); Essig (1990); Keener (1975); Keener (1967); Pringle (1971)=Z; Tamura in Kubitzki, Rohwer, & Bittrich (1993).

1 Flowers numerous, in compound cymose-paniculate inflorescences; sepals white; filaments glabrous; [subgenus *Clematis*].
  2 Flowers perfect, with 5-10 carpels; anthers 1.5-3 mm long; leaf margins entire (rarely cleft); leaflets (3-) 5 (-7); [alien, in disturbed areas].. ..... ***C. terniflora***
  2 Flowers mostly polygamo-dioecious, the pistillate with 18-60 carpels; anthers 0.5-1 mm long; leaf margins coarsely toothed; leaflets 3 (*C. virginiana*) or 5-7 (*C. catesbyana*); [native, though sometimes weedy].
    3 Leaves 3-foliolate; pistillate flowers with 40-60 carpels ..... ***C. virginiana***
    3 Leaves (3-) 5-7-foliolate; pistillate flowers with 18-35 carpels ..... ***C. catesbyana***
1 Flowers solitary or in groups of 3's; sepals usually at least partly bluish, purplish or red; filaments pubescent.
  4 Leaves (most or all of them) simple, sessile or subsessile; plant an erect herb to 7 dm tall; [subgenus *Viorna*].
    5 Leaves glaucous and glabrous beneath, the uppermost commonly pinnate and tendril-bearing ..... ***C. addisonii***
    5 Leaves green and usually pubescent beneath, the uppermost usually simple and entire, neither pinnate nor tendril-bearing (though occasionally lobed).
      6 Leaves of flowering material soft-pubescent beneath, the largest 3-9 cm wide, with stomates on the lower surface only; leaves of fruiting material usually light green with the secondary and tertiary veins forming prominent reticulations on the upper surface.
        7 Stems and leaves usually densely sericeous-woolly; sepal backs densely sericeous; mature styles white to pale yellow, sharply recurved and flexuous; [of shale barrens and calcareous woodlands of w. VA] ..... ***C. coactilis***
        7 Stems and leaves villous; sepal backs moderately sericeous-pilose; mature styles yellowish-white to deep tawny, loosely spreading-recurved; [of various woodlands, fairly widespread in our area] ..... ***C. ochroleuca***
      6 Leaves of flowering material glabrous to sparsely pilose beneath, the largest 2-5 cm wide (or 3.5-11 cm wide in *C. fremontii*), with stomates on both surfaces; leaves of fruiting material often dark green, either with the secondary and tertiary veins forming prominent reticulations on the upper surface (*C. fremontii*) or the upper with the secondary and tertiary veins not forming prominent reticulations on the upper surface (*C. albicoma* and *C. viticaulis*).
        8 Sepal tips acuminate; achene bodies cobwebby-tomentose toward the tip; [of prairies of nw. GA] ..... ***C. fremontii***
        8 Sepals tips obtuse to acute; achene bodies pilose throughout; [of shale barrens of w. VA and WV].
          9 Sepal backs villous; pubescence on the summit of the achene and the base of the style spreading or reflexed; mature styles white to pale yellow, sharply recurved and flexuous ..... ***C. albicoma***
          9 Sepal backs finely puberulent; pubescence on the summit of the achene and the base of the style closely appressed-ascending; mature styles tawny to deep reddish-brown, loosely spreading-recurved ..... ***C. viticaulis***
4 Leaves (most of them) compound, petiolate; plant a trailing or climbing vine, to many meters long (or erect or ascending in *C. addisonii* and *C. socialis*).
  10 Sepals thin in texture, 3-5 cm long, soft-villous, neither apically recurved nor with broad, strongly crisped margins; leaves 3-foliolate; [subgenus *Atragene*] ..... ***C. occidentalis var. occidentalis***
  10 Sepals thick in texture, 1-5 cm long, short-sericeous, apically recurved; leaves 1-11-foliolate; [subgenus *Viorna*].
    11 Lower surface of leaves glaucous and glabrous (rarely with a few scattered hairs).
      12 Plant an erect or ascending herb; lower leaves simple, upper leaves simple to 2-6-foliolate; [of dry limestone glades, endemic to VA] ..... ***C. addisonii***
      12 Plant a climbing vine; all leaves generally compound, often 6-10-foliolate; [of various habitats, ranging from NC south].
        13 Leaf blade thin in texture; secondary and tertiary veins not prominently reticulate ..... ***C. glaucophylla***
        13 Leaf blade leathery in texture; secondary and tertiary veins prominently reticulate; [in the Ridge and Valley of eastern TN and westward] ..... ***[C. versicolor]***
    11 Lower surface of leaves not glaucous, pubescent (rarely nearly glabrous).
      14 Plants erect, to 2-3 (-5) dm tall, forming clonal patches by underground rhizomes; leaflets linear-lanceolate, averaging ca. 10× as long as wide ..... ***C. socialis***
      14 Plants viny, sprawling or climbing, the stems usually over 1 m long, not rhizomatous-clonal; leaflets generally broader.
        15 Leaves coriaceous, the secondary and tertiary veins forming prominent reticulations on the upper surface.
          16 Leaf blade coarsely reticulate-veined, the ultimate closed areoles often > 2 mm long in the longer dimension, the tertiary and quaternary veins not prominently raised; achene beak sparsely pubescent to silky, with ascending or appressed hairs ..... ***[C. pitcheri var. pitcheri]***
          16 Leaf blade finely reticulate-veined, the ultimate closed areoles mostly < 2 mm long in the longest dimension, the tertiary and quaternary veins often pominently raised; achene beak plumose, with spreading hairs ..... ***C. reticulata***
        15 Leaves membranous, the secondary and tertiary veins forming faint, indistinct reticulations on the upper surface.

17 Sepals 2.5-5 cm long, the tips widely spreading, the upper margins thin, crisped, to 6 mm wide; peduncles usually without bracts ..... ***C. crispa***

17 Sepals 1.5-3 cm long, the tips either abruptly and shortly recurved (*C. viorna*) or spreading to short-reflexed (*C. morefieldii*), the upper margins not thin or crisped, to 2.5 mm wide; peduncles usually with bracts.

18 Stems with cobwebby pubescence; bracts near the base of the peduncle; sepals densely silky-pubescent on the outer surface, pinkish-green; [limestone habitats of n. AL and se. TN ..... ***[C. morefieldii]***

18 Stems glabrous to sparsely pilose; bracts well above the base of the peduncle; sepals sparsely pubescent on the outer surface, pale lavender to purple; [widespread in our area] ..... ***C. viorna***

Clematis addisonii Britton, Addison's Leatherflower. Mt (VA): dry to mesic calcareous barrens, woodlands, and forests, over dolostone (Elbrook Formation); rare. April-June. Endemic to w. VA (Botetourt, Montgomery, Roanoke, and Rockbridge counties). [= C, F, FNA, G, K, W; = *Viorna addisonii* (Britton) Small – S; = *Coriflora addisonii* (Britton) W.A. Weber]

Clematis albicoma Wherry, White-haired Leatherflower. Mt (VA): shale barrens; uncommon. May-June. Endemic to w. VA (Alleghany, Augusta, Bath, Botetourt, Highland, and Rockbridge counties), and e. WV. [= C, FNA, G, K, W; = *C. albicoma* var. *albicoma* – F; = *Coriflora albicoma* (Wherry) W.A. Weber]

Clematis catesbyana Pursh, Coastal Virgin's-bower, Satin-curls. Cp (GA, NC, SC), Mt (NC, VA): dunes and interdune swales with abundant shell hash, calcareous woodlands and thickets; rare (rare in NC and VA). July-September. Se. VA south to FL and west to LA, and inland especially in calcareous parts of c. TN and n. AR and s. MO, as well as in the Ridge and Valley of VA and disjunct at Linville Caverns, McDowell County, NC, where on dolomite in a geologic window in the Blue Ridge. [= C, FNA, GW, K; < *C. ligusticifolia* Nuttall – RAB, misapplied; > *C. catesbyana* – S; > *C. micrantha* Small – S]

Clematis coactilis (Fernald) Keener, Virginia White-haired Leatherflower. Mt (VA): shale barrens, shaly woodlands, dry calcareous barrens and woodlands; rare. May-June. Endemic to w. VA (Botetourt, Craig, Giles, Montgomery, Pulaski, Roanoke, and Wythe counties). [= C, FNA, K, W; = *C. albicoma* Wherry var. *coactilis* Fernald – F; = *Coriflora species 1*]

Clematis crispa Linnaeus, Marsh Clematis, Southern Leatherflower, Blue Jasmine. Cp, Pd (GA, NC, SC, VA), Mt (GA): marshes, swamps, disturbed wet or moist areas; common (rare in VA, rare in Piedmont). April-August. Widespread in Southeastern United States, FL to TX, north to se. VA and s. IL. [= RAB, C, F, FNA, G, GW, K, W; = *Viorna crispa* (Linnaeus) Small – S; = *Coriflora crispa* (Linnaeus) W.A. Weber]

Clematis fremontii S. Watson. Mt (GA): prairies; rare. MO, KS, and NE; disjunct in the Ridge and Valley of nw. GA (Floyd County) and se. TN (Hamilton County). See Anonymous (2003) and Horn & Shaw (2007) for additional information. [= FNA, K; = *Coriflora fremontii* (S. Watson) W.A. Weber]

Clematis glaucophylla Small, White-leaved Leatherflower. Mt (GA, VA?), Pd, Cp (GA): habitat in our area poorly known, the species not recently seen here, probably in dry woodlands or openings over calcareous rocks, according to RAB in "rich woods"; rare (rare in VA). May-September. Widespread in Southeastern United States, from se. TN and OK, south to FL and LA, but apparently rare and poorly known. Previous attributions of this species for NC, SC, KY, and (perhaps) VA appear to be based on misidentifications. [= RAB, C, F, FNA, G, GW, K; = *Viorna glaucophylla* (Small) Small – S; = *Coriflora glaucophylla* (Small) W.A. Weber]

Clematis occidentalis (Hornemann) A.P. de Candolle *var.* ***occidentalis***, Purple Clematis, Mountain Clematis. Mt (NC, VA): rocky slopes over mafic rocks (greenstone, amphibolite), known positively in NC only from Bluff Mountain, Ashe County; rare. May-June. Var. *occidentalis* is widespread in ne. North America, from New Brunswick west to w. Ontario, south to NJ, DE, OH, nw. IL, and ne. IA, and in the mountains to w. VA and w. NC. Two other varieties occur in the Rocky Mountains. Fernald's var. *cacuminis,* published under *C. verticillaris,* described plants from the mountains of VA and NC; it is apparently merely a form based on material in early flower (Pringle 1971). [= FNA, K; < *C. verticillaris* A.P. de Candolle – RAB, G; < *C. occidentalis* – C, W; > *C. verticillaris* var. *verticillaris* – F; > *C. verticillaris* A.P. de Candolle var. *cacuminis* Fernald – F; < *Atragene americana* Sims – S]

Clematis ochroleuca Aiton, Curlyheads. Pd (GA, NC, SC, VA), Mt (GA, NC, VA), Cp (NC, SC, VA): dry woodlands and woodland borders, generally over mafic or calcareous rocks, such as diabase, gabbro, or calcareous siltstone; uncommon (rare in Mountains and Coastal Plain). April-June. Primarily Piedmont: NY south to ec. GA. [= RAB, C, F, FNA, G, K, W; = *Viorna ochroleuca* (Aiton) Small – S; = *Coriflora ochroleuca* (Aiton) W.A. Weber]

Clematis reticulata Walter. Cp (GA, SC), Pd (GA), Mt? (GA?): dry, sandy woodlands, such as longleaf pine sandhills and dry hammocks; uncommon. May-August. Se. SC south to FL, west to TX, and north in the interior to TN and AR. [= RAB, FNA, K; = *Viorna reticulata* (Walter) Small – S; = *Coriflora reticulata* (Walter) W.A. Weber]

Clematis socialis Kral, Alabama Leatherflower. Mt (GA): bottomlands; rare. Nw. GA (Floyd Co.) and ne. AL (St. Clair and Cherokee counties). Timmerman-Erskine & Boyd (1999) report on reproductive ecology of this endangered species; Goertzen & Boyd (2007) on its genetic diversity. [= FNA, K]

* ***Clematis terniflora*** A.P. de Candolle, Sweet Autumn Clematis, Yam-leaved Clematis. Mt (NC, VA), Pd, Cp (GA, NC, SC, VA): disturbed areas; uncommon, native of e. Asia (Japan, China, Korea). July-September. [= C, FNA, GW, K, W; ? *C. dioscoreifolia* Léveillé & Vaniot – RAB; > *C. dioscoreifolia* Léveillé & Vaniot var. *robusta* Carrière & Rehder – F; ? *C. paniculata* Thunberg – S; ? *C. maximowicziana* Franchet & Savatier]

Clematis viorna Linnaeus, Northern Leatherflower, Vase-vine. Mt, Pd, Cp (GA, NC, SC, VA): mesic forests, woodlands, thickets, especially over mafic rocks; common (rare in Coastal Plain south of VA). May-September. Widespread in Southeastern United States, north to PA, IL, and MO. [= RAB, C, F, FNA, G, K, W; > *Viorna viorna* (Linnaeus) Small – S; > *Viorna beadlei* Small – S; > *Viorna flaccida* (Small) Small – S; > *Coriflora viorna* (Linnaeus) W.A. Weber; > *Coriflora beadlei* (Small) W.A. Weber]

Clematis virginiana Linnaeus, Virgin's-bower. Mt, Pd, Cp (GA, NC, SC, VA): moist forests, thickets, and openings; common (rare in Coastal Plain south of VA). July-September. Widespread in e. North America. Vegetatively, this species can be distinguished from *C. viorna* and *C. crispa* (the other common and widespread species in our area) by its leaves with three

relatively symmetrical leaflets (vs. leaves with 3-many irregular leaflets). [= RAB, C, F, FNA, GW, K, S, W; ? *C. virginiana* var. *virginiana* – G]

Clematis viticaulis Steele, Millboro Leatherflower. Mt (VA): shale barrens and shaly woodlands; rare. May-June. Endemic to w. VA (Augusta, Bath, and Rockbridge counties). [= C, F, FNA, G, K, W; = *Coriflora viticaulis* (Steele) W.A. Weber]

Clematis morefieldii Kral, Morefield's Leatherflower. Ip (AL, TN): limestone habitats; rare. Endemic to nc. AL and se. TN. See Estes & Fleming (2006) for additional information. [= FNA, K; = *Coriflora morefieldii* (Kral) W.A. Weber]

Clematis pitcheri Torrey & A. Gray var. *pitcheri*, Bellflower Leatherflower, ranges east to nc. TN (Chester, Wofford, & Kral 1997) and KY (Kartesz 1999). [= FNA, K; < *Viorna pitcheri* (Torrey & A. Gray) Britton – S]

Clematis versicolor Small ex Rydberg, Pale Leatherflower. Sc. KY, c. TN, nc. AL; Ozarks and Ouachitas of s. MO, n. and c. AR, and e. OK. [= FNA, K; *Viorna versicolor* (Small ex Rydberg) Small – S; = *Coriflora versicolor* (Small ex Rydberg) W.A. Weber]

* *Clematis viticella* Linnaeus, native to Europe, has been reported for TN (Pringle in FNA 1997). [= FNA, K; *Viticella viticella* (Linnaeus) Small] {not yet keyed}

Other species of *Clematis*, of Asian or European origin, are cultivated as ornamentals.

Consolida (A.P. de Candolle) S.F. Gray 1821 (Annual Larkspur)

A genus of about 43 species, annual herbs, of Eurasia. References: Warnock in FNA (1997); Tamura in Kubitzki, Rohwer, & Bittrich (1993).

1 Lower bracts of the inflorescence with 5 or more lobes; inflorescence an elongate or compound raceme; pistil densely pubescent; follicle 12-25 mm long ..... ***C. ajacis***
1 Lower bracts of the inflorescence unlobed or the lowermost with 3 lobes; inflorescence a corymbiform raceme; pistil glabrous; follicle 8-17 mm long ..... ***C. regalis***

* ***Consolida ajacis*** (Linnaeus) Schur, Rocket Larkspur. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): roadsides, fields, waste places, disturbed ground; common, native of Europe. [= FNA, K; = *Delphinium ajacis* Linnaeus – RAB, F, G, S; = *Delphinium ambiguum* Linnaeus – C; = *Consolida ambigua* (Linnaeus) P.W. Ball & Heywood in Heywood & P.W. Ball – W]

* ***Consolida regalis*** S.F. Gray, Rocket Larkspur, Forking Larkspur. Cp (NC): disturbed areas; rare, native of Europe. Also known from DC and to be expected in VA. [= FNA, K; = *Delphinium consolida* Linnaeus – C, G, S]

* *Consolida pubescens* (de Candolle) Soó is naturalized in s. TN (Warnock in FNA 1997). [= FNA, K] {not yet keyed}

Coptis Salisbury 1807 (Goldthread)

A genus of about 15 species, perennial herbs, of boreal to temperate e. Asia and North America. References: Ford in FNA (1997); Tamura in Kubitzki, Rohwer, & Bittrich (1993).

Coptis trifolia (Linnaeus) Salisbury *var.* ***groenlandica*** (Oeder) Fassett, Goldthread, Goldenroot. Mt (NC): bogs; rare. May-June. The species ranges from Greenland west to AK, south to NJ, nw. NC, n. IN, IA, and British Columbia; and in e. Asia. Var. *groenlandica* is the variety in e. North America, northeast to Greenland, and in southern parts of nw. North America; var. *trifolia* is Alaskan and e. Asian. Whether the varieties are worth recognition is somewhat questionable. *Coptis* had been reported for NC by many floras (for instance, C, F, G, and S), but the documentation was unknown; its presence in NC has now been confirmed. The species is distinctive, with neatly trifoliolate leaves, small white flowers on scapes, and yellow roots. [= C; = *C. groenlandica* (Oeder) Fernald – F; = *C. trifolia* ssp. *groenlandica* (Oeder) Hultén – G; < *C. trifolia* – FNA, K, S]

Delphinium Linnaeus 1753 (Larkspur)

A genus of about 320 species, herbs, of Eurasia, Africa, and North America. References: Warnock in FNA (1997); Kral (1976)=Z; Warnock 1995; Tamura in Kubitzki, Rohwer, & Bittrich (1993). [also see *Consolida*]

1 Follicles divergent; raceme 0.5-2 (-3) dm long; flowering plants 2-9 (-13) dm tall; flowering March-May; [section *Diedropetala*; subsection *Grumosa*].
  2 Stems (4.5-) 6-9 (-13) dm tall; flowers (sepals) deep blue; lower stem pubescent; [in sunny or semi-sunny situations, apparently endemic to n. AL] ..... ***D. alabamicum***
  2 Stems 2-6 dm tall; flowers (sepals) deep bluish purple, pink, or white; lower stem glabrous or nearly so; [usually in deep shade, widespread in our area] ..... ***D. tricorne***
1 Follicles erect; raceme > 3 dm long; flowering plants 5-20 dm tall; flowering May-September.
  3 Seeds wing-margined, the surfaces smooth; stem below the inflorescence glabrous; flowering plants 8-20 dm tall; flowering July-September; [section *Diedropetala*; subsection *Exaltata*] ..... ***D. exaltatum***
  3 Seeds with prominent transverse ridges; stem below the inflorescence pubescent; flowering plants 2-10 (-15) dm tall; flowering May-July; [section *Diedropetala*; subsection *Virescens*].
    4 Basal leaves usually present at anthesis; flowers (sepals) white; stems 2-4 (-7) dm tall; ultimate segments of midcauline leaves 5-12 in number, 2-4 mm wide ..... ***D. carolinianum*** *ssp.* ***calciphilum***

4 Basal leaves absent at anthesis; flowers (sepals) blue to purple (rarely white); stems (3-) 6-10 (-15) dm tall; ultimate segments of midcauline leaves 12-25 in number, 0.5-1.5 mm wide.....***D. carolinianum ssp. carolinianum***

Delphinium alabamicum Kral, Alabama Larkspur. Mt (GA): limestone prairies and glades; rare. Endemic to c. and n. AL and nw. GA. [= FNA, K]

Delphinium carolinianum Walter *ssp.* ***calciphilum*** M.J. Warnock, Glade Larkspur. Mt (GA): limestone glades; rare (GA Special Concern). KY south through e. and c. TN to ne. AL and nw. GA. [= FNA, K; < *D. virescens* Nuttall – C, G; < *D. carolinianum* var. *carolinianum* – F; < *D. carolinianum* – S; < *D. virescens* var. *virescens* – Z; < *D. carolinianum* Walter ssp. *virescens* (Nuttall) R.E. Brooks]

Delphinium carolinianum Walter *ssp.* ***carolinianum***, Prairie Larkspur, Carolina Larkspur, Blue Larkspur. Pd, Cp (GA, SC): rocky woodlands, granite outcrops, Altamaha Grit outcrops, blackland prairies, moist sandy woodlands associated with longleaf pine; rare (GA Watch List, SC Rare). May-July. IL west to MO, south to LA and TX, with disjunct occurrences eastward in SC, GA, TN, and MS. The flowers are a pale to medium blue. This species has been reported for NC (by C) and "north to Va." (by F and S). I know of no documentation for its past or present occurrence in NC or VA, but its presence in those states is plausible. [= FNA, K; = *D. carolinianum* Walter – C, G, Z; < *D. carolinianum* var. *carolinianum* – F; < *D. carolinianum* – S]

Delphinium exaltatum Aiton, Tall Larkspur. Mt (NC, VA), Pd (NC): dry to moist soils over calcareous (such as dolostone, especially Elbrook Formation) or mafic rocks (such as amphibolite, metagabbro, greenstone, and diabase), usually in the open (as grassy balds) or on forest edges in partial sun; rare. July (low elevations) - September (high elevations). Sw. PA and OH southwest to MO and e. TN, and south to the Mountains of VA and the Mountains and Piedmont of NC. The flowers are a pale to medium blue. [= RAB, C, F, FNA, G, K, S, W, Z]

Delphinium tricorne Michaux, Dwarf Larkspur. Mt (GA, NC, {SC}, VA), Pd, Cp (NC, VA): rich, moist forests, especially over mafic or calcareous rocks, less commonly (as along the Roanoke River in ne. NC) on very fertile alluvial deposits; uncommon (rare in Piedmont and Coastal Plain, rare in GA). March-May. Sw. PA and MN south to NC, nw. GA, AL, and OK. The flowers are variable in color, usually a deep bluish violet, but ranging through pink to pure white. [= RAB, C, F, FNA, G, K, S, W, Z]

Enemion Rafinesque 1820 (Isopyrum)

A genus of about 6 species, perennial herbs, of temperate North America and e. Asia. The issue of the separation of the genus *Enemion* from *Isopyrum* remains controversial; I here follow Keener (1977). References: Ford in FNA (1997); Tamura in Kubitzki, Rohwer, & Bittrich (1993); Keener (1977).

Identification notes: *Enemion* is superficially similar to the much more common *Anemonella thalictroides*, with which it sometimes grows, but can be distinguished by the following characters: fruit a follicle (vs. fruit an achene), petaloid sepals 5 (vs. 5-10, usually some at least of the flowers on a plant with 6 or more).

Enemion biternatum Rafinesque, Isopyrum, False Rue-anemone. Pd (NC, SC, VA), Cp (FL, NC): rich forests, either on natural levees with very nutrient rich sediments or on slopes with underlying mafic rocks; rare (NC Rare, VA Rare, SC Rare). March-April; May. Fairly widespread in e. North America, primarily west of the Appalachians, from w. NY, s. Ontario and MN south to TN and AR; disjunct in the Piedmont and Coastal Plain of VA, NC, and SC and the FL Panhandle. [= FNA, K; = *Isopyrum biternatum* (Rafinesque) Torrey & Gray – RAB, C, F, G, S]

Eranthis Salisbury 1808 (Winter-aconite)

A genus of about 8 species, perennial herbs, of Europe and Asia. References: Parfitt in FNA (1997); Tamura in Kubitzki, Rohwer, & Bittrich (1993).

* ***Eranthis hyemalis*** (Linnaeus) Salisbury, Winter-aconite. Cp (VA), Pd (NC): cultivated in gardens, rarely persisting or escaped; rare, native of Eurasia. January-March. [= F, FNA, G, K]

Ficaria Schaeffer 1760 (Lesser Celandine)

Best treated as a genus separate from *Ranunculus*, based on morphology and molecular phylogenetics; *Myosurus* is more closely related to *Ranunculus* than is *Ficaria* (Paun et al. 2005). References: Paun et al. (2005).

* ***Ficaria verna*** Hudson, Lesser Celandine, Pilewort. Pd (NC, VA), Cp (VA): disturbed rich forests and bottomlands, mesic suburban forests, lawns, naturalized locally from horticultural plantings; rare, native of Europe. First reported for NC by Krings et al. (2005). [= *Ranunculus ficaria* Linnaeus – C, F, FNA, G, Y; > *R. ficaria* var. *bulbifera* Marsden-Jones – K]

Helleborus Linnaeus 1753 (Hellebore, Christmas-rose)

A genus of about 21 species, perennial herbs, of Europe and Asia. References: Ford in FNA (1997); Tamura in Kubitzki, Rohwer, & Bittrich (1993).

* ***Helleborus viridis*** Aiton, Green Hellebore, Christmas-rose. Mt (VA), Pd (NC): cultivated in gardens, seeding down, rarely escaped or persistent; rare, native of Europe. December-May. This plant has fallen somewhat out of horticultural favor. [= C, F, FNA, G, K, S]

Myosurus Linnaeus 1753 (Mousetail)

A genus of about 15 species, annual scapose herbs, nearly cosmopolitan (lacking in e. Asia and tropical regions), with a center of diversity in w. North America. References: Whittemore in FNA (1997); Campbell (1952)=Z; Tamura in Kubitzki, Rohwer, & Bittrich (1993).

Myosurus minimus Linnaeus, Mousetail. Pd (NC, SC, VA), Cp (NC, VA), {GA}: usually in disturbed areas, such as fields in floodplains; uncommon. March-May. The species is circumboreal and also found in various places in the Southern Hemisphere. Widely distributed in North America, Eurasia, and the Southern Hemisphere. A number of subspecies have been described; if these are recognized, our material is the typic ssp. *minimus*. The pre-Columbian occurrence of *Myosurus* in our area is uncertain; it may well be an alien. [= RAB, C, F, FNA, G, GW, K, S; > *M. minimus* ssp. *minimus* – Z]

Nigella Linnaeus 1753 (Fennel-flower)

A genus of about 20 species, annual herbs, of Europe, n. Africa, and Asia. References: Ford in FNA (1997); Tamura in Kubitzki, Rohwer, & Bittrich (1993).

* ***Nigella damascena*** Linnaeus, Love-in-a-mist, Fennel-flower. Mt (VA): cultivated in gardens, rarely persistent or escaping; rare, native of s. Europe. [= C, F, FNA, G, K]

Ranunculus Linnaeus 1753 (Buttercup, Crowfoot, Spearwort)

A genus of about 600 species, perennial and annual herbs, nearly cosmopolitan (most diverse in temperate and boreal regions of the Northern Hemisphere). The seven subgenera are distinctive and have often been recognized at the generic level; three are represented in our area. Distributions given in many works (including Harvill et al. 1992) for the *R. hispidus* complex are apparently garbled by differences in taxonomic concepts. I am here following Duncan's (1980) taxonomic entities, though recognizing some of his varieties as species. References: Whittemore in FNA (1997); Duncan (1980)=Z; Keener (1976)=Y; Keener & Hoot (1987)=X; Paun et al. (2005); Tamura in Kubitzki, Rohwer, & Bittrich (1993). Keys adapted, in part, from C, GW, X, Y, and Z. [also see *Ficaria*]

Identification notes: Mature or relatively mature achenes are necessary for the identification of some species. Shape and pubescence of the receptacle is also a frequently used taxonomic character, best judged by stripping off the achenes.

1 Petals dull, white; achenes roughly transverse-ridged; plants aquatic, the leaves finely dissected to merely shallowly lobed; [native, occurring in circumneutral waters]; [subgenus *Batrachium*] ..... **Key A**
1 Petals shiny, yellow (sometimes fading or bleaching to whitish); achenes usually not transverse-ridged (though often variously ornamented); plants aquatic or terrestrial, the leaves various; [native or introduced, occurring in various habitats]; [subgenus *Ranunculus*].
  2 Cauline leaves all simple, mostly lanceolate, either entire, denticulate, or serrate, but not lobed or deeply divided; [native, occurring in marshes or other wetlands]; [section *Flammula*] ..... **Key B**
  2 Cauline leaves (at least most them) lobed, divided, or compound; [native or introduced, occurring in various habitats].
    3 Basal leaves not divided, mostly cordate, reniform, or ovate (and merely toothed), distinctly unlike the deeply divided cauline leaves; achenes turgid, ovoid, 1-2.5 mm long, without pronounced marginal rims; petals 1.5-3 mm long; [native, occurring in mesic to dry forests and woodlands, and also (especially *R. abortivus*) weedy]; [section *Epirotes*] ..... **Key C**
    3 Basal leaves mostly deeply parted or compound, the cauline leaves generally similar but smaller and often less divided; achenes various, 1-5 mm long, with or without pronounced marginal rims; petals 2-15 mm long; [native or introduced, occurring in various habitats].
      4 Achenes markedly spiny, papillose, or tuberculate (the protuberances few and small in *R. sardous*, keyed both here and below); [introduced, usually weedy and in disturbed habitats]; [section *Echinella*] ..... **Key D**
      4 Achenes smooth (rarely pubescent or papillose); [native or introduced, occurring in various habitats].
        5 Achenes turgid, 1-1.5 (-2) mm long, the marginal rims scarcely or not at all evident, the achenes corky-thickened at their bases for dispersal by floating; [of mucky marshes or ditches, or aquatic in pools]; [section *Hecatonia*] ..... **Key E**
        5 Achenes moderately turgid or flattened, 1.5-3.8 mm long, with a pronounced (at 10× or more) marginal rim appearing as a differentiated border or flange, more-or-less flattened, and separated from the central bulge of the achene by a concavity or even a groove, the achenes not corky-thickened at their bases; [of mostly terrestrial or in bottomland forests]; [section *Ranunculus*] ..... **Key F**

Key A – subgenus *Batrachium* (White Water Crowfoots)

1 Leaves floating, shallowly lobed; receptacles glabrous ..... ***R. hederaceus***
1 Leaves submersed (or stranded by falling water levels), dissected into filiform segments; receptacles hispid.
  2 Leaves firm (not collapsing when removed from water); free petioles much shorter than the dilated stipular base; leaves usually much shorter than the internode above; achene beaks 0.7-1.5 mm long ..... ***R. longirostris***
  2 Leaves flaccid (collapsing when removed from water); free petioles about as long as the dilated stipular base; leaves usually about as long as the internode above; achene beaks 0.1-0.3 (-0.5) mm long ..... ***R. trichophyllus*** *var.* ***trichophyllus***

Key B – subgenus *Ranunculus*, section *Flammula* (simple-leaved buttercups) (Spearworts)

1 Petals 1-3 (-5), 1-2 mm long, about as long as the sepals; annual ..... ***R. pusillus***
1 Petals (4-) 5-9, distinctly longer than the sepals; annual or perennial.
  2 Cauline leaves 6-14 cm long; sepals 4-7 mm long; achene beak 1.0-1.3 mm long ..... ***R. ambigens***
  2 Cauline leaves 1-6 cm long; sepals 1.5-3 mm long; achene beak 0.1-0.3 mm long ..... ***R. laxicaulis***

Key C – subgenus *Ranunculus*, section *Epirotes*

1 Achene beaks (0.6-) 0.7-1.0 mm long; petals < ½ as long as the sepals; sepals hirsute ..... ***R. allegheniensis***
1 Achene beaks 0.1-0.3 mm long; petals > ½ as long as the sepals; sepals glabrous to sparsely long-villous.
  2 Leaves and stems glabrous or nearly so (or the upper stem puberulent); basal leaves 1-6 (-10) cm wide, reniform to cordate at the base; roots usually all filiform ..... ***R. abortivus***
  2 Leaves and stems villous, at least toward the base; basal leaves 1-2.5 cm wide, truncate to cuneate (rarely cordate) at the base; roots sometimes in part fusiform-thickened ..... ***R. micranthus***

Key D – subgenus *Ranunculus*, section *Echinella*

1 Flowers sessile, opposite the petioles; sepals 3; petals 3 ..... ***R. platensis***
1 Flowers pedunculate, axillary; sepals usually 5; petals usually 5.
  2 Petals 1-2 (-3) mm long; receptacles glabrous ..... ***R. parviflorus***
  2 Petals (3-) 4-12 mm long; receptacles pubescent.
    3 Achenes bodies 1.5-3 mm long, 30-60 per head; achene beak ca. 0.5 mm long; achene with conical protuberances or short spines, to 0.16 mm long; achene beak 0.1-0.5 mm long.
      4 Achene with a few conical protuberances; petals 5-12 mm long; plant sparsely to densely hirsute; achenes 30-40 per head ..... ***R. sardous***
      4 Achene with numerous short spines; petals (3-) 4-5 mm long; plant with a few, widely scattered, long hairs; achenes 40-60 per head.. ..... ***R. trilobus***
    3 Achenes 3-5 mm long, 4-20 per head; achene beak 1.5-3.0 mm long; achene conspicuously spiny, the longer spines mostly 0.30-0.85 mm long.
      5 Achenes 4-9 per head, in a single whorl; achene margins spiny, as also the faces; beak of the achene 2.5-3 mm long ..... ***R. arvensis***
      5 Achenes 10-20 per head, in several whorls; achene margins smooth, the spines restricted to the faces; beak of the achene 1.5-2.5 mm long ..... ***R. muricatus***

Key E – subgenus *Ranunculus*, section *Hecatonia*

1 Petals 6-14 mm long; achene body 1.3-2.5 mm long, the beak 0.7-1.5 mm long; plants with submersed leaves dissected into numerous linear segments; [aquatic] ..... ***R. flabellaris***
1 Petals 2-4 (-5) mm long; achene body 0.8-1.2 mm long, the beak 0-0.1 mm long; plants without distinctive, dissected submersed leaves; [terrestrial or semi-aquatic] ..... ***R. sceleratus*** *var.* ***sceleratus***

Key F – subgenus *Ranunculus*, section *Ranunculus*

1 Petals 2-6 mm long, about as long as the sepals; achene beak strongly hooked, 0.5-1.2 mm long ..... ***R. recurvatus*** *var.* ***recurvatus***
1 Petals 5-15 mm long, (1.3-) 1.5× or more as long as the sepals; achene beak straight, flexuous, slightly curved, or hooked, 0.2-3.0 mm long.
  2 Achene beaks recurved or hooked, the stigmatic surface elongate, along the upper (curved) side of the style (beak) (visible at 10×); [introduced, usually weedy in disturbed habitats].
    3 Stems repent, rooting at the nodes ..... ***R. repens***
    3 Stems erect, not rooting at the nodes.
      4 Petals 5-8 mm long; plant a soft-based annual; achene face usually with at least a few conical protuberances (if examined carefully at 10× or more) ..... ***R. sardous*** **[of section *Echinella*]**
      4 Petals 8-16 mm long; plant a cormose or hard-based perennial; achene face truly smooth.
        5 Sepals spreading; stems not cormose-thickened at the base; larger leaves appearing (3-) 5-parted, all of the segments sessile; plant to 12 dm tall ..... ***R. acris***
        5 Sepals tightly reflexed; stems cormose-thickened at the base; larger leaves pinnately 3-5-parted, the terminal segment long-stalked; plant to 6 dm tall ..... ***R. bulbosus***
  2 Achene beaks straight or slightly curved, flexuous, the stigmatic surface limited to the tip of the style (beak); [native, normally in more-or-less natural habitats].

6 Larger leaves mostly pinnately 3-7-foliolate, the terminal leaflet larger than the lateral leaflets, the leaflets (especially the terminal) often further cleft or lobed, the blade usually longer than wide in outline, the segments often rather narrow; naked receptacle conical, tapering gradually to the apex (the region of staminal attachment as thick as the region of gynoecial attachment, which tapers through all or nearly all of its length, best seen by stripping off the achenes); rhizome regenerating totally each growing season, producing both fibrous and (at the end of the growing season) tuberous roots (1.3-4.9 mm in diameter); [rare in our area, in calcareous, mafic, or ultramafic sites with prairie affinities] ..... ***R. fascicularis***

6 Larger leaves mostly palmately 3-foliolate, the terminal leaflet about the same size as the lateral leaflets, the leaflets sometimes further cleft or lobed, the blade usually as wide as long or wider; naked receptacle clavate or ellipsoid (the region of staminal attachment distinctly narrower than the region of gynoecial attachment, thus forming a waist, from which the gynoecial region expands and then tapers to the apex); rhizome regenerated partially each growing season, producing uniform, fibrous roots (up to 3.0 mm in diameter); leaves usually simple and ovate, or trifoliate with ovate leaflets; [collectively widespread in our area].

7 Achenes wide-margined (wider portions of the margin 1/4 to 2/3 as wide as the achene body); plants colonial, sending out stolons (by the time of fruiting) which root at the nodes, forming new plants; sepals reflexed at full anthesis ..... ***R. carolinianus***

7 Achenes narrow-margined (wider portions of the margin 1/8 or less as wide as the achene body); plants usually erect or repent by the time of fruiting (if repent sometimes forming adventitious roots at the nodes, but not generally developing new plants); sepals spreading at full anthesis (sometimes reflexed later).

8 Plants repent; aerial shoots 50-80 (-91) cm long at time of fruiting; [generally of swamps and marshes] ..... ***R. caricetorum***

8 Plants erect; aerial shoots 14-45 (-60) cm long at time of fruiting; [generally of upland habitats] ..... ***R. hispidus***

Ranunculus abortivus Linnaeus, Kidneyleaf Buttercup. Mt, Pd, Cp (GA, NC, SC, VA): low fields, disturbed areas, bottomlands, lawns, roadsides; common (uncommon in Coastal Plain south of VA). (February-) March-June. Labrador to AK, south to FL, TX, and CO. A common weed in shady and sunny places. [= RAB, FNA, GW, K, S, W, Y; > *R. abortivus* var. *abortivus* – C, F, G; > *R. abortivus* var. *indivisus* Fernald – F]

* ***Ranunculus acris*** Linnaeus, Tall Buttercup, Bitter Buttercup. Mt, Pd (GA, NC, VA), Cp (NC, SC, VA): pastures, fields, roadsides, disturbed areas; common (uncommon in Piedmont, rare in Coastal Plain), native of Europe. May-August. [= RAB, C, F, FNA, G, GW, S, W, Y; > *R. acris* var. *acris* – K]

Ranunculus allegheniensis Britton, Allegheny Buttercup, Mountain Crowfoot. Mt (NC, VA, SC?), Pd (VA): cove forests, rich forested slopes; uncommon (rare in Piedmont). April-June. MA west to OH, south to w. NC and ne. TN, an Appalachian endemic. [= RAB, C, F, FNA, G, GW, K, S, W, Y]

Ranunculus ambigens S. Watson, Water-plantain Crowfoot, Water-plantain Spearwort. Cp, Pd (NC, VA), Mt (VA): marshes; rare (NC Rare, VA Watch List). April-June. ME west to MN, south to VA, NC, ne. TN, w. TN, and LA. [= RAB, C, F, FNA, G, GW, K, W, Y; = *R. obtusiusculus* Rafinesque – S]

* ***Ranunculus arvensis*** Linnaeus, Corn Crowfoot, Hungerweed. Pd (GA, NC, SC), Mt (NC): fields, disturbed areas; rare, native of Europe. April-June. [= C, FNA, G, GW, K, X, Y; > *R. arvensis* var. *arvensis* – RAB; > *R. arvensis* var. *tuberculatus* (A.P. de Candolle) Koch – RAB]

* ***Ranunculus bulbosus*** Linnaeus, Bulbous Buttercup. Cp (NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common (rare in SC), native of Europe. April-June. [= RAB, C, FNA, GW, K, S, W, Y; > *R. bulbosus* var. *bulbosus* – F; > *R. bulbosus* var. *dissectus* Barbey – F; > *R. bulbosus* var. *valdepubens* (Jordan) Briquet – F]

Ranunculus caricetorum Greene, Northern Swamp Buttercup, Marsh Buttercup. Pd, Cp, Mt (VA): swampy forests and marshes; rare. April-August. New Brunswick west to s. Manitoba, south to NJ, n. VA, s. OH, and s. MO; reports of this species further south are probably in error. This species is octoploid (n = 32); the remainder of the *R. hispidus* complex is tetraploid. [= *R. hispidus* Michaux var. *caricetorum* (Greene) T. Duncan – C, FNA, K, Z; = *R. septentrionalis* Poiret – GW, W, Y, misapplied; > *R. septentrionalis* var. *caricetorum* (Greene) Fernald – F, G; > *R. septentrionalis* var. *pterocarpus* Linnaeus Benson – G; > *R. septentrionalis* var. *septentrionalis* – F, G]

Ranunculus carolinianus A.P. de Candolle. Cp, Pd, Mt (GA, NC, SC, VA): swamp forests, wet woodlands, open marshy wetlands; uncommon. April-August. NY west to s. Ontario, WI, and MN, south to n. peninsular FL, LA, and e. TX. This species is tetraploid (n = 16). [= RAB, F, G, GW, W, Y; = *R. hispidus* Michaux var. *nitidus* (Chapman) T. Duncan – C, FNA, K, Z; > *R. palmatus* Elliott – S; > *R. septentrionalis* – S]

Ranunculus fascicularis Muhlenberg ex Bigelow, Thick-root Buttercup, Early Buttercup. Pd (GA, NC, SC, VA), Mt (GA, NC, VA), Cp (GA): wet flats with prairie affinities (with *Camassia scilloides*), rocky barrens and glades over mafic rocks (such as gabbro or diabase), ultramafic outcrop barrens (over olivine), limestone barrens; rare (NC Watch List, SC Rare). March-June. MA and NY west to s. Ontario, MN, and se. Manitoba, south to c. NC, nc. SC, sw. GA, and e. TX; occurrences which are both south of New England and east of the Appalachians are scattered and disjunct. This species is tetraploid (n = 16). [= C, FNA, GW, K, S, W, Y, Z; > *R. fascicularis* var. *fascicularis* – F, G]

Ranunculus flabellaris Rafinesque, Yellow Water Crowfoot. Cp (NC, VA): pools in floodplains of small stream swamps, other stagnant or slowly moving waters; rare (NC Rare, VA Watch List). March-May. ME west to British Columbia, south to ne. NC, KY, IN, IL, LA, OK, UT, and CA. [= RAB, C, F, FNA, G, GW, K, Y; = *R. delphiniifolius* Torrey ex Eaton – S]

Ranunculus hederaceus Linnaeus, Ivy-leaved Water Crowfoot. Longstalked Crowfoot. Cp (NC, SC, VA), Mt (VA): coastal brackish marshes, other circumneutral marshes; rare (NC Rare, VA Rare). April-June. Se. PA south to SC on the Coastal Plain; disjunct in Newfoundland; also in Europe. [= RAB, C, F, FNA, G, GW, K, Y]

Ranunculus hispidus Michaux, Hispid Buttercup, Hairy Buttercup. Mt, Pd (GA, NC, SC, VA), Cp (GA, VA): rich moist forests, creekbanks, mesic to dry woodlands and forests, bottomlands; common. March-June. MA and VT west to s. Ontario, n. IL, and se. KS, south to c. NC, s. GA, s. AL, AR, and ne. OK. This species is tetraploid (n = 16). [= RAB, GW, S, W, Y; = *R. hispidus* var. *hispidus* – C, FNA, K, Z; > *R. hispidus* var. *hispidus* – F, G; > *R. hispidus* var. *falsus* Fernald – F; > *R. hispidus* var. *marilandicus* (Poiret) L. Benson – G; > *R. hispidus* var. *eurylobus* L. Benson – F, G]

Ranunculus laxicaulis (Torrey & A. Gray) Darby, Coastal Plain Spearwort. Cp (GA, NC, SC, VA), Pd (GA): marshes; rare (NC Watch List, VA Rare). April-June. DE south to sw. GA, west to TX, inland in the interior to w. TN, s. IN, s. IL, MO, and KS, almost entirely on the southeastern Coastal Plain. *R. subcordatus* E.O. Beal, allegedly endemic to NC, is conspecific

with *R. laxicaulis*. [= RAB, F, FNA, G, K, W; ? *R. texensis* Engelmann – C; > *R. laxicaulis* – GW, Y; > *R. subcordatus* E.O. Beal – GW, Y; ? *R. oblongifolius* Elliott – S, misapplied]

Ranunculus longirostris Godron, White Water Crowfoot. Mt, Pd (VA): submerged in streams; rare (VA Rare). Sw. Québec west to Saskatchewan, ID, and OR, south to DE, VA, KY, nc. TN, AL, AR, TX, NM, and AZ. [= C, F, GW, K, Y; < *R. aquatilis* Linnaeus var. *diffusus* – FNA; ? *R. circinatus* Sibthorp – G; ? *Batrachium trichophyllum* – S, misapplied]

Ranunculus micranthus Nuttall, Small-flowered Buttercup, Rock Buttercup. Pd (NC, VA), Mt, Cp (VA), {GA?}: rich forests; uncommon (rare south of VA) (NC Rare). April-June. MA west to SD, south to e. VA, c. NC, sc. TN, WV, OH, and OK. [= RAB, C, FNA, G, GW, K, S, W, Y; > *R. micranthus* var. *micranthus* – F; > *R. micranthus* var. *delitescens* (Greene) Fernald – F]

* ***Ranunculus muricatus*** Linnaeus. Pd (GA, SC), Cp (SC): ditches and marshes; rare, native of Europe. April-June. [= RAB, FNA, GW, K, S, X, Y]

* ***Ranunculus parviflorus*** Linnaeus, Small-flowered Buttercup, Stickseed Crowfoot. Cp, Pd, Mt (GA, NC, SC, VA): disturbed areas; common (rare in Mountains), native of Europe. February-July. [= RAB, C, F, FNA, G, GW, K, S, W, X, Y]

* ***Ranunculus platensis*** Sprengel. Pd (NC), Cp (GA): lawns, ditches; rare, native of South America. [= FNA, GW, K, X, Y]

Ranunculus pusillus Poiret, Low Spearwort. Cp, Pd (GA, NC, SC, VA), Mt (GA, NC, VA): marshes, ditches, other wet habitats; common (uncommon in Mountains). April-June. S. NY south to FL, west to TX, north in the interior to OH, IN, and MO. [= RAB, C, F, FNA, G, GW, S, W, Y; > *R. pusillus* var. *pusillus* – K]

Ranunculus recurvatus Poiret *var.* ***recurvatus***, Hooked Buttercup, Hooked Crowfoot. Mt, Pd, Cp (GA, NC, SC, VA): bottomland forests, cove forests, swamps, mesic slope forests; common. April-June. ME and Québec west to MN, south to sw. GA, MS, and OK. Var. *tropicus* (Grisebach) Fawcett & Rendle occurs in Puerto Rico {and elsewhere?}. [= FNA, K; < *R. recurvatus* – RAB, C, G, GW, S, W, Y; > *R. recurvatus* var. *recurvatus* – F; > *R. recurvatus* var. *adpressipilis* Weatherby – F]

* ***Ranunculus repens*** Linnaeus, Creeping Buttercup, Meg-many-feet. Mt, Pd (NC, VA), Cp (NC, SC, VA): low meadows, disturbed areas; uncommon, native of Europe. [= RAB, FNA, G, GW, K, S, W, Y; > *R. repens* var. *repens* – C, F; > *R. repens* var. *degeneratus* Schur – C; > *R. repens* var. *glabratus* A.P. de Candolle – C, F; > *R. repens* var. *pleniflorus* Fernald – F]

* ***Ranunculus sardous*** Crantz, Sardinian Buttercup, Hairy Buttercup. Cp, Pd (GA, NC, SC, VA), Mt (GA, VA): low fields, disturbed areas; uncommon, native of Europe. April-July. [= RAB, C, F, FNA, G, GW, K, X, Y]

Ranunculus sceleratus Linnaeus *var.* ***sceleratus***, Cursed Buttercup, Celery-leaf Crowfoot. Cp (GA, NC, SC, VA), Pd (NC, VA), Mt (VA): marshes, ditches, and stream margins; common (uncommon south of VA). June-September. The species is circumboreal, ranging south in North America (partly introduced, at least southward) to n. FL, LA, TX, and CA. Var. *sceleratus* is widespread and the only variety in e. North America; var. *multifidus* occurs in w. North America. The epithet is often misspelled "*scleratus*." [= C, F, FNA, G, K; < *R. sceleratus* – RAB, GW, S, W, Y]

Ranunculus trichophyllus Chaix *var.* ***trichophyllus***, White Water Crowfoot. Cp, Mt, Pd (VA), {NC?}: submerged in water of acidic streams; rare (NC Rare, VA Rare). *R. trichophyllus* is circumboreal, ranging south in North America to NJ, VA, nc. TN, PA, MN, SD, NM, AZ, and CA. Var. *trichophyllus* ranges south to the southern limit of the species. This taxon was reported as far south as NC by G and S; the documentation is unknown and the species was not treated by RAB. The more northern var. *calvescens* W. Drew, with the receptacle glabrous or with a few scattered hairs (vs. hirsute with tufted hairs), ranges south to PA and MI. [= C, F, K; < *R. aquatilis* Linnaeus var. *diffusus* Withering – FNA; < *R. trichophyllus* – Y; *R. aquatilis* Linnaeus var. *capillaceus* (Thuill.) A.P. de Candolle – G; *Batrachium flaccidum* (Persoon) Ruprecht – S]

* ***Ranunculus trilobus*** Desfontaines. Cp (SC): fields, roadsides, ditches; rare, native of sw. Europe. [= FNA, K, X, Y]

Ranunculus harveyi (A. Gray) Britton var. *harveyi*, east to e. TN and AL. [= FNA, K] {synonymy incomplete}

Ranunculus macounii d'Urv., occurs in WV (Kartesz 1999). {investigate} [= K] {not yet keyed; synonymy incomplete}

Ranunculus pensylvanicus Linnaeus f., Bristly Buttercup, ranges south to s. PA (Rhoads & Klein 1993), DE, DC, and MD (Whittemore in FNA 1997). [= FNA, K] {synonymy incomplete}

Thalictrum Linnaeus 1753 (Meadow-rue)

A genus of about 330 species, perennial herbs, of Eurasia, North America, South America, and Africa. References: Park & Festerling in FNA (1997); Park (1992)=Z; Tamura in Kubitzki, Rohwer, & Bittrich (1993). [also see *Anemonella*]

1 Fruit (achene) scimitar-shaped, borne on a stipe 1.5-4 mm long; flowers perfect; [section *Physocarpum*].
  2 Achene concave or straight on the upper surface, 4-5.5 mm long, borne on a stipe 1.5-3 mm long; inflorescence branches stiff and diverge at acute angles; [fairly widespread in our area, on a wide variety of moist substrates, especially in the Mountains] ..... ***Th. clavatum***
  2 Achene straight on the upper surface, 2.5-4 mm long, borne on a stipe 2.5-4 mm long; inflorescence branches flexuous and divergent; [of sandstone rockhouses of Cumberland Plateau of AL, TN, and KY] ..... ***[Th. mirabile]***
1 Fruit (achene) not scimitar-shaped, not borne on a stipe; flowers unisexual (or sometimes a few or more bisexual).
  3 Leaflets of the stem leaves linear to narrowly lanceolate, oblanceolate or elliptic, (3-) 5-10 (-25)× as long as wide; [section *Leucocoma*]..... ..... ***Th. cooleyi***
  3 Leaflets of the stem leaves ovate, obovate, or suborbicular, 0.7-3 (-5)× as long as wide.
    4 Most of the leaflets with (3-) 4-6 (-9) lobes or teeth; [section *Heterogamia*].
      5 Cauline leaf subtending the lowest flowering branch sessile; plant flowering May-July; achenes borne on a 0.7-2.5 mm long stipe..... ..... ***Th. coriaceum***
      5 Cauline leaf subtending the lowest flowering branch with a petiole 3-7 cm long; plant flowering March-April; achenes nearly sessile, the stipe nonexistent or <0.3 mm long.
        6 Largest leaflets < 15 mm wide; stems 10-40 cm tall, reclining..... ***Th. debile***
        6 Largest leaflets > 15 mm long; stems 30-80 cm tall, erect..... ***Th. dioicum***
    4 Most of the leaflets with 1-3 (-5) lobes or teeth; [section *Leucocoma*].

7 Leaflet undersurfaces, peduncles, and achenes with stipitate glands or papillae.
  8 Anthers 0.5-1.2 mm long; stigmas 0.6-2.2 mm long ..... ***Th. pubescens var. hepaticum***
  8 Anthers 1.5-2.8 mm long; stigmas (1.5-) 2.0-3.5 mm long ..... ***Th. revolutum***
7 Leaflet undersurfaces, peduncles, and achenes glabrous or pubescent, lacking both stipitate glands and papillae.
  9 Leaflet undersurfaces, peduncles, and achenes finely pubescent ..... ***Th. pubescens var. pubescens***
  9 Leaflet undersurfaces, peduncles, and achenes glabrous.
    10 Leaflets entire to 3-lobed, averaging about 10 mm wide, the broadest usually < 20 mm wide; filaments (2-) 3-4.5 (-6.5) mm long (averaging 3.6 mm) ..... ***Th. macrostylum***
    10 Leaflets 3-lobed (rarely entire), averaging 15-23 mm wide, the broadest usually 15-60 mm wide; filaments (2-) 4-5 (-8) mm long (averaging 4-5 mm).
      12 Anthers 0.5-1.2 mm long; stigmas 0.6-2.2 mm long ..... ***Th. pubescens var. hepaticum***
      12 Anthers 1.5-2.8 mm long; stigmas (1.5-) 2.0-3.3 mm long ..... ***Th. revolutum***

Thalictrum clavatum A.P. de Candolle, Lady-rue, Mountain Meadowrue. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp? (VA?): seepages, moist forests, spray cliffs at waterfalls, brookbanks; common, rare in Piedmont (rare in Coastal Plain, if record is valid). May-July. A Southern Appalachian endemic: VA, WV, e. KY south through w. NC and e. TN to nw. SC and n. GA. [= RAB, C, F, FNA, G, GW, K, S, W]

Thalictrum cooleyi Ahles, Cooley's Meadowrue, Savanna Meadowrue. Cp (FL, GA, NC): ecotones between calcareous savannas and adjacent swamp forests, shallowly underlain by coquina limestone ("marl"), generally within a few meters of *Taxodium ascendens* and *Liriodendron tulipifera*; rare. Late June-early July; August-October. The species is endemic to two small areas, centered around Maple Hill (Pender and Onslow counties, NC) and Old Dock (Columbus and Brunswick counties, NC), with a small disjunct population in Panhandle FL (Walton County), and a small number of ambiguous populations in sw. GA (Dougherty and Worth counties); the GA populations are assigned here for now but may well represent a new taxon. It is associated with a number of other narrow endemic species. The leaflets of basal leaves (winter rosettes) are much broader, resembling the leaflets of other *Thalictrum* species in length/width ratio. Leaves produced from May on have the very narrow leaves typical of the species. Park (1992) found that *Th. cooleyi* has the highest chromosome number in the genus, 2n = 210, a ploidy level of 30× compared to the base chromosome level of 7 in *Thalictrum*. [= RAB, FNA, GW, K, WH, Z]

Thalictrum coriaceum (Britton) Small, Appalachian Meadowrue, Maid of the Mist. Mt (GA, NC, SC, VA), Pd (VA): rich forests; uncommon, rare in Piedmont (GA Rare). May-July. A Southern and Central Appalachian endemic: MD, VA, and WV south through w. KY and e. TN to w. NC and ne. GA. The roots are bright yellow. A preliminary study concluded that *Th. steeleanum* B. Boivin is not distinct from *Th. coriaceum* (Park 1988); further study is needed. *Th. steeleanum* is alleged to differ in the following ways (and others): plant with long, cordlike rhizomes (vs. stout caudex), terminal leaflets mostly wider than long (vs. mostly longer than wide), achenes curved, 4-6 mm long (vs. less curved, 2.5-4 mm long). Park found these characters (and others) to be variable and to occur together within populations. It ranges from s. PA south through MD, e. WV, w. VA to nw. NC. [= RAB, FNA, K; > *Th. coriaceum* – C, F, G, W, in a narrower sense; > *Th. steeleanum* B. Boivin – C, F, G, W; > *Th. coriaceum* – S; > *Th. caulophylloides* Small – S]

Thalictrum debile Buckley, Trailing Meadowrue. Mt (GA): moist to wet forests over limestone; rare (GA Threatened). Nw. GA west to e. MS. [= FNA, GW, K, S]

Thalictrum dioicum Linnaeus, Early Meadowrue. Mt, Pd (GA, NC, SC, VA), Cp (VA): seepages, moist forests; common, rare in Coastal Plain. ME, Québec, and MN south to SC, c. GA, AL, and MO. [= RAB, C, F, FNA, G, GW, K, S, W]

Thalictrum macrostylum Small & Heller, Small-leaved Meadowrue. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): moist places, perhaps associated with circumneutral soils, moist to dry ultramafic outcrop barrens (over olivine), tidal freshwater marshes; rare. May-August. Se. VA south and west through NC, SC, sc. GA, FL, and AL to MS. [= C, F, FNA, G, GW, K, S, WH, Z; > *Th. macrostylum* – RAB; > *Th. subrotundum* B. Boivin – RAB]

Thalictrum pubescens Pursh *var.* ***hepaticum*** (Greene) Keener, Appalachian Tall Meadowrue. Mt (GA, NC): seepage areas; rare (NC Watch List). May-July. PA south to n. GA and se. TN, strictly or primarily in the Appalachians. Plants tentatively placed here have been problematic. Keener (1981) reduced *Th. hepaticum* Greene to a variety of *Th. pubescens*, and discussed their distinction. Park (1992) contends that these plants are, indeed, glandular puberulent, and should therefore be reduced to synonymy under *Th. revolutum*, stating "these are not given varietal status [under *Th. revolutum*] since this morphological variation in anthers is not correlated with a continuous geographic range. As indicated above, I have located specimens from Georgia, North Carolina, Tennessee, and Pennsylvania which fit the description." As mapped by Keener (1981) *Th. pubescens* var. *hepaticum* (Greene) Keener appears as an endemic to the Southern Appalachians; if extended to Pennsylvania, the distribution is still very restricted (and in a phytogeographically plausible manner) compared to either *Th. revolutum* or *Th. pubescens*. This entity appears to be closer to *Th. pubescens* in leaflet shape, sepal length, anther length, and stigma length, and to *Th. revolutum* in leaflet and petiolule vestiture. More study is needed; the taxon is here provisionally accepted in order to draw attention to the problem. [= W; < *Th. polygamum* Muhlenberg ex Sprengel – RAB, F, G, S, nomen nudum; < *Th. pubescens* – C, GW, K; < *Th. revolutum* – FNA]

Thalictrum pubescens Pursh *var.* ***pubescens***, Common Tall Meadowrue, Late Meadowrue, King-of-the-meadow. Mt, Pd (NC, VA), Cp (NC, SC, VA), {GA}: bogs, marshes, wet forests; common, rare in Piedmont and Coastal Plain south of VA. May-July. Labrador, Newfoundland, and Ontario south to GA, SC and MS. [= W; < *Th. polygamum* Muhlenberg ex Sprengel – RAB, F, G, S, nomen nudum; < *Th. pubescens* – C, GW, K, Z; < *Th. pubescens* – FNA]

Thalictrum revolutum DC, Skunk Meadowrue. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, VA): mesic to dry forests, woodlands, and barrens, over hornblende, greenstone, dolostone, and serpentinized olivine; common, rare in Coastal Plain south of VA. May-July. Québec and Ontario south to n. FL, LA, and TX, and scattered southwest to CO, NV, and AZ. The species is normally stipitate-glandular or papillose, but can be glabrous, as accounted for in the key. [= RAB, C, F, G, GW, K, S, W, WH; < *Th. revolutum* – FNA]

Thalictrum dasycarpum Fischer & Avé-Lallemant, Purple Meadowrue. Québec and Yukon south to PA, KY, TN, AL, MS, LA, TX, NM, AZ, and WA. It has been reported for scattered localities in VA (Harvill et al. 1992). Park (1992) and FNA do not document the occurrence of *Th. dasycarpum* in our area; substantiation is needed. [= FNA, K] {not yet keyed; synonymy incomplete}

Thalictrum mirabile Small is a delicate relative of *Th. clavatum*, occurring on wet sandstone cliffs primarily in the Cumberland Plateau (and especially associated with sandstone rockhouses), from KY south through TN to n. AL and nw. GA (and additionally cited in FNA as occurring in w. NC). The inflorescence appears sparser because of the shorter and narrower achenes borne on longer stipes. [= FNA, GW, K, S]

Trautvetteria Fischer & C.A. Meyer 1835 (Tassel-rue)

A monotypic genus, a perennial herb, disjunctly distributed in temperate to boreal e. North America, w. North America, and Japan (or sometimes treated as 2-3 species). *Trautvetteria* is very closely related to some parts of *Ranunculus* (Johansson 1998). References: Parfitt in FNA (1997); Tamura in Kubitzki, Rohwer, & Bittrich (1993); Johansson (1998).

Trautvetteria caroliniensis (Walter) Vail *var.* ***caroliniensis***, Tassel-rue, False Bugbane. Mt, Pd (GA, NC, SC, VA), Cp (GA, NC, SC): streambanks, seepages, grassy balds, moist forests, swamp forests, very rarely in calcareous longleaf pine savanna ecotones; common, uncommon in Piedmont, rare in Coastal Plain (SC Rare). Late May-July. The genus is monotypic, the single species distributed disjunctly as follows: sw. PA and KY to GA, AL, and Panhandle FL, primarily in the Southern and Central Appalachians, disjunct on calcareous sites in AR (Sundell et al. 1999), IN, IL, and MO [var. *caroliniensis*], in w. North America from s. British Columbia south to CA, AZ, and NM [var. *borealis* (H. Hara) T. Shimizu], and in Japan [var. *japonica* (Siebold & Zuccarini) T. Shimizu]. The varieties are poorly differentiated morphologically and may not warrant recognition. The discovery of this species in the edge of a calcareous savanna (Camp Branch Savanna, Brunswick County, NC) in the outer Coastal Plain was surprising; the small population has since been destroyed by intensive silvicultural practices. [= K; < *T. caroliniensis* – RAB, C, F, FNA, G, GW, S, W]

Xanthorhiza Marshall 1785 (Yellowroot)

A monotypic genus, a shrub, of temperate e. North America. References: Parfitt in FNA (1997); Tamura in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: An unmistakable plant, the stems usually about knee-high and unbranched, the rhizomes with a bright yellow, bitter-tasting alkaloid.

Xanthorhiza simplicissima Marshall, Yellowroot, Brook-feather. Mt, Pd, Cp (GA, NC, SC, VA): streambanks and riverbanks; common (uncommon in Coastal Plain, and essentially absent from VA north of the James River). March-May; May-June. NY and se. PA (where only naturalized, according to Rhoads & Klein 1993), south to SC, sw. GA, w. FL, and AL. [= RAB, C, F, FNA, G, GW, K, W; = *Xanthorrhiza simplicissima* – S, orthographic variant]

RESEDACEAE A.P. de Candolle ex Gray 1821 (Mignonette Family)

A family of about 6 genera and 75-80 species, herbs and shrubs, of the northern hemisphere. References: Kubitzki in Kubitzki & Bayer (2003).

Reseda Linnaeus 1754 (Mignonette)

A genus of about 55-60 species, herbs, of Europe, Mediterranean region, and c. Asia.

1 Upper and middle leaves deeply pinnately lobed.
  2 Carpels 4; petals white; seeds tuberculate ..... ***[R. alba]***
  2 Carpels 3; petals yellowish; seeds smooth ..... ***[R. lutea]***
1 Upper and middle leaves entire or finely toothed (sometimes with 1-2 lateral lobes).
  3 Sepals and petals 4; seeds smooth; fruits < 7 mm long, crowded, erect to ascending ..... ***[R. luteola]***
  3 Sepals and petals 6; seeds rugose; fruits > 7 mm long, well-spaced, pendent.
    4 Capsules 7-11 mm long; sepals (in fruit) < 5mm long ..... ***R. odorata***
    4 Capsules (well-developed) 11-15 mm long; sepals (in fruit > 5 mm long) ..... ***[R. phyteuma]***

* ***Reseda odorata*** Linnaeus, Garden Mignonette. Cp (SC), Pd (NC): gardens, garden borders, and disturbed areas; rare, doubtfully established, native of Mediterranean Europe. Reported for scattered locations in eastern North America (Kartesz 1999). [= C, G, K]

* *Reseda alba* Linnaeus, White Mignonette. South to DE and se. PA (Rhoads & Klein 1993). Native of the Mediterranean region. [= C, F, G, K]

* *Reseda lutea* Linnaeus, Yellow Mignonette, Wild Mignonette. South to DE, se. PA, and sc PA (Rhoads & Klein 1993). Native of Europe. [= C, F, G, K]

* *Reseda luteola* Linnaeus, Weld, Dyer's Rocket, Yellow-weed. Formerly cultivated as a dye plant, is reported from se. and sc. PA (Rhoads & Klein 1993). Native of Eurasia. [= C, F, G, K]
* *Reseda phyteuma* Linnaeus, Corn Mignonette. Reported from se. PA (Rhoads & Klein 1993). Native of Europe. [= K]

RHAMNACEAE A.L. de Jussieu 1789 (Buckthorn Family)

A family of about 50-52 genera and 900-925 species, mostly trees, shrubs, and lianas, cosmopolitan in distribution. References: Brizicky (1964a)=Z; Richardson et al. (2000a, 2000b); Medan & Schirarend in Kubitzki (2004).

1 Plant a vine; [tribe *Rhamneae*] ..... ***Berchemia***
1 Plant a shrub or small tree.
  2 Leaves with 3 prominent veins from near the base.
    3 Plants not spiny; fruit dry, capsular; [native]; [tribal placement uncertain] ..... ***Ceanothus***
    3 Plants armed with stipular spines; fruit pulpy; [alien, cultivated and escaped]; [tribe *Paliureae*] ..... ***Ziziphus***
  2 Leaves with prominently pinnate venation, the lowermost lateral veins no more prominent than others.
    4 Leaves opposite, 2-4 cm long; [of shell middens and shell hammocks in the outer Coastal Plain of NC and SC]; [tribe *Rhamneae*] ..... ***Sageretia***
    4 Leaves alternate (or opposite in *Frangula* and some *Rhamnus*), 3-15 cm long; [of various habitats in the Piedmont and Mountains (rarely Coastal Plain) of VA, NC, and SC].
      5 Inflorescence repeatedly branched dichotomously; peduncles fleshy and reddish in fruit; nectariferous disc pubescent; [tribe *Paliureae*] ..... ***Hovenia***
      5 Inflorescence not repeatedly branched dichotomously; peduncles not fleshy; nectariferous disc glabrous; [tribe *Rhamneae*].
        6 Winter buds naked, pubescent; flowers perfect, sepals, stamens, and petals 5; style undivided; leaves with 8-10 lateral veins on either side of the midvein ..... ***Frangula***
        6 Winter buds with bud scales; flowers functionally unisexual, sepals and stamens 4 or 5 (the stamens rudimentary in the pistillate flowers), petals 0 or 4 (never 5); style divided 1/3 to 2/3 its length into 2, 4 or 5 segments; leaves with (2-) 3-9 lateral veins on either side of the midvein ..... ***Rhamnus***

Berchemia Necker 1825 (Supplejack)

A genus of about 12 species, vines, of tropical to warm temperate Asia, Africa and se. North America. *B. scandens* is the only New World species. References: Brizicky (1964a)=Z; Medan & Schirarend in Kubitzki (2004).

Identification notes: The young stems are shining and reddish, the bark on older stems is medium gray and smooth (though often marred by sap wells drilled by Yellow-bellied Sapsuckers). Larger stems can reach 10 cm in diameter. The smooth bark and neatly pinnately-veined leaves are distinctive.

Berchemia scandens (Hill) K. Koch, Supplejack, American Rattan. Cp (GA, NC, SC, VA), Pd (GA, NC), Mt (GA): swamp forests, bottomlands, streambanks, in mesic to even xeric uplands over calcareous rock or sediment; common (rare in Piedmont). April-May; August-October. Se. VA south to s. FL, west to TX, north in the interior to nc. TN, w. TN, s. IL, and s. MO. *Berchemia* climbs high into the crowns of swamp trees. [= RAB, C, F, G, GW, K, S, Z]

Ceanothus Linnaeus 1753 (Redroot, New Jersey Tea)

A genus of ca. 55 species, shrubs, mostly in California. References: Fross & Wilken (2006)=X; Coile (1988)=Y; Brizicky (1964a)=Z; Medan & Schirarend in Kubitzki (2004).

1 Leaves 0.2-1.0 cm long, obovate ..... ***C. microphyllus***
1 Leaves 2-10 cm long, elliptic to ovate.
  2 Inflorescences terminating leafy terminal shoots; leaves mostly obtuse to acute ..... ***C. herbaceus***
  2 Inflorescences terminating leafless axillary shoots (these sometimes with leafy bracts distinctly smaller than normal leaves); leaves mostly acute to acuminate.
    3 Leaves (3-) 4-10 cm long, mostly 2.5-6 cm wide; [of various habitats of the Piedmont, Mountains, and rarely Coastal Plain] ..... ***C. americanus var. americanus***
    3 Leaves 2-4 (-6) cm long, mostly 1-2 cm wide; [primarily of sandy habitats of the Coastal Plain and rarely Piedmont] ..... ***C. americanus var. intermedius***

Ceanothus americanus Linnaeus *var.* ***americanus***, Common New Jersey Tea. Mt, Pd (GA, NC, SC, VA), Cp (NC, VA): woodland borders, dry woodlands, glady openings, dry ridge forests and woodlands (pine or oak) in the Mountains; common. May-June; June-July. ME west to s. Manitoba, south to FL and TX. [= C, F, G, X, Y, Z; < *C. americanus* – RAB, K, S, W; = *C. americanus* – S]

Ceanothus americanus Linnaeus *var.* ***intermedius*** (Pursh) Torrey & A. Gray, Southern New Jersey Tea. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): sandhills, dry sandy woodlands and forests, rocky openings around granitic or quartzitic rocks in the Piedmont; common. May-June; June-July. NJ (or possibly MA) south to FL, west to LA, mostly on the Coastal Plain, but disjunct inland to sandy soils around outcrops of siliceous rocks. The recognition of infraspecific taxa in the variable *C. americanus* is uncertain; var. *intermedius* may either represent ecological forms, or the variation may be too clinal to make

taxonomic recognition rewarding. However, material from our area (and beyond) sorts relatively easily, with some intermediates from the Piedmont; varietal status seems provisionally appropriate. [= C, F, G, X, Y, Z; < *C. americanus* – RAB, K, S, W; = *C. intermedius* Pursh – S]

Ceanothus herbaceus Rafinesque, Prairie Redroot. Pd (VA?): flood-scoured rocky riverbanks; rare. April-May. Primarily midwestern: MI west to MT, south to nw. IN, AR, TX, and Mexico; disjunct eastward in Québec, NH, VT, NY, MD, WV, DC, and n. VA (? - Arlington County). Rafinesque described *C. herbaceus* from "near the falls of the Potowmack, between the rocks." The holotype not extant, Coile (1988) chose a neotype, collected by Sheldon in 1881 from "Arlington County, Virginia, Chain Bridge, rocky river bottoms, Potomac River." However, Bartgis, Fleming, & Wiegand (1997) indicate that *C. herbaceus* in the Washington, D.C. area can only be ascribed with certainty to DC and MD. [= K, X, Y, Z; = *C. ovatus* Desfontaines – F, S, misapplied; = *C. pubescens* (Torrey & A. Gray ex S. Watson) Rydberg ex Small – S]

Ceanothus microphyllus Michaux. Cp (GA): sandhills; common. E. GA, FL, and s. AL, approaching to within a few kilometers of SC (in Screven and Chatham counties, GA), and should be sought in se. SC (except that its outlandish appearance makes it difficult to overlook!). *C. ×serpyllifolius* Nuttall (pro sp.) is apparently a hybrid of *C. americanus* var. *intermedius* and *C. microphyllus* (Coile 1988); it is known from scattered sites in FL and GA. [= K, S, X, Y, Z]

Frangula P. Miller 1754 (Buckthorn)

The distinctions between *Frangula* and *Rhamnus* are many and meaningful; their separation at the generic level seems warranted based on morphological and molecular analyses (Richardson et al. 2000a; Bolmgren & Oxelman 2004). References: Brizicky (1964a)=Z; Medan & Schirarend in Kubitzki (2004).

1 Leaves entire; leaves ca. 2× as long as wide ..... ***F. alnus***
1 Leaves serrulate; leaves ca. 3× as long as wide ..... ***F. caroliniana***

* ***Frangula alnus*** P. Miller, European Alder-Buckthorn. Mt (NC), Pd (VA): forested area along Blue Ridge Parkway; rare, native of Europe. This species is a seriously invasive weed in ne. United States, south to (at least) NJ, s. PA (Rhoads & Klein 1993), KY, and se. TN (Marion County) (Chester, Wofford, & Kral 1997, Kral 1981), and w. NC. [= K; = *Rhamnus frangula* Linnaeus – C, F, G]

Frangula caroliniana (Walter) A. Gray, Carolina Buckthorn. Mt (GA, NC, SC, VA), Pd (GA, NC, SC), Cp (GA, SC): dry to moist barrens, woodlands, and forests, Coastal Plain limestone bluffs and shell middens, especially over mafic or calcareous rocks; rare (NC Watch List). May-June. Sw. VA west to s. OH and s. MO, south to FL and TX. [= K; = *Rhamnus caroliniana* Walter – RAB, S, W; > *Rhamnus caroliniana* Walter var. *caroliniana* – C, F, G, Z]

Hovenia Thunberg 1781 (Raisin-tree)

A genus of 7 species, trees, of e. Asia. References: Brizicky (1964a)=Z; Medan & Schirarend in Kubitzki (2004).

* ***Hovenia dulcis*** Thunberg, Japanese Raisin-tree. Pd (NC): escaped from cultivation to suburban woodlands; rare, native of China. Goldman (1998) presents a discussion of this species' introduction into North America, with a color photograph. [= RAB, K, Z]

Rhamnus Linnaeus 1753 (Buckthorn)

The recognition of *Frangula* as separate from *Rhamnus* is supported by molecular phylogeny (Bolmgren & Oxelman 2004). References: Brizicky (1964a)=Z; Bolmgren & Oxelman (2004); Medan & Schirarend in Kubitzki (2004). [also see *Frangula*]

1 Leaves mostly opposite or subopposite (or some alternate), mostly with (2-) 3-6 lateral veins on either side of the midrib; plant a large shrub or small tree, to 10 m tall; fruit with 4 stones; [aliens, mostly of moist (but not boggy) soils].
  2 Leaves mostly 1-2× as long as wide, with (2-) 3 (-4) lateral veins on either side of the midrib; style divided ½ its length into 4 segments..... ***[Rh. cathartica]***
  2 Leaves mostly 2-3× as long as wide, with 4-6 lateral veins on either side of the midrib; style divided ⅔ its length into 2 segments ..... ***Rh. davurica***
1 Leaves alternate, mostly with (4-) 6-9 lateral veins on either side of the midrib; plant a shrub to 2 m tall; fruit with 2-3 stones; [natives].
  3 Sepals and stamens 5; petals 0; fruit with 3 stones; [of mafic or calcareous peaty wetlands and seeps]..... ***Rh. alnifolia***
  3 Sepals and stamens 4; petals 4; fruit with 2 stones; [of dry to moist calcareous woodlands and thickets].
    4 Young leaves and young branches glabrous or with scattered hairs; mature leves glabrous below..... ***Rh. lanceolata var. glabrata***
    4 Young leaves and young branches pubescent; mature leaves soft pubescent below..... ***Rh. lanceolata var. lanceolata***

Rhamnus alnifolia L'Héritier, Alder-leaved Buckthorn, American Alder-Buckthorn. Mt (VA): mafic or calcareous (dolomitic) seeps, usually with *Parnassia grandifolia*; rare. May-July. Newfoundland west to British Columbia, south to NJ, PA, w. VA, ne. TN (Chester, Wofford, & Kral 1997), OH, n. IN, n. IL, IA, and CA. [= C, F, G, K, W, Z]

* ***Rhamnus davurica*** Pallas, Dahurian Buckthorn. Pd (NC, VA): suburban woodlands, rarely naturalized; rare, native of e. Asia. Also reported from suburban areas near Louisville, KY, and Knoxville, TN (D. Estes, pers. comm..). [> *Rhamnus davurica* ssp. *??* – K; = *Rh. citrifolia* (Weston) W. Hess & Stearn – C]

Rhamnus lanceolata Pursh *var.* ***glabrata*** Gleason, Western Lance-leaved Buckthorn. Mt (VA): dry habitats over calcareous rocks; rare. April-May. Var. *glabrata* Gleason ranges from OH west to SD, south to w. VA (Ludwig 1999), KY, c. TN, AR, and KS. [= C, F, G, Z; = *Rh. lanceolata* ssp. *glabrata* (Gleason) Kartesz & Gandhi – K; < *Rh. lanceolata* – S, W]

Rhamnus lanceolata Pursh *var.* ***lanceolata***, Eastern Lance-leaved Buckthorn. Mt (VA): dry to moist thickets over calcareous rocks; rare. April-May. Var. *lanceolata* ranges from PA south to AL, mostly in the Appalachians. [= C, F, G, Z; = *Rh. lanceolata* ssp. *lanceolata* – K; < *Rh. lanceolata* – S, W]

* *Rhamnus cathartica* Linnaeus, Common Buckthorn. Reported for VA by Harvill et al. (1991), but the report is actually based on specimens of *Rh. davurica* (Virginia Botanical Associates 2005). {check sspp.} [= C, F, G, K, Z]

Sageretia Brongniart 1827 (Small-flowered Buckthorn)

A genus of about 35 species, shrubs and trees, of tropical to warm temperate areas of Africa, Asia, and America. References: Nesom (1993c)=Y; Brizicky (1964a)=Z; Medan & Schirarend in Kubitzki (2004).

Identification notes: *S. minutiflora* can appear superficially a bit like *Ilex vomitoria*, with which it typically grows; it can be distinguished from *Ilex vomitoria* by its opposite leaves.

Sageretia minutiflora (Michaux) C. Mohr, Small-flowered Buckthorn. Cp (GA, NC, SC): shell middens and shell hammocks; rare (GA Threatened, NC Rare, SC Rare). September; November. Se. NC south to s. FL, west to s. MS. *S. minutiflora* is apparently most closely related to *S. elegans* (Kunth) Brongniart, which ranges from s. Mexico south to s. South America. [= RAB, K, S, Y, Z]

Ziziphus P. Miller 1754 (Jujube)

A genus of 85-100 species, shrubs and trees, of tropical and warm temperate areas. References: Brizicky (1964a)=Z; Medan & Schirarend in Kubitzki (2004).

* ***Ziziphus zizyphus*** (Linnaeus) Karsten, Chinese Jujube, Common Jujube. Cp (FL), Pd (GA): disturbed areas; rare, native of Eurasia. Reported from ec. GA (Jones & Coile 1988). Cultivated at least as far north as NC. [= K, WH; = *Zizyphus zizyphus* (Linnaeus) Karsten – S, orthographic variant; = *Z. jujuba* P. Miller – Z]

RHIZOPHORACEAE R. Brown 1814 (Red Mangrove Family)

A family of about 15 genera and 120 species, of tropical areas of the Old and New World.

Rhizophora Linnaeus (Red Mangrove)

A genus of 8-9 species, trees and shrubs, of tropical shores.

Rhizophora mangle Linnaeus, Red Mangrove. Cp (FL, GA, NC, SC): beaches; rare. Well-established from n. FL southwards into the West Indies and beyond in tropical America. The distinctive floating seedlings of *Rhizophora* occasionally wash up as jetsam on beaches of GA, NC, and SC, particularly following hurricanes. Photographic evidence has been supplied from Bear Island, Onslow County, NC, 11 June 1996 (Dave Owen, pers. comm. and photograph). These propagules may sprout and grow for some time, forming a young sapling with leaves, but do not survive because of frost. *Rhizophora* is not currently truly an established part of the flora of the "primary Flora area," but is repeatedly introduced naturally. [= GW, K, S, WH]

ROSACEAE A.L. de Jussieu 1789 (Rose Family)

A family of about 85-95 genera and 2000-3000 species, trees, shrubs, and herbs, nearly cosmopolitan, but mainly boreal and temperate. References: Eriksson et al. (2003); Kalkman in Kubitzki (2004); Ertter (2007). [also see *CHRYSOBALANACEAE*]

1 Herbs.
  2 Leaves simple..... ***Aphanes, Dalibarda, Geum (Waldsteinia)***
  2 Leaves compound.
    3 Leaves pinnately compound, with (5-) 7-many leaflets ..... ***Agrimonia, Aruncus, Drymocallis, Filipendula, Geum, Poteridium, Poterium, Sanguisorba***
    3 Leaves palmately compound, with 3-7 (-9) leaflets ..... ***Fragaria, Gillenia, Potentilla, Sibbaldiopsis, Geum (Waldsteinia)***
1 Trees or shrubs
  2 Leaves compound.
    3 Leaves palmately compound, with 3-5 leaflets..... ***Rubus, Sibbaldiopsis***
    3 Leaves pinnately compound, with 5-many leaflets ..... ***Dasiphora, Rosa, Sorbaria, Sorbus***

2 Leaves simple.
Amelanchier, Aronia, Chaenomeles, Crataegus, Cydonia, Exochorda, Kerria, Malus, Neviusia, Photinia, Physocarpus, Prunus, Pyracantha, Pyrus, Rhodotypos, Rubus, Spiraea, Stephanandra

FRAG:
1 Leaflets pinnatifid (each leaflet incised nearly to the midvein); stamens 2 or 4 per flower; [subgenus *Poteridium*] ..... ***Poteridium***
1 Leaflets toothed (the incisions not nearly to the midvein); stamens 4 or 15-20 per flower.
  2 Leaflets 0.8-2 cm long; inflorescence 1-2 cm long, globose; stamens 15-20 per flower, the filaments 3-4 mm long; sepals green to pinkish-purple; [cultivated, occasionally escaped] ..... ***Poterium***
  2 Leaflets 3-10 cm long; inflorescence 6-30 cm long, spike-like; stamens 4 per flower, the filaments 8-10 mm long; sepals white (sometimes fading greenish); [native] ..... ***Sanguisorba***

Agrimonia Linnaeus (Agrimony)

A genus of about 10-15 species, herbs, mainly north temperate. References: Robertson (1974)=Z; Kalkman in Kubitzki (2004).

1 Inflorescence axis glandular-pubescent (sometimes also with non-glandular hairs).
  2 Larger leaves with 11-15 (-23) primary leaflets (not counting the secondary leaflets); stamens 5-7 ..... ***A. parviflora***
  2 Larger leaves with 3-9 primary leaflets (not counting the secondary leaflets); stamens 10-15.
    3 Hypanthium 3-5 mm wide in fruit; nutlet 3-3.3 mm in diameter; inflorescence usually with copious long, spreading, non-glandular hairs ..... ***A. gryposepala***
    3 Hypanthium 2-2.5 mm wide in fruit; nutlet 2-2.4 mm in diameter; inflorescence usually with minute glandular hairs only (or sparsely pubescent with long non-glandular hairs] ..... ***A. rostellata***
1 Inflorescence axis pubescent with non-glandular hairs.
  4 Larger leaves with 3-5 (-7) primary leaflets (not counting the secondary leaflets) ..... ***A. microcarpa***
  4 Larger leaves with 5-13 primary leaflets (not counting the secondary leaflets).
    5 Terminal leaflets 1-2.5 (-3) cm long; [of pinelands of the Coastal Plain] ..... ***A. incisa***
    5 Terminal leaflets 2.5-9 cm long; [of various habitats].
      6 Larger leaves with 7-13 lanceolate-elliptic leaflets; outer bristles of the fruit spreading ..... ***A. bicknellii***
      6 Larger leaves with 5-7 (-9) obovate-elliptic leaflets; outer bristles of the fruit ascending ..... ***A. pubescens***

Agrimonia bicknellii (Kearney) Rydberg. Cp (GA, NC, SC, VA), Pd (NC, SC, VA): moist forests and woodlands; uncommon? July-September; August-October. MA west to MI, south to NC, GA, and TN. Closely related to, and perhaps not separable from, *A. pubescens*. [= K, S, Z; < *A. pubescens* Wallroth var. *pubescens* – RAB; < *A. pubescens* – C, F, G]

Agrimonia gryposepala Wallroth, Common Agrimony. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): mesic forests, thickets, marshes, bogs, wet meadows, wet forests; common (rare in GA). July-August; July-October. ME and Ontario west to MT, south to NJ, w. NC, e. TN, IN, and KS; also in CA and NM. [= RAB, C, F, G, K, S, W, Z]

Agrimonia incisa Torrey & A. Gray, Pineland Agrimony. Cp (FL, GA, NC?, SC): pinelands, disturbed areas associated with pinelands; rare. July-early September. E. SC south to c. peninsular FL and west to MS (also reported from NC, but no specimen has been seen). [= RAB, C, K, S, WH, Z]

Agrimonia microcarpa Wallroth, Low Agrimony. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): dry to moist forests and woodlands; uncommon. July-September; August-October. NJ south to n. FL, west to e. TX. [= C, F, G, K, S, W, WH, Z; = *A. pubescens* Wallroth var. *microcarpa* (Wallroth) Ahles – RAB; > *A. microcarpa* – S; > *A. platycarpa* Wallroth – S]

Agrimonia parviflora Aiton, Southern Agrimony. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): marshes, bottomland forests, wet pastures; common. July-September; July-October. CT west to s. MI and SD, south to FL, TX, the West Indies and Mexico. [= RAB, C, F, G, K, S, W, Z]

Agrimonia pubescens Wallroth, Downy Agrimony. Mt (GA, NC, SC, VA), Pd, Cp (GA, NC, VA): dry to moist forests and woodlands; common. July-September; August-October. ME west to MI and SD, south to NC, GA, and OK. [= K, S, W, Z; < *A. pubescens* var. *pubescens* – RAB; < *A. pubescens* – C, F, G (also see *A. bicknellii*)]

Agrimonia rostellata Wallroth, Woodland Agrimony. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist to wet forests and woodlands; common (rare in FL). July-August; July-October. CT west to IN and KS, south to SC, GA, Panhandle FL, LA, and OK. [= RAB, C, F, G, K, S, W, WH, Z]

* ***Agrimonia eupatoria*** Linnaeus, Medicinal Agrimony. Mt (NC): fields and disturbed areas; rare, apparently naturalized, native of Eurasia. July-September. Introduced at scattered localities in ne. North America. [= C, F, G, K, Z] {not yet keyed}

Agrimonia striata Michaux, Roadside Agrimony. Pd (GA): {habitat unknown}; rare. South to se. PA (Rhoads & Klein 1993), MD, DE, WV, KY, Piedmont GA (Jones & Coile 1988), and AL. It will key to *A. bicknellii* in the above key, but differs in having the leaves conspicuously glandular and sparsely pubescent beneath (vs. densely velvety pubescent and not conspicuously glandular), the fruiting hypanthium 4-5 mm long (vs. 2.5-3 mm long). [= C, F, G, K] {not yet keyed}

Amelanchier Medikus 1789
(Serviceberry, Sarvis, Shadbush, Juneberry, "May Cherry", "Currant")

A genus of about 20-40 species, shrubs and trees, north temperate. References: Robertson (1974)=Z; Kalkman in Kubitzki (2004).

Amelanchier arborea (Michaux f.) Fernald. Cp (FL): [= C, F, G, W; > *A. arborea* var. *arborea* – RAB, K, Z; > *A. arborea* var. *alabamensis* (Britton) G.N. Jones – K, Z; > *A. arborea* var. *austromontana* (W.W. Ashe) Ahles – RAB, K, Z; > *A. canadensis* – S, misapplied; > *A. alabamensis* Britton – S; < *A. arborea* -- WH]

Amelanchier canadensis (Linnaeus) Medikus, Eastern Serviceberry. (GA, NC, SC, VA). [= RAB, C, G, GW, K, W; > *A. canadensis* var. *canadensis* – F, Z; > *A. canadensis* var. *subintegra* Fernald – F, Z; = *A. oblongifolia* (Torrey & A. Gray) Roemer – S]

Amelanchier laevis Wiegand, Smooth Serviceberry. (GA, NC, SC, VA). [= C, G, K, W, S, Z; = *A. arborea* var. *laevis* – RAB; > *A. laevis* var. *laevis* – F]

Amelanchier nantucketensis Bicknell, Nantucket Serviceberry. Pd (VA): rocky areas; rare. In Potomac River Gorge, VA and MD (Chris Frye, pers. comm.), but may actually be a new species. See Dibble & Campbell (1995). [= F, K; ? *A. canadensis* × *spicata* – C]

Amelanchier obovalis (Michaux) Ashe, Coastal Plain Serviceberry. (GA, NC, SC, VA). [= RAB, C, F, G, GW, K, Z]

Amelanchier sanguinea (Pursh) A.P. de Candolle *var.* ***sanguinea***, Roundleaf Serviceberry, New England Serviceberry. (GA, NC, VA). [= K; < *A. sanguinea* – RAB, F, S, W, Z; *A. sanguinea* var. *sanguinea* – C, G (also see *A. humilis*)]

Amelanchier stolonifera Wiegand, Dwarf Serviceberry. (GA, NC, SC, VA). [= F, K, S, W, Z; < *A. spicata* (Lamarck) K. Koch – RAB, C, G, misapplied as to North American material]

Amelanchier bartramiana (Tausch) M.J. Roemer. South to WV and PA. [= C, F, G, K] {synonymy incomplete}

Amelanchier humilis Wiegand. South to montane MD, NJ, and PA. [= K; < *A. sanguinea* var. *sanguinea* – C, G; > *A. humilis* var. *humilis* – F] {synonymy incomplete}

Aphanes Linnaeus (Parsley-piert)

A genus of about 20 species, herbs, of tropical and temperate Old World. *Aphanes* has usually been accepted by Europeans as distinct from *Alchemilla*, but Kalkman (in Kubitzki 2004) retains it (with some doubt) in *Alchemilla*, as a subgenus and Eriksson et al. (2003) include it in *Alchemilla* based on molecular evidence. References: Robertson (1974)=Z; Kalkman in Kubitzki (2004); Eriksson et al. (2003).

* ***Aphanes microcarpa*** (Boissier & Reuter) Rothmaler, Parsley-piert. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (NC, SC, VA): lawns, fields, pastures, roadsides; common (uncommon in Piedmont of VA and Mountains of NC and VA, rare in FL), native of Europe. Late April-May. This plant is inconspicuous and often overlooked. [= C, K, WH; = *Alchemilla microcarpa* Boissier & Reuter – RAB, F, G, W, Z; > *Aphanes australis* Rydberg – S]

* *Aphanes arvensis* Linnaeus is reported for SC and TN by Kartesz (1999), but the only documentation consists of generalized range maps published in Hultén & Fries (1986). Rejected as a component of our region's flora without additional documentation. [= C, K; = *Alchemilla arvensis* (Linnaeus) Scopoli – F, G] {not keyed}

Aronia Medicus 1789 (Chokeberry)

A genus of about 65 species, of e. Asia and e. North America (south into Central America). *Aronia* has sometimes been treated as a component of *Sorbus* or *Pyrus*. More recently, Robertson et al. (1991) have included *Aronia* in *Photinia*. Kalkman in Kubitzki (2004) agrees that *Aronia* and *Photinia* should be combined, but points out that *Aronia* is the older name and therefore must be used for the combined genus. References: Hardin (1973)=Y; Robertson (1974)=Z; Robertson et al. 1991=X; Kalkman in Kubitzki (2004).

Identification notes: All our species of *Aronia* can be distinguished from other shrubs in our flora by the presence of several dark (usually purplish-black) trichomes on the upper surface of the midrib, mostly toward the base of the leaf.

1 Lower surfaces of leaves, twigs, and inflorescence rachis glabrous; fruit black ..... ***A. melanocarpa***
1 Lower surfaces of leaves, twigs, and inflorescence rachis pubescent; fruit bright red or dark purple.
  2 Fruit bright red; leaves densely pubescent beneath ..... ***A. arbutifolia***
  2 Fruit dark purple; leaves sparsely pubescent beneath ..... ***A. prunifolia***

Aronia arbutifolia (Linnaeus) Persoon, Red Chokeberry. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC, VA): bogs, pocosins, wet savannas, swamps, other wet habitats; common. March-May; September-November. Newfoundland south to c. peninsular FL and west to TX, mainly in the Coastal Plain, but extending inland in the south to WV and KY. [= C, G, GW, S, W; = *Sorbus arbutifolia* (Linnaeus) Heynhold var. *arbutifolia* – RAB; = *Pyrus arbutifolia* (Linnaeus) Linnaeus f. – F, Z; = *Photinia pyrifolia* (Lamarck) K. Robertson & J.B. Phipps – K, WH, X]

Aronia melanocarpa (Michaux) Elliott, Black Chokeberry. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (VA): balds, forests, and openings and exposed rock outcrops at high elevations, bogs in the Mountains; uncommon (rare in Piedmont). May-June; August-September. Widespread in ne. North America, extending south to n. GA, n. AL, and MO. [= C, G, GW, S; = *Sorbus melanocarpa* (Michaux) Heynhold – RAB; = *Pyrus melanocarpa* (Michaux) Willdenow – F, Z; < *A. melanocarpa* – W (also see *A. prunifolia*); = *Photinia melanocarpa* (Michaux) J.B. Phipps – K, X]

Aronia prunifolia (Marshall) Rehder, Purple Chokeberry. Pd, Mt (NC, VA), Cp (VA): balds, bogs, seepages, swamp forests; uncommon, rare south of VA (NC Watch List). April-May; September-October. Widespread but local in ne. North

America, south to NC, FL?, and OH. While apparently originating as a hybrid between our other two species, *A. prunifolia* exists in populations independent of the two parent species, apparently reproducing successfully. It seems best to treat a now independent lineage such as this as a separate taxon. [= C, G, GW; = *Sorbus arbutifolia* var. *atropurpurea* (Britton) Schneider – RAB; = *Pyrus floribunda* Lindley – F, Z; = *Aronia atropurpurea* Britton – S; < *A. melanocarpa* – W; = *Photinia floribunda* (Lindley) J.B. Phipps – K, X]

Aruncus Linnaeus 1758 (Goat's-beard)

A genus of 1-2 species, perennial herbs, of temperate North America and Europe. References: Robertson (1974)=Z; Kalkman in Kubitzki (2004).

Identification notes: *Aruncus dioicus* can be distinguished from the superficially closely similar *Astilbe biternata* by the following characteristics: trichomes of foliage not glandular (vs. glandular in *Astilbe*), stamens 20 (vs. 10), carpels 3-4 (vs. 2), seeds < 1.5-2 mm long (vs. ca. 4 mm long), terminal leaflets usually unlobed (vs. terminal leaflets usually trilobed).

1 Follicles 2.5-3.5 mm long ..... ***[A. sylvester]***
1 Follicles 1.5-2 mm long.
  2 Follicles semi-ovoid, strongly convex on the back, about 1/2 as thick (measured radially) as long; leaves somewhat lustrous, the lower surface glabrous to sparsely pubescent ..... ***A. dioicus* var. *dioicus***
  2 Follicles nearly cylindric, about 1/3 as thick (measured radially) as long; leaves dull, the lower surface pubescent ..... ***A. dioicus* var. *pubescens***

Aruncus dioicus (Walter) Fernald *var.* ***dioicus***, Eastern Goat's-beard. Mt (GA, NC, SC, VA), Pd (GA, NC, VA), Cp (VA): moist, nutrient-rich forests and woodland borders; common. May-June; June-September. NY (?) and PA west to IN, south to NC, SC, GA, and AL. [= C, F, K, Z; < *A. dioicus* – RAB, W; = *A. allegheniensis* Rydberg – S]

Aruncus dioicus (Walter) Fernald *var.* ***pubescens*** (Rydberg) Fernald, Midwestern Goat's-beard. Mt (VA): moist, nutrient-rich forests and woodland borders?; rare? May-June; June-September. W. VA, KY, and IL west to IA, south to TN, AR, and OK. The validity of this variety and its attribution to our area (by G, K, and S) need further evaluation. Robertson (1974) states that the "two varieties intergrade completely, and it is questionable whether they should be maintained." [= C, F, K, Z; < *A. dioicus* – W; = *A. pubescens* Rydberg – S]

* *Aruncus sylvester* Kosteletzky ex Maximowicz is attributed to our area by Small (1933). This European species is occasionally cultivated in e. North America. [= C, G; = *A. dioicus* var. *vulgaris* (Maximowicz) Hara – K; = *A. aruncus* (Linnaeus) Karsten – S]

Chaenomeles Lindley 1821 (Flowering Quince)

A genus of 3-4 species, shrubs, of montane, temperate e. Asia. References: Kalkman in Kubitzki (2004).

* ***Chaenomeles speciosa*** (Sweet) Nakai, Flowering Quince. Pd (NC), Cp (VA): frequently persisting and rarely spreading from horticultural plantings to suburban woodlands; rare, native of China. January-April. The "fruiting" or Common Quince, *Cydonia oblonga* P. Miller, native of the Caucasus, is widely cultivated in Europe and formerly in e. North America. It has fallen out of favor, and is now rarely cultivated in our area. [= C, K]

Crataegus Linnaeus 1753 (Hawthorn, Haw, Thornapple)
(contributed by R. Lance)

A genus of 100-500 species, shrubs and small trees, north temperate and Central America, most in e. North America. References: Lance (in prep.)=X; Phipps (1988)=Z; Beadle in Small (1913)=Q; Phipps, O'Kennon, & Lance (2003)= V ; Phipps (1998)=Y; Phipps, Lance, & Dvorsky (2006)=U; Phipps, O'Kennon, & Dvorsky (2006)= N; Lance (1995); Kalkman in Kubitzki (2004).

Identification notes: all references to leaves and petioles pertain to foliage on short shoots (floreal shoots), unless otherwise specified.

1 Leaf bases cordate, truncate, rounded, or very abruptly contracted from a rounded base ..... **Key A**
1 Leaf base acute to cuneate.
  2 Leaves conspicuously glandular on petiole and teeth, especially when young; twigs and branchlets geniculate ..... **Key B**
  2 Leaves eglandular, or if glandular then twigs relatively straight, not conspicuously geniculate ..... **Key C**

Key A – hawthorns with leaf bases cordate, truncate, rounded, or very abruptly contracted from a rounded base

1 Primary lateral veins of lobed leaves run to sinuses of lobes, as well as to points of lobes.
  2 Leaves thin, dull, hairy at least on petiole, deeply laciniate; fruit oblong ..... ***C. marshallii***
  2 Leaves subcoriaceous, glossy, glabrous, often 3-lobed; fruit globose ..... ***C. phaenopyrum***

1 Primary lateral veins of lobed leaves run only to lobe points.
  3 Leaves small, most < 3 cm; petioles mostly < 1 cm long, conspicuously glandular and twigs geniculate.
    4 Leaves broadly obovate on floreal shoots, 1.5-3 cm long, tomentose, serrations acute; terminal shoot leaves suborbicular, truncate at base ..... *C. dispar*
    4 Leaves often suborbicular, < 2 cm long, glabrate to pubescent, serrations blunt ..... *C. lepida*
  3 Leaves and petioles longer, glandular or not, but twigs not geniculate.
    5 Leaf blades on terminal shoots often > 9 cm long.
      6 Petiole eglandular, pubescent or tomentose; leaf veins distinct on adaxial surface, slightly sunken ..... *C. mollis*
      6 Petiole glandular, sparsely hairy or glabrous; leaf veins not as conspicuous
        7 Leaf blades longer than wide; calyx lobes evenly serrate ..... *C. coccinea*
        7 Leaf blades often as wide as long; calyx lobes deeply and irregularly serrate ..... *C. dilatata*
    5 Leaf blades on terminal shoots rarely > 8 cm long.
      8 Leaf shape predominately deltoid, base truncate or very abruptly contracted into petiole.
        9 Lobe tips acuminate, often reflexed; young leaves scabrate adaxially; leaves thin.
          10 Stamens 5 to 10 ..... *C. macrosperma*
          10 Stamens 15 to 20 ..... *C. schuettei*
        9 Lobe tips acute or obtuse, not reflexed; young leaves hairy or glabrous; leaves firm.
          11 Fruit calyx sessile; leaves may bear hairs when young; stamens usually 10 ..... *C. iracunda*
          11 Fruit calyx elevated; leaves glabrous; stamens usually 20 ..... *C. pruinosa*
      8 Leaf shape predominately ovate or broadly ovate, base rounded or abruptly narrowed
        12 Leaves pubescent throughout; petioles conspicuously glandular; terminal shoot leaves very shallowly lobed ..... *C. triflora*
        12 Leaves sparsely pubescent abaxially, or glabrous; petioles slightly glandular or eglandular; terminal shoot leaves distinctly lobed.
          13 Petioles eglandular; fruit calyx sessile.
            14 Leaves thin, dull yellow-green; hairs scattered along veins of abaxial side, esp. when young; fruit 10-15mm diameter ..... *C. aemula*
            14 Leaves firm, glossy or bright green, with hair tufts in abaxial main vein axils; fruit usually < 10 mm diameter ..... *C. viridis*
          13 Petioles glandular; fruit calyx elevated.
            15 Stamens 5 to 10.
              16 Anthers white or yellow; sepals glandular or toothed beyond middle ..... *C. boyntonii*
              16 Anthers purple; sepals wholly glandular-serrate ..... *C. buckleyi*
            15 Stamens 15 to 20.
              17 Leaves mostly unlobed on floreal shoots, shallowly lobed (1/4 – 1/3 to midrib) on terminal shoots ..... *C. mendosa*
              17 Leaves shallowly lobed on floreal shoots, lobed 1/3-1/2 to midrib on terminal shoots ..... *C. pulcherrima*

Key B – hawthorns with acute to cuneate leaf bases; leaves conspicuously glandular on petiole and teeth; and twigs and branchlets geniculate

1 Leaves mostly widely elliptic or broadly obovate, base acute to short-cuneate.
  2 Leaves sharply-toothed and shallowly lobed.
    3 Leaves sparsely hairy to glabrous ..... *C. alleghaniensis*
    3 Leaves tomentose ..... *C. dispar*
  2 Leaves with short, blunt teeth, mostly unlobed.
    4 Leaves < 2 cm long; twigs very slender; thorns mostly < 2 cm ..... *C. lepida*
    4 Leaves > 2 cm long; twigs stiff; thorns > 2 cm.
      5 Fruit yellow ..... *C. flava*
      5 Fruit red.
        6 Branches mostly ascending and crooked ..... *C. aprica*
        6 Branches recurved or drooping ..... *C. visenda*
1 Leaves mostly obovate or spatulate, base cuneate to attenuate.
  7 Leaves and pedicels glabrous; branches slender, strongly weeping ..... *C. lacrimata*
  7 Leaves and pedicels variously hairy, at least when young; branches drooping or recurved.
    8 Leaves obscurely toothed to entire on margin, especially lower half of blade ..... *C. lassa*
    8 Leaves toothed along most of margin.
      9 Leaf base attenuate or long-cuneate; apex 3-lobed or with 3 distinct points.
        10 Fruit small, usually < 8mm, often with calyx elevated ..... *C. anisophylla*
        10 Fruit usually 10 mm or more, calyx sessile ..... *C. senta*
      9 Leaf base cuneate; apex short-pointed; rarely lobed on floral shoots.
        11 Leaf teeth acute; twigs moderately slender, branchlets rigid ..... *C. alabamensis*
        11 Leaf teeth blunt, glandular; twigs slender, branchlets flexuose ..... *C. munda*

Key C – Leaves eglandular, or if glandular then twigs relatively straight, not conspicuously geniculate

1 Leaves spatulate or oblanceolate, < 13 mm wide; petiole winged to base; pyrenes < 4 mm long ..... *C. spathulata*
1 Leaves not as above, or pyrenes > 4 mm long.
  2 Leaves with hair tufts in abaxial main vein axils; [typically of wet or floodplain habitats].
    3 Inflorescence simple, 1 to 5-flowered; fruit > 1 cm diameter, mature in late spring ..... *C. aestivalis*
    3 Inflorescence compound, 5 to 20-flowered; fruit usually < 1 cm, mature in autumn.
      4 Petiole 5-12 mm long; terminal shoot leaves rarely lobed ..... *C. crus-galli*

4 Petiole > 15 mm long; terminal shoot leaves rarely unlobed ..... ***C. viridis***
2 Leaves glabrous or with hairs scattered, not in tufts; [typically of upland habitats].
5 Pyrenes of fruit channeled or pitted on inner side.
6 Leaves thin, dull yellow-green, usually pubescent at least abaxially; pedicels tomentose ..... ***C. calpodendron***
6 Leaves firm, dark green or lustrous, glabrous or slightly hairy abaxially, veins conspicuously impressed and reticulate adaxially; pedicels glabrous or pubescent ..... ***C. succulenta***
5 Pyrenes of fruit plane on inner side.
7 Leaves mostly < 3 cm long; calyx lobes foliaceous, deeply toothed; spines slender ..... ***C. uniflora***
7 Leaves commonly > 3 cm long and not with above combination of characters.
8 Thorns short (< 2 cm), or spinose spur shoots present; fruit black; leaves with reticulate veins adaxially; main lateral veins run to sinuses and lobe tips in lobed leaves ..... ***C. brachyacantha***
8 Thorns usually > 2 cm long; fruit not black; leaves not as above.
9 Petioles eglandular.
10 Leaves widely obovate, with rounded lobes and blunt teeth; calyx lobes broadly triangular ..... ***C. margarettae***
10 Leaves not widely obovate; lobes acute or lacking; calyx lobes elongate.
11 Leaves mostly ovate or broadly elliptic.
12 Petiole and leaf underside glabrous or sparsely hairy ..... ***C. aemula***
12 Petiole and leaf underside pubescent to tomentose ..... ***C. mollis***
11 Leaves mostly obovate or oblong-elliptic.
13 Leaf veins impressed adaxially, prominent abaxially; leaves dull green.
14 Leaves pubescent abaxially; branches dark gray; fruit usually <12 mm; calyx and fruit stem hairy ..... ***C. collina***
14 Leaves sparsely hairy to glabrous abaxially after maturity; branches ashy gray; fruit 12-22 mm; calyx and fruit stem glabrous ..... ***C. punctata***
13 Leaf veins obscure; leaves lustrous.
15 Leaves, petioles, pedicels hairy ..... ***C. berberifolia***
15 Leaves, petioles, pedicels glabrous ..... ***C. crus-galli***
9 Petioles glandular (3 or more glands visible).
16 Leaves distinctly hairy or pubescent abaxially.
17 Leaves lobed 1/3- 2/3 to midrib on terminal shoots; fruit calyx elevated ..... ***C. intricata***
17 Leaves shallowly lobed to unlobed on terminal shoots; fruit calyx sessile.
18 Leaves thin; inflorescence simple, 3 to 5-flowered; stamens usually 30 or more ..... ***C. triflora***
18 Leaves firm; inflorescence compound, > 5-flowered; stamens 20 or fewer.
19 Leaves shallowly lobed on terminal shoots, usually > 5cm wide ..... ***C. harbisonii***
19 Leaves unlobed, most < 5 cm wide.
20 Leaf veins slightly impressed adaxially; fruit calyx deeply glandular-serrate; petiole conspicuously glandular ..... ***C. ashei***
20 Leaf veins distinctly impressed adaxially; fruit calyx remotely serrate to entire; petiole sparsely glandular ..... ***C. collina***
16 Leaves sparsely hairy to glabrous.
21 Stamens 5-10 ..... ***C. intricata***
21 Stamens 15-20.
22 Leaves shallowly lobed on terminal shoots (1/4-1/3 to midrib), usually unlobed on floreal shoots ..... ***C. mendosa***
22 Leaves shallowly to moderately lobed on all shoots.
23 Leaves mostly ovate-lanceolate ..... ***C. sargentii***
23 Leaves ovate or widely ovate.
24 Twigs short; petiole often winged ½ its length; fruit often 10 mm or more in diameter ..... ***C. pallens***
24 Twigs elongate; petiole winged 1/3 or less of length; fruit usually < 10 mm in diameter ..... ***C. pulcherrima***

Crataegus aemula Beadle, Rome Hawthorn. Cp, Pd (GA): upland hardwood and pine-hardwood forests, over sandstone, circumneutral clay soils, and calcareous substrates; uncommon (but may be locally abundant). April; September. Nw. GA and ne. AL. Related to *C. iracunda*, but foliage of *C. aemula* differs in having frequent rounded bases, thin texture, yellow-green coloration. Fruits are lustrous light red, 12-18 mm diameter. *C. aemula* has been shown to be triploid, possibly apomictic; producing a high percentage of fertile seed with little seedling variation. [= K, Q, X; < *C. macrosperma* – S]

Crataegus aestivalis (Walter)Torrey & A. Gray, Mayhaw, Eastern Mayhaw. Cp (GA, NC, SC): swamp forests, generally where flooded for much of the year, often flowering and fruiting while standing in water, often associated with *Taxodium distichum, Nyssa aquatica, Nyssa biflora*, and *Planera aquatica*; uncommon (though locally abundant). March-April; June-July. Se. NC south to n. FL and se. AL. The historic record of *C. aestivalis* in VA appears to be based on a single specimen collected 22 July 1934 by M.L. Fernald & B. Long, in Princess Anne County, which is actually *C. crus-galli*. Related species *C. rufula* Sargent and *C. opaca* Hooker & Arnott occur in the deeper south in similar habitats, *C. rufula* restricted to w. FL, sw. GA, and se. AL, and *C. opaca* ranging from s. MS west to e. TX and s. AR. See Phipps (1988) for extensive additional discussion of *C. aestivalis* and relatives. The fruits of all three species are traditionally gathered for preserves, pies, and jelly. [= RAB, K, X, Z; < *C. aestivalis* – S]

Crataegus alabamensis Beadle, Alabama Hawthorn. Pd, Cp (GA, NC, SC): sandhills, upland pine and pine-oak forests, rocky woodlands, especially xeric or subxeric habitats with sandy or well-drained clay soils; uncommon. April; August-September. C. and e. NC south to n. FL, west to n. AL and s. MS. Often reaching treelike proportions (4-8 m tall, trunk 10-30 cm diameter). Some local forms may produce palatable fruit to 22 mm in diameter. [= X; < *C. flava* Aiton – RAB, K, S; > *C. teres* Beadle – Q; > *C. attrita* Beadle – Q; > *C. clara* Beadle – Q; > *C. ravenelii* Sargent – Q; > *C. cuthbertii* Ashe]

Crataegus alleghaniensis Beadle. Mt, Pd (GA, NC, SC, GA), Cp (GA, SC); upland pine and pine-oak forests, disturbed woodlands, rocky bluffs and slopes; uncommon. April; August-September. W. and sc. NC to c. SC, c. GA, west to c. AL and ne. MS. A variable species, displaying characteristics which suggest intermediacy between the complex of taxa involved in *C.*

intricata Lange and *C. aprica* Beadle. [= X; < *C. flava* Aiton – RAB, W; > *C. alleghaniensis* – Q; > *C. ignava* Beadle – K, Q; > *C. extraria* Beadle – K, Q; > *C. impar* Beadle – K, Q; > *C. cullasagensis* Ashe – Q]

Crataegus anisophylla Beadle. Cp (GA): upland pine forests, pine-oak scrub, sandhills, disturbed woodlands, roadsides, abandoned fields; uncommon. Late March-April; late August-September. Se GA to c. peninsular FL, west to s. AL. This is a poorly understood taxon among the group of hawthorns often categorized under *C. flava* Aiton in many earlier floral treatments. Related to *C. lassa* Beadle. [= X; > *C. anisophylla* – Q; > *C. viaria* Beadle – Q; > *C. cirrata* Beadle – Q; > *C. versuta* Beadle – K, Q; > *C. resima* Beadle – K, Q < *C. flava* – S]

Crataegus aprica Beadle, Sunny Hawthorn. Mt, Pd, Cp (GA, NC, SC) {VA?}: upland pine forests, pine-oak forests, mixed hardwood forests over rocky or sandy substrates, abandoned fields, roadsides; common. Late March-April; September. NC south to s. GA and n. FL, west to c. & n. MS and e. TN. Related to *C. flava* Aiton, and perhaps one of the parents of it (see discussion of *C. flava*). [= W, X; < *C. flava* Aiton – RAB; > *C. aprica* – Q; > *C. sororia* Beadle – Q; > *C. annosa* Beadle – K, Q]

Crataegus berberifolia Torrey & Gray, Barberry Hawthorn. Pd, Cp (GA, NC, SC): mixed hardwood and pine forests of uplands, usually in subxeric to xeric habitats in NC, SC, GA, especially over basic to calcareous soils; common. Distributed primarily from Piedmont of NC south to Piedmont and upper Coastal Plain of SC, Piedmont and upper Coastal Plain of GA, and west across AL, MS, LA, to e. TX; north to s. AR, TN. April-May; August-October. Related to *C. crus-galli*, and differing primarily from that species by the consistent pubescence or stiff hairs on foliage, twigs, floral and fruit parts. [= C, K, X; > *C. berberifolia* – Q, S; > *C. mohri* – Q; > *C. engelmannii* Sargent; > *C. torva* Beadle; > *C. mohrii* Beadle – S]

Crataegus boyntonii Beadle, Boynton Hawthorn. Mt, Pd (GA, NC, SC, VA}: upland forest understories, pastures, rock outcrops, shrubby thickets; uncommon. W. VA south to c. GA, west to n. MS, n. to IL, KY, and WV. April-May; September-October. Related to *C. intricata* Lange, from which *C. boyntonii* differs chiefly in having an abundance of broadly ovate to deltoid leaves 5-8 cm long and 3-5 cm wide, more robust thorns, and more treelike habit (4-6 m tall, less prone to develop root suckering and multiple stems). [= Q, X; < *C. flabellata* – RAB; = *C. boyntoni* – F, G, orthographic variant; < *C. intricata* Lange – C, K]

Crataegus brachyacantha Sargent & Engelmann, Blueberry Hawthorn. Cp (GA): open pinelands; rare (GA Special Concern). April; September. In sw. GA, one historic record, disjunct from a main range further west (primarily LA and e. TX). The only eastern hawthorn bearing black fruit, appearing blue due to an exterior waxy bloom. [= K, Q, S, Y, X]

Crataegus buckleyi Beadle. Buckley Hawthorn. Mt, Pd (GA, NC, SC): upland pine and hardwood forests, rock outcrops; uncommon. April-May; August-October. W. NC, w. SC, n. GA west to n. AL, north to e. TN (and perhaps WV and VA). Related to *C. boyntonii*, and perhaps only a variety of it; *C. buckleyi* differs chiefly in having purple anthers, more glandular-serrate calyx lobes, russet fruit, and smaller leaves (3-6 cm long x 2-4 cm wide) than *C. boyntonii*. [= Q, X; < *C. flabellata* – RAB; < *C. intricata* Lange – C, K]

Crataegus calpodendron (Ehrhart) Medikus, Pear Hawthorn. Mt (VA, NC), Pd (GA, NC, SC): mixed hardwood forests, open slopes, wooded ravines, streamsides, especially over basic or calcareous rocks; uncommon. From a generally northern range, the southern limits extend down the Appalachian region and adjacent Piedmont of VA to n. GA, c. AL, n. MS, and TN w. to AR. May-early June; September-October. Usually found as a solitary specimen, or in small local populations. One of the latest hawthorns in our area to flower; fruit production appears scant in its southern range. [= RAB, C, K, S, W, X; > *C. calpodendron* var. *calpodendron* – F, G; > *C. calpodendron* var. *microcarpa* (Chapman) Palmer – F, G; > *C. calpodendron* var. *globosa* (Sargent) Palmer – F, G; > *C. chapmanii* Beadle – Q]

Crataegus coccinea Linnaeus, Scarlet Hawthorn. Mt, Pd (NC, VA): deciduous forest understories, pastures, upland thickets; rare. May; October. Distributed southward along the Appalachian Plateau from a predominately northern range. The combination of large, pubescent leaves (9-12 cm long) on terminal shoots, evenly toothed calyx lobes, and 5-10 stamens per flower are distinctive. *C. coccinea* may attain treelike proportions, to 10 m tall. [= RAB, C, X; > *C. pennsylvanica* W.W. Ashe – F, G; > *C. pedicellata* Sargent – K, W]

Crataegus collina Chapman, Chapman's Hill-thorn. Mt (VA, NC), Pd (GA, NC, SC): hillside forests and young woodlands, especially over calcareous rocks; uncommon. March-April; August-October. Sw. VA west to KS, south to c. GA, s. AL, c. MS, AR and OK Closely allied to *C. punctata* Jacquin, but more widespread in range and habitat tolerance across the Southeast. Occupies sub-xeric uplands in Appalachian Region, tolerant of lowland floodplains in GA, AL, TN. One of the earliest hawthorns to flower in spring. Foliage may be conspicuously pubescent in some local populations. [= S, W, X; > *C. collina* var. *collina* – F, G; > *C. collina* var. *collicola* (W.W. Ashe) – F, G; > *C. rigens* Beadle – K, Q; > *C. collina* – Q; > *C. ingens* Beadle – Q; > *C. amnicola* Beadle – Q; < *C. punctata* Jacquin – RAB, C]

Crataegus crus-galli Linnaeus, Cockspur Hawthorn. Mt, Pd, Cp (GA, NC, SC, VA): pastures, thickets, disturbed woodlands and forests, fencerows; common. April-May; September-October. *C. crus-galli* sometimes forms extensive local colonies. Numerous variants occur, differing mostly in size and shape of leaves. [= C, W, X; < *C. crus-galli* Linnaeus – RAB; > *C. crus-galli* – K; > *C. macra* Beadle; > *C. regalis* Beadle var. *regalis* – F; > *C. algens* Beadle; > *C. arborea* Beadle – K; > *C. limnophylla* Sargent – K; > *C. crus-galli* var. *crus-galli* – F, G; > *C. crus-galli* var. *pyracanthifolia* (Aiton) Sargent – F, G; > *C. crus-galli* var. *exigua* (Sargent) Eggleston – G; > *C. crus-galli* var. *macra* (Beadle) Palmer – F, G; > *C. pyracanthoides* Beadle var. *arborea* (Beadle) Palmer – G; ? *C. crus-galli* – S]

Crataegus dispar Beadle, Aiken Hawthorn. Cp (GA, SC), Pd (SC): upland pine or pine-oak forests, usually of sub-xeric to xeric conditions, in well-drained clay or sandy soils; uncommon. Late March-April; September. Endemic to GA and SC; lower Piedmont and adjacent upper Coastal Plain of sc. SC, historically also in e. GA. A distinctive species with its deeply cut and serrated, tomentose leaves, often pale bluish-green in color. At the time of this publication, *C. dispar* does not appear to be common in the vicinity of Aiken, SC. [= K, Q, X]

Crataegus flava Aiton, Yellow Hawthorn. Cp (SC, GA): dry woodlands; rare. A problematic taxon, originally described from a plant under cultivation in Europe, and assumed native from central SC s. to n. FL; few naturally-occurring plants have been located in the Southeastern US which match closely the type specimen. The related *C. aprica* Beadle is most similar, and

may be involved in contributing to a possible hybrid origin of *C. flava*. Unfortunately, the name *C. flava* Aiton and the ambiguous taxon which it historically represents has been widely misapplied for more than a century. [= Q, X; < *C. flava* Aiton – RAB, K, S; > *C. elliptica* Aiton]

Crataegus intricata Lange, Entangled Hawthorn. Mt, Pd (GA, NC, SC, VA): pastures, wooded hills, rock outcrops, thickets; common. Late April-May; August-October. Widespread range from northern states s. to c. SC, c. GA, c. AL, n. MS, west to AR and OK. Broadly defined, a variable species incorporating many minor forms, here considered in synonomy. Some of these variants include yellowish-fruited types such as *C. fortunata* Sargent (of NC and WV), *C. straminea* Beadle (of AL and TN), pubescent types such as *C. biltmoreana* Beadle (of VA, NC, GA, AL, and TN), *C. communis* Beadle (of NC, GA, AL, and TN), *C. craytonii* Beadle (of NC), and types which bear very shallowly lobed leaves such as *C. padifolia* Beadle (of AL and TN) and *C. rubella* Beadle (of NC, SC, GA, AL, TN, and VA). *C. intricata* frequently exhibits a shrubby habit, and may form colonies by root sprouts. [= C, K, S, W, X; < *C. flabellata* – RAB; > *C. intricata* var. *intricata* – F, G; > *C. intricata* var. *straminea* (Beadle) Palmer – F, G; > *C. biltmoreana* Beadle – F, G, Q; > *C. communis* Beadle – Q; > *C. craytonii* Beadle – Q; > *C. fortunata* Sargent – F; > *C. padifolia* Beadle var. *padifolia* – F, G; > *C. padifolia* var. *incarnata* Sargent – F, G; > *C. rubella* Beadle – F, G, Q; > *C. straminea* Beadle – Q]

Crataegus iracunda Beadle, Red Hawthorn. Cp, Pd (GA, NC, SC, VA): swamps, bottomlands, moist slopes; wooded hills; uncommon (though locally abundant). April-May; September-October. Southern range limits appear to extend south to c. SC, GA, AL (and possibly MS). A difficult species to distinguish vegetatively, appearing most closely allied to *C. macrosperma* Ashe. The typically scabrous young leaves, 10 pink to purplish stamens, and firm-textured fruit with sessile calyx can vary among some local populations of *C. iracunda* to the extent that it may be confused with *C. schuettei*, *C. pruinosa*, or *C. boyntonii*. [= K, X; < *C. flabellata* (Bosc) K. Koch – RAB, C; > *C. iracunda* var. *iracunda* – F, G; > *C. iracunda* var. *silvicola* (Beadle) Palmer – F, G; > *C. iracunda* – Q; > *C. silvicola* Beadle – Q; > *C. drymophila* Sargent; > *C. populnea* Ashe – F, G; > *C. riparia* Ashe; > *C. sectilis* Ashe; > *C. shallotte* Ashe]

Crataegus lassa Beadle, Sandhill Hawthorn. Cp, Pd (GA, NC, SC): pine forests, oak-pine scrub, upland scrublands, xeric woodlands, especially in deep sand and soils of rapid drainage; common. Here *C. lassa* is broadly defined to include a wide range of minor species, most described by Beadle. Late March-April; August-September. *C. lassa* is most often shrubby in habit (2-4 m tall), with a rounded or open crown reaching close to the ground, commonly with multiple stems. [= X; < *C. flava* Aiton – RAB; >< *C. flava* – K; > *C. lassa* – Q; > *C. lanata* Beadle – Q; > *C. laxa* Beadle; > *C. frugalis* Beadle – Q; > *C. integra* Beadle – Q; > *C. dolosa* Beadle – Q; > *C. inops* Beadle – Q; > *C. meridiana* Beadle – Q; > *C. colonica* Beadle – Q; > *C. insidiosa* Beadle – K, Q; > *C. pulla* Beadle – Q; > *C. egens* Beadle – Q; > *C. pearsonii* Ashe – K, Q; > *C. michauxii* Persoon – Q, S]

Crataegus lepida Beadle. Cp (GA): xeric, sandy soils of open pinelands, wiregrass-dominated roadsides and forest edges, oak-pine scrub; uncommon. Late March-April; August-September. S. GA south to c. peninsular FL. Allied to *C. munda*, *C. lepida* is distinctive in bearing a preponderance of oval to orbicular, 1-2 cm leaves. [= X; > *C. lepida* – Q; > *C. condigna* Beadle – K, Q]

Crataegus macrosperma Ashe, Fanleaf Hawthorn. Mt, Pd, Cp (GA, NC, SC, VA): mesic or subxeric hardwood forests, wooded slopes, rock outcrops, pastures, thickets, mountain balds and rocky summits; common. April-early May; September-October. VA south to c. GA, west to n. LA, w. KY, and WV. *C. macrosperma* is often confused with *C. pruinosa* (Wendl.) K. Koch and *C. iracunda* Beadle, due to similar leaf shape, but *C. macrosperma* appears consistent in its adaxially scabrous young leaves, 5-10 stamens, and soft-textured mature fruit. The pyrenes are not unusually large (5-8 mm), despite the name. [= K, W, X; < *C. flabellata* (Bosc) K. Koch – RAB; > *C. flabellata* – C; > *C. macrosperma* var. *macrosperma* – F, G; > *C. macrosperma* var. *roanensis* (W.W. Ashe) Palmer – F, G; > *C. macrosperma* – Q; > *C. brainerdii* – C, misapplied to material in our area; > *C. roanensis* Ashe – Q; < *C. macrosperma* – S]

Crataegus margarettae Ashe. Mt (VA): mesic hardwood forests, streamside thickets, pastures; rare. April-May; September-October. WV {TN, w. VA} west to MO, IO, north to WI and MI. *C. margarettae* is related to the wide-ranging *C. chrysocarpa* Ashe, but is distinctive in its widely obovate to nearly orbicular leaves, rounded or obtuse lobes, cuneate base, and petioles often as long as the blade. [= *C. margaretta* – Q, S, X; > *C. margaretta* var. *margaretta* – F, G; > *C. margaretta* var. *brownii* (Britton) Sargent – F; > *C. margaretta* var. *brownei* – G (orthographic variant); < *C. chrysocarpa* Ashe – C; > *C. chrysocarpa* – K; = *C. margarettiae* – K, orthographic variant]

Crataegus marshallii Eggleston, Parsley Hawthorn, Parsley Haw. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): swamp forests (especially over calcareous soils), alluvial forests, dry and mesic upland slopes (especially over mafic or calcareous rocks). April-early May; September-October. Se. VA south to c. peninsular FL, west to e. TX, and north in the interior to sc. TN, n. AL, n. MS, w. TN, s. IL, se. MO, nc. AR, and se. OK (Phipps 1998); common. *C. marshallii* is distinctive and immediately recognizable among *Crataegus*, by its deeply lobed leaves, small flowers, and small fruits (4-6 mm long by about 3 mm wide, with only 1-3 pyrenes). [= RAB, C, F, G, K, S, W, X, Y; = *C. apiifolia* (Marshall) Michaux – Q]

Crataegus mendosa Beadle. Cp, Pd (GA), {SC}: mesic hardwood forests, mixed pine-hardwood forests, upland wooded hills over calcareous substrates and well-drained clays; uncommon. Lower Piedmont and upper Coastal Plain of sc. SC, wc. GA, ne. and c. AL, and c. and s. MS. April; September. Allied to *C. pulcherrrima* Ashe, and perhaps only a variety of it, *C. mendosa* is distributed well northward and eastward beyond the bulk of the range of *C. pulcherrima*. Related *C. venusta* Beadle and *C. austrina* Beadle occur in central AL. [= K, N, Q, S, X]

Crataegus mollis Scheele, Downy Hawthorn. Mt (VA), Pd (GA): mesic forests, alluvial forests, wooded uplands over basic or calcareous soils; rare in our area. Late March-April; September-October. The unusual occurrence of this species in the Mountains of VA is atypical of the majority of the range, which is north and west of VA and AL; ME to ND, s to s.TX, e. to nw. GA. *C. mollis* shows wide variabiliy in size and shape of leaves and fruit, but the tomentose young petioles and pubescent leaf undersides are consistent. The fruits of some local genotypes can reach 24 mm diameter, among the largest of the genus in the U.S. *C. mollis* often reaches treelike dimensions, to 10 m tall and trunk diameters to 30 cm. [= C, S, X; > *C. mollis* var. *mollis* –

F, G; > *C. mollis* – K, Q; > *C. cibaria* Beadle – Q; > *C. gravida* Beadle – Q; > *C. cibilis* Ashe; > *C. meridionalis* Sargent – K; ?> *C. albicans* W.W. Ashe – S]

Crataegus munda Beadle. Mt, Pd, Cp (GA, NC, SC): xeric or subxeric forests, scrublands, disturbed woodlands; uncommon. Late March-April; September-October. NC south to n. FL, west to s. and c. AL. *C. munda* as here considered includes in synonomy several shrubby taxa with small (1-3 cm), predominately spatulate leaves, slender geniculate twigs, and inflorescences of 1 to 3 (-5) flowers. [= X; < *C. flava* Aiton – RAB, W; > *C. munda* – K, Q; > *C. geniculata* Ashe – Q; > *C. yadkinensis* Ashe – Q; > *C. pexa* Beadle – Q; > *C. invicta* Beadle – K, Q; > *C. floridana* Sargent – S]

Crataegus pallens Beadle. Mt (NC): subxeric forests, slopes, rock outcrops, especially over mafic or calcareous substrates; rare. Late April-May; September-October. W. NC, e. TN, ne. AL, and perhaps n. GA. *C. pallens* is allied to *C. intricata* Lange, as well as exhibiting characters affiliated with *C. pulcherrima* Ashe. The oblong-ovate leaves with 2 to 3 pairs of straight-sided lobes, 15-20 stamens, yellowish oval fruit, dark furrowed bark, and somewhat twiggy crown atop these multi-stemmed shrubs is here considered diagnostic. A closely related taxon, *C. pinetorum* Beadle (Pineland Hawthorn), of ne. AL and uncertain distribution beyond, exhibits subglobose reddish fruit on pedicels 1-2 cm. [= Q, X; < *C. flabellata* – RAB; < *C. intricata* Lange – K, S]

Crataegus phaenopyrum (Linnaeus f.) Medikus, Washington Hawthorn. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): upland forests, floodplain forests, pastures, thickets, disturbed areas; uncommon (though locally abundant). May-early June; September-October. One of our most distinctive hawthorns, and commonly cultivated across the eastern U.S. Native range presumed to be PA s. to n. FL, w. to IL, MO, MS; naturalized populations originating from widespread cultivation may be involved in parts of this range, and expansions elsewhere. [= RAB, C, G, K, W, X; > *C. youngii* Sargent – F; > *C. phaenopyrum* – F, S; > *C. populifolia* – S]

Crataegus pruinosa (Wendl.) K. Koch, Frosted Hawthorn. Mt, Pd (NC, SC, GA, VA), Cp (NC, SC, GA): upland forests, pastures, rock outcrops, mountain summits and balds, floodplain forests; uncommon (though locally abundant). April-May; September-October. Broadly defined, a variable species with many closely related taxa here considered synonymous. This species may occur as a lone shrub or tree, or become colonial in regularly disturbed areas. The presence of a waxy bloom on the mature fruit (pruinose) is not a dependable trait, and fruits can vary from green to bright red, glaucous or not. Foliage and floral parts are usually entirely glabrous on plants in our area. [= C, S, W, X; < *C. flabellata* – RAB; > *C. pruinosa* var. *pruinosa* – F, G; > *C. pruinosa* var. *delawarensis* (Sargent) Palmer – F, G; > *C. rugosa* – F, G; > *C. pruinosa* – K; > *C. arcana* Beadle – K, Q; > *C. rustica* Beadle – Q; > *C. vicinalis* Beadle – Q; > *C. gattingeri* Ashe – F; > *C. gattingeri* var. *gattingeri* – G; > *C. gattingeri* var. *rigida* Palmer – G; > *C. georgiana* Sargent – Q]

Crataegus pulcherrima Ashe, Beautiful Hawthorn. Cp (GA): upland hardwood forests and hardwood-pine mixtures, ravines, mesic slopes, especially over iron-rich soils and rolling terrain with soils high in clay or loam content; uncommon (though locally abundant). Se. GA, c. panhandle FL, west to LA (and perhaps e. TX), north to c. MS and n. AL. April; September-October. Defined broadly, *C. pulcherrima* includes many closely related species described by Beadle, most not clearly distinct and here considered synonymous. Some may deserve varietal status following further study. Foliage of *C. pulcherrima* display a consistency of evenly-lobed leaves with straight, parallel primary veins and obscure secondary venation. The inflorescences are compound, with 20 stamens per flower; fruits are usually small (5-10mm diameter), with dense flesh; bark of main trunk brown, furrowed. [= X; > *C. pulcherrima* – K, N, Q; > *C. macilenta* Beadle – Q; > *C. lenis* Beadle – Q; > *C. ancisa* Beadle – K, Q; > *C. opima* Beadle – N, Q; > *C. inanis* Beadle – K, Q; > *C. illustris* Beadle – Q; > *C. incilis* Beadle – N, Q; < *C. intricata* Lange – S]

Crataegus punctata Jacquin, Dotted Hawthorn. Mt. (VA, NC): high elevation forests, balds, rock outcrops; uncommon (though locally abundant). The majority of range is north of our area, with southern limits along the higher Appalachian elevations of NC, TN, (perhaps n. GA), and west to KY, MO, and IL. May; September-October. *C. punctata* is considered here distinct from *C. collina*, which has a wider Southeastern range and habitat tolerance. *C. punctata*, often in company with *C. macrosperma*, comprises the majority of hawthorn forests, "orchards," and thickets seen in the high elevations of the North Carolina Blue Ridge, in openings and disturbed *Picea rubens* and *Abies fraseri* forests. [= K, Q, W, X; < *C. punctata* – RAB, C; > *C. punctata* var. *punctata* – F, G; > *C. punctata* var. *aurea* Aiton – F, G; > *C. punctata* var. *canescens* Britton – F, G; > *C. punctata* var. *pausiaca* (W.W. Ashe) Palmer – F, G; ? *C. punctata* – S]

Crataegus sargentii Beadle, Sargent's Hawthorn. Pd (GA): mesic upland forests over calcareous or circumneutral substrates; rare. W. GA, c. and n. AL (and perhaps se. TN). April; September. *C. sargentii* displays intermediate characteristics between the range of variation seen in *C. intricata* and that of *C. pulcherrima*. It is also on the northern range limits of the latter group. Although this might suggest hybrid origin, the genetics of *C. sargentii* has not been carefully investigated. Fruit production is usually scant in *C. sargentii*, and seed viability appears to be very low. [= K, X; > *C. sargentii* – N, Q; > *C. eximia* Beadle – N, Q; > *C. gilva* Beadle – N, Q; < *C. intricata* Lange – S]

Crataegus schuettei W.W. Ashe, Schuette's Hawthorn. Mt (VA, NC): mesic hardwood forests; uncommon (though may be locally abundant). April-May; September-October. *C. schuettei* occupies a range predominately north of our area, in NH, NY, WI, n. IL, n. WV; known to extend s. to w. NC (and perhaps also to e. TN and n. GA), but the extent of distribution is poorly understood. Closely related to *C. macrosperma*. Foliage of juvenile shoots of *C. schuettei* in w. NC often are laciniate, with deep, acute sinuses nearly reaching the midrib. [= K, X; < *C. flabellata* (Bosc) K. Koch – RAB, C; > *C. basilica* Beadle – F, G, Q, W]

Crataegus senta Beadle. Mt (NC), Cp (SC) {GA?}: upland hills, disturbed forests, pastures; uncommon. W. NC and c. SC (perhaps south to GA and n. FL). April-May; September. *C. senta* appears to be one of the most northerly distributed hawthorns allied closely to the group to which *C. alabamensis* Beadle, *C. lassa* Beadle, and *C. lacrimata* Small belong. The drooping branches, red fruit, and small, sharply 3-lobed or 3-pointed, obovate leaves are distinctive. [= Q, X; < *C. flava* Aiton – RAB, K, S, W; > *C. pentasperma* Ashe]

Crataegus spathulata Michaux, Littlehip Hawthorn. Cp (GA, NC, SC, VA), Pd, Mt (GA, NC, SC): bottomland forests, extending upslope to drier sites especially on mafic or calcareous substrates; uncommon in NC, common southward. April-May;

September-October. E. NC south to panhandle FL, west to e. TX, north in the interior to w. NC, c. TN, s. MO, and e. OK (Phipps 1988). This species is distinctive for its small spatulate leaves (tending to be trilobed) and thin, flaking bark (multicolored green, brown, and brownish gray). [= RAB, C, F, G, K, Q, S, W, X, Y]

Crataegus succulenta Schrader ex Link, Fleshy Hawthorn. Mt (NC, VA): high elevation rocky summits, mesic forests, high pastures, especially over basic soil or mafic substrates; rare. May; October. Widespread across the northern U.S. states, extending s. along the Appalachians to WV, w. VA, w. NC, and s. in the interior to MO. An attractive species, with bright red fruit, obovate to orbicular leaves with reticulate venation, widely spreading branches, and numerous long thorns (5-9 cm long). [= RAB, C, K, S, W, X; > *C. succulenta* var. *succulenta* – F, G; > *C. succulenta* var. *neofluvialis* (Ashe) Palmer – F, G; > *C. neofluvialis* Ashe – Q; > *C. vernans* Ashe]

Crataegus triflora Chapman, Threeflower Hawthorn. Mt, Pd, Cp (GA): wooded ravines and slopes under mesic forests, limestone outcrops, flatwoods, prairies; rare. April-May; September-October. Nw. and wc. GA, west to AL, MS, LA; (possibly in TN?). Usually a multi-stemmed shrub 1-3 m tall, but occasionally to 6 m. *C. triflora* produces some of the largest flowers in the genus (to 3 cm diameter), though frequently only 3 flowers borne per inflorescence; occasional vigorous plants may bear 3-6 flowers per inflorescence. The orange-red, soft fruit is palatable and may reach 22 mm diameter. [= K, W, X; > *C. triflora* – Q, U; > *C. austromontana* Beadle – Q, U]

Crataegus uniflora Muenchhausen, Oneflower Hawthorn. Mt, Pd, Cp (GA, NC, SC, VA): upland forests, disturbed lands, roadsides, rock outcrops, often in xeric or sub-xeric conditions; common. April-May; September-October. PA and NJ south to n. FL, w. to e. TX, OK, and MO. Normally a shrubby species, 0.5-2 m in height, though local forms may reach 4 m, particularly in n. FL. Among minor variations in foliage, consistent are the slender thorns (2-7 cm long) and foliaceous calyx lobes persistent on the fruit. [= RAB, C, F, G, K, S, W, X; > *C. uniflora* – Q; > *C. gregalis* Beadle – Q; > *C. arenicola* Ashe; > *C. raleighensis* Ashe – Q]

Crataegus viridis Linnaeus, Green Hawthorn. Pd, Cp (GA, NC, SC), Mt (SC, VA): swamps, bottomland forests, alluvial woodlands, wet flatwoods, and uplands where soils are often basic to calcareous; common. Late March-late April; September-November. DE w. to n. MO, south to central peninsular FL and central TX One of our largest hawthorn species, frequently reaching treelike proportions (5-10 m tall, trunk 10-40 cm diameter). The orange-red fruits often persist on the bare branches into winter, sometimes until the following spring. Bark of the trunk is usually mottled with patterns of gray, reddish-brown, and greenish-gray coloration, due to the dehiscing layers of scales and plates. [= RAB, C, S, W, X; > *C. viridis* var. *viridis* – F, G, K; > *C. viridis* var. *ovata* (Sargent) Palmer – F, G; > *C. viridis* var. *lanceolata* (Sargent) Palmer – F, G; > *C. viridis* – Q; > *C. interior* Beadle – Q; > *C. vulsa* Beadle – K, Q; > *C. penita* Beadle – K, Q]

Crataegus visenda Beadle. Pd, Cp (GA, NC, SC): upland pine and pine-oak forests, disturbed lands, wooded hills with clay or sandy soils, often in xeric or sub-xeric conditions; uncommon. April; late August-September. Central & upper Coastal Plain of NC south to n. FL, west to s. & e. MS, n. AL, and nw. GA. *C. visenda* is related closely to *C. aprica* Beadle, but the foliage tends to have a higher percentage of nearly orbicular blades and branches are more recurved or drooping. Often attaining the dimensions of a small tree (4-8 m tall and with a trunk 7-20 cm diameter). [= X; < *C. flava* Aiton – RAB, S; >< *C. flava* – K; > *C. visenda* – Q; > *C. tristis* Beadle – K, Q; > *C. segnis* Beadle – Q; > *C. arrogans* Beadle – K, Q; > *C. sodalis* Beadle – Q]

Crataegus ashei Beadle, Ashe Hawthorn. Cp (AL): prairies, hardwood forests, pine-hardwood flats, especially over calcareous clay soils; rare. C. and s. AL west to c. and s. MS and e. LA (s. TN?). April; September. Related to *C. triflora* Chapman and *C. harbisonii* Beadle. [= Q, U, X; < *C. harbisonii* Beadle – K]

Crataegus austrina Beadle. C. AL. [= Q, X; =? *C. tecta* Beadle – N]

Crataegus dilatata Sargent, Broadleaf Hawthorn. Reported from a single county in WV, otherwise bulk of range is in PA & areas northward. May; October. Related to *C. coccinioides*, which is occasionally cultivated but restricted in natural range to the lower Midwest. [= C, X]

Crataegus harbisonii Beadle, Harbison Hawthorn. Rare, endemic to c. and w. TN and currently known only from Davidson Co, TN: hardwood forests understories, over limestone; very rare. Late April-May; Sept.-Oct. Related species *C. ashei* Beadle has a more southern distribution in AL, MS, and LA. *C. harbisonii* appears to be extirpated from nearly all of its former range, even though once described as common in the Nashville area. [= Q, S, U, X; < *C. harbisonii* Beadle – K]

Crataegus lacrimata Small, Weeping Hawthorn. Xeric, sandy soils , in scrublands and in association with sparse stands of *Pinus clausa* or *Pinus palustris*. Endemic to the western FL panhandle; perhaps in adjacent sandhill scrub of AL. Late March-April; August-September. The combination of conspicuously slender weeping branches, small spatulate leaves, glabrous character, and treelike habit in *C. lacrimata* is unique among a large group of related hawthorns which occupy sandy habitats in the Coastal Plain. [= Q, X]

* ***Crataegus monogyna*** Jacquin, English Hawthorn. Reported for VA in W. [= C, F, G, K] {not yet keyed}

Crataegus opaca Hooker & Arnott. AL. [= K, X]

Crataegus pinetorum Beadle. In AL and TN. [= K, N, Q, X]

Crataegus rufula Sargent. Cp (GA): flatwoods ponds, river swamps; uncommon. [= K, Z; > *C. maloides* Sargent – S] {not yet keyed; synonymy incomplete}

Crataegus venusta Beadle. C. AL. [= N, Q, X; < *C. sargentii* Beadle – K]

Cydonia P. Miller 1754 (Quince)

A monotypic genus, a shrub, probably native of the Caucasus. References: Kalkman in Kubitzki (2004)=Z.

* *Cydonia oblonga* P. Miller, Edible Quince, is reported for MD (Kartesz 1999). [= K, Z; = *Pyrus cydonia* Linnaeus]

Dalibarda Linnaeus (Dewdrop, Robin-runaway, Star-violet)

A genus of 1-5 species (depending on circumscription), or perhaps be included in *Rubus* (Alice & Campbell 1999). References: Robertson (1974)=Z; Alice & Campbell (1999).

Dalibarda repens Linnaeus, Dewdrop, Robin-runaway, Star-violet. Mt (NC, VA): bog margins and mountain swamp forests, often along spring seeps, mostly in dense shade beneath *Rhododendron maximum*; rare (NC Endangered, VA Rare). June-September. Newfoundland west to MI and MN, south to NJ and OH, and disjunct to WV, sw. VA, and w. NC. [= RAB, C, G, GW, K, S, W; = ***Rubus dalibarda*** Linnaeus; = *Rubus repens* (Linnaeus) Kuntze]

Dasiphora Rafinesque (Shrubby-cinquefoil)

Molecular phylogenetic studies indicate that this genus is more closely related to *Alchemilla, Aphanes, Drymocallis, Fragaria, Sibbaldiopsis*, and other genera outside our area than to *Potentilla* (Eriksson et al. 2003). References: Robertson (1974)=Z; Eriksson et al. (2003); Kalkman in Kubitzki (2004); Ertter (2007).

Dasiphora fruticosa (Linnaeus) Rydberg ssp. *floribunda* (Pursh) Kartesz, Shrubby-cinquefoil, Golden-hardhack. This species is widepread in the western and northern parts of North America, south to NJ, PA, OH, IN, and IL. It was reported for western NC (near Ducktown, in Turtletown, Cherokee County, N.C.") by Gattinger (1901), but additional documentation is lacking. [= K; < *Potentilla fruticosa* Linnaeus – C, G, Z; > *Potentilla fruticosa* var. *fruticosa* – F; = *Pentaphylloides floribunda* (Pursh) A. Löve]

Drymocallis Fourrier ex Rydberg 1908

A genus of about 30 species, best segregated from *Potentilla*. Molecular phylogenetic studies indicate that this genus is more closely related to *Alchemilla, Aphanes, Dasiphora, Fragaria, Sibbaldiopsis*, and other genera outside our area than to *Potentilla* (Eriksson et al. 2003). Ertter (2007)=Z; References: Eriksson, Donoghue, & Hibbs (1998); Eriksson et al. (2003); Kalkman in Kubitzki (2004).

Drymocallis arguta (Pursh) Rydberg, Tall Potentilla. Mt (VA): greenstone barrens; rare (VA Rare). Québec west to Mackenzie, south to w. VA, IN, MO, and AZ. Reported for e. TN by Gattinger (1901); the documentation unknown. [= Z; = *Potentilla arguta* Pursh – F, G; > *P. arguta* var. *arguta* – C; > *P. arguta* ssp. *arguta* – K]

Eriobotrya Lindley 1821 (Loquat)

A genus of about 30 species, trees and shrubs, native to e. Asia.

* ***Eriobotrya japonica*** (Thunberg) Lindley, Loquat. Cp (FL, GA): suburban woodlands; rarely naturalized, native of e. Asia. Also reported for LA. [= K, WH]

Exochorda Lindley 1858 (Pearlbush)

A genus of about 4 species, shrubs, of e. Asia. References: Kalkman in Kubitzki (2004).

* ***Exochorda racemosa*** (Lindley) Rehder, Pearlbush. Pd (GA, NC, SC, VA), Cp (NC): disturbed areas, woodland borders; rare, native of China. First reported for South Carolina by Hill & Horn (1997). [= C, G, K]

Filipendula P. Miller 1754 (Queen-of-the-Prairie)

A genus of about 15 species, herbs, north temperate in e. and nw. North America, Europe, and Asia. References: Schanzer (1994)=Y; Robertson (1974)=Z.

1 Lateral leaflets lobed and toothed; flowers pink; fruit straight; rootstock with long subterranean runners; [native plant of wetlands, also sometimes cultivated]; [section *Albicoma*] ..... ***F. rubra***
1 Lateral leaflets merely coarsely toothed; flowers white; fruit twisted; rootstock short, without runners; [introduced species, sometimes escaped, at least north of our area]; [section *Filipendula*] ..... ***[F. ulmaria]***

Filipendula rubra (Hill) B.L. Robinson, Queen-of-the-Prairie. Mt (NC, VA), Pd (VA): bogs, wet meadows, over mafic or calcareous rocks; rare. June-July; July-September. PA west to n. IL and MN, south to WV, w. VA, w. NC, e. TN (Roane County(Gattinger 1901), KY, and IA (reports from GA appear to be unsubstantiated). The closest relatives are the other two members of section *Albicoma*: *F. palmata* (Pall.) Maximowicz and *F. angustifolia* (Turczaninow) Maximowicz, both of ne. Asia. [= RAB, C, F, G, GW, K, S, W, Y, Z]

* *Filipendula ulmaria* (Linnaeus) Maximowicz, Meadowsweet, Queen-of-the-Meadow, is cultivated and sometimes escaped or persistent. It is reported for KY, WV, PA, and NJ (Kartesz 1999). [= Y; > *F. ulmaria* var. *ulmaria* – C, F, G; > *F. ulmaria* ssp. *ulmaria* – K]

Fragaria Linnaeus (Strawberry)

A genus of about 10 species, herbs, of temperate Eurasia, North America, and South America. References: Kalkman in Kubitzki (2004).

1 Fruit (at least the larger on a plant) usually > 1.5 cm thick; petals 10-15 mm long; leaves evergreen; [cultivated, rarely persistent]..... ***F. ×ananassa***

1 Fruit 1-1.5 cm thick; petals 3-10 mm long; leaves deciduous (at least tardily so); [native].

2 Achenes set in pits on the mature receptacle; calyx lobes appressed to the developing fruit (after petal drop); petals (5-) 7-10 mm long; principal lateral veins diverging from the midrib of the leaflet at an angle of ca. 30 degrees; terminal tooth of leaflets > ½ as wide as the adjacent teeth, as long as or surpassing them in length..... ***F. virginiana***

2 Achenes superficial on the mature receptacle; calyx lobes spreading to reflexed from the developing fruit (after petal drop); petals 3-7 mm long; principal lateral veins diverging from the midrib of the leaflet at an angle of ca. 45 degrees; terminal tooth of leaflets < ½ as wide as the adjacent teeth, and surpassed by them in length.

4 Long hairs of the petioles and peduncles ascending to appressed..... ***F. vesca var. americana***

4 Long hairs of the petioles and peduncles spreading to retrorse..... ***[F. vesca var. vesca]***

* ***Fragaria ×ananassa*** Thuillier (pro sp.) [*chiloensis* × *virginiana*], Garden Strawberry, Cultivated Strawberry. Cp, Pd, Mt (GA, NC, SC, VA): gardens, persistent on garden edges; commonly cultivated, rarely persistent or weakly escaped. An octoploid hybrid of the two octoploid species, *F. chiloensis* and *F. virginiana*. [= RAB, F; = *F. ×ananassa* var. *ananassa* – K; < *F. ×ananassa* – RAB, F; = *F. ananassa* – C; = *F. chiloensis* Duchesne var. *ananassa* – G]

Fragaria vesca Linnaeus *var.* ***americana*** Porter. (NC, VA). [= C, F, G; < *F. vesca* – RAB; = *F. vesca* ssp. *americana* (Porter) Staudt – K, W; = *F. americana* (Porter) Britton – S]

Fragaria virginiana P. Miller, Wild Strawberry. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): grasslands, roadsides, pastures, woodlands; common (rare in FL). [= RAB, C, W, WH; > *F. virginiana* var. *virginiana* – F, G; > *F. virginiana* var. *illinoensis* (Prince) Gray – F, G; > *F. virginiana* var. *australis* Rydberg – G; > *F. virginiana* ssp. *virginiana* -- K; > *F. virginiana* ssp. *grayana* (Vilmorein ex J. Gay) Staudt – K; > *F. virginiana* – S; > *F. australis* (Rydberg) Rydberg – S; > *F. grayana* Vilmorin ex J. Gay – S]

Fragaria vesca Linnaeus var. *vesca*. East and south to PA, WV, and KY. [= C, F, G; = *F. vesca* ssp. *vesca* – K]

Geum Linnaeus 1753 (Avens)

Many researchers have advocated breaking *Geum* into varying numbers of segregate genera; even the most conservative divisions place *G. radiatum* in a genus separate from our other species (such as *Parageum*; see synonymy) and some would place *G. vernum* in *Stylipus*. Molecular studies (Smedmark 2006; Smedmark & Eriksson 2002) make a strong case for a broad circumscription of *Geum*, including *Waldsteinia*, as many of the segregates are complexly and reticulately inter-related. References: Robertson (1974)=Z, Bolle (1933)=Y; Král (1966)=X; Smedmark (2006)=V; Weakley (in prep.)=Q; Smedmark & Eriksson (2002); Kalkman in Kubitzki (2004). [including *Parageum* and *Waldsteinia*]

1 Style deciduous; leaves 3-foliolate or 3-lobed, lacking small leaflets towards the base; [subgenus or genus *Waldsteinia*]

2 Leaves trilobed (the sinuses cleft 1/4 to 3/4 the way to the midrib); leaves rather densely pubescent with stiff hairs, these distributed on the veins and on the intervein surfaces; [of a small area at the southern terminus of the Southern Appalachians in n. GA, nw. SC, and sw. NC) ..... ***G. lobatum***

2 Leaves trifoliolate (fully divided), and also typically additionally lobed; leaves sparsely pubescent with stiff hairs, these distributed mostly or strictly on the veins, the intervein surfaces glabrous to very sparsely pubescent; [more widespread].

3 Petals 4-10 mm (longer than the sepals), 2-6 mm wide; [of VA and KY northwards]..... ***G. fragarioides***

3 Petals 2.5-4 mm long (about as long as the sepals), 1-1.5 mm wide; [of VA and KY southwards]..... ***G. species 1***

1 Style persistent; leaves various (see below).

4 Style straight or slightly sinuous, neither jointed nor tightly twisted, the tip straight; basal leaves with a cordate or reniform terminal lobe 7-15 cm wide and 1-several lateral lobes generally < 1 cm long (rarely to 2 cm long); cauline leaves much reduced, flabellate, with clasping base and rounded apex; leaves thick, subcoriaceous, the upper surface dark green and glossy; petals 13-20 mm long, bright yellow; [of crevices and ledges on high elevation cliffs (less commonly grassy balds)]; [subgenus *Micracomastylis*; genus *Parageum*]..... ***G. radiatum***

4 Style with a tight kink or twist, the straight portion above the kink more-or-less deciduous, leaving a hook; basal leaves variable, trifoliate, pinnatifid, simple or with a large terminal lobe (to 8 cm wide) and much smaller lateral lobes; cauline leaves trifoliate to simple, mostly sessile or petiolate base, with acute or acuminate apex; leaves herbaceous, the upper surface medium green, not notably glossy; petals 1-10 mm long, white, cream, pale yellow, bright yellow, or lavender; [of mesic to boggy forests, or less commonly, grassy balds (*G. geniculatum*)].

5 Calyx lobes 2-4 mm long, lacking bractlets between the lobes; head of achenes elevated above the calyx on a 1-2 mm stipe; flowering April-May; fruiting May-June; [subgenus or genus *Stylipus*]..... ***G. vernum***

5 Calyx lobes 3-15 mm long, with bractlets between the lobes; head of achenes more-or-less sessile; flowering May-August; fruiting late May-September; [subgenus or genus *Geum*].

6 Portion of the style above the kink 3-7 mm long; calyx campanulate, cup-like in flower and fruit (sometimes becoming slightly and irregularly reflexed late in fruit), the calyx lobes 5-10 mm long, green to purple; petals yellow or often with a substantial suffusion of rose, lavender, or purple; lower portion of style with long, gland-tipped hairs.

7 Portion of the style above the kink 4-7 mm long; calyx lobes 5-10 mm long, green or purple-darkened; [of nw. NC and adjacent TN] ..... ***G. geniculatum***
7 Portion of the style above the kink 3-4 mm long; calyx lobes 9-15 mm long, purple; [of ne. WV northward] ..... ***G. rivale***
6 Portion of the style above the kink 1-2 mm long; calyx reflexed soon after anthesis, the calyx lobes 3-9 mm long, green; petals white, cream, or yellow; lower portion of style glabrous or with long, eglandular hairs.
8 Larger stipules > 10 mm wide, coarsely toothed or even lobed; mid-cauline leaves very coarsely toothed, with 1-5 teeth per cm of margin ..... ***G. virginianum***
8 Larger stipules 2-10 (-12) mm wide, entire to toothed; mid-cauline leaves less coarsely toothed, with 3-7 teeth per cm of margin.
9 Plant in flower.
10 Petals bright yellow, 5-9 mm long ..... ***G. aleppicum***
10 Petals white or cream (often drying pale yellow), 2-7 (-7.5) mm long.
11 Petals (3-) 4-7 (-7.5) mm long; pedicels puberulent (sometimes also slightly hirsute); [of moist to dry forests] ..... ***G. canadense***
11 Petals (2-) 2.5-4 (-5.5) mm long; pedicels densely hirsute with spreading or slightly reflexed hairs, and also puberulent; [of wetlands].
12 Young achenes glabrous ..... ***G. laciniatum var. laciniatum***
12 Young achenes sparsely to densely pubescent with long stiff trichomes ..... ***G. laciniatum var. trichocarpum***
9 Plant in fruit.
13 Pedicel predominantly puberulent, also sometimes with scattered longer hairs; cauline leaves mostly 3-foliolate or simple; receptacle densely hispid with yellowish, stiff hairs (best seen by removing a several achenes to expose the receptacle surface); [widespread and common in our area, primarily occurring in moist to wet forests] ..... ***G. canadense***
13 Pedicel moderately to densely hirsute with spreading to reflexed hairs 1-2.5 mm long, and also puberulent; cauline leaves mostly pinnately compound, the leaflets mostly elongate and often also laciniately divided; receptacle glabrous or sparsely to densely hispid; [rare in our area, occurring in the Mountains of NC and the Mountains, Piedmont, and Coastal Plain of VA, primarily in bogs and boggy meadows].
14 Hairs on the achene extending upward onto the lower portion of the style; pedicel sparsely hirsute with spreading hairs; receptacle densely hispid ..... ***G. aleppicum***
14 Hairs on the achene absent **or** at least not extending upward onto the lower portion of the style; pedicel densely hirsute with spreading to reflexed hairs; receptacle glabrous to sparsely hispid.
15 Achenes glabrous ..... ***G. laciniatum var. laciniatum***
15 Achenes sparsely to densely pubescent with long stiff trichomes ..... ***G. laciniatum var. trichocarpum***

Geum aleppicum Jacquin, Yellow Avens. Mt (NC, VA), Pd (VA): bogs and boggy meadows; rare (NC Rare, VA Rare). June-July; July-August. Circumboreal, in North America south to NJ, w. NC, ne. TN (Chester, Wofford, & Kral 1997), IN, IL, IA, and NM. The report for GA (Jones & Coile 1988) is in error. American plants are sometimes separated from Eurasian ones as var. *strictum* (Aiton) Fernald. [= RAB, GW, K, W, Y, Z; > *G. aleppicum* var. *strictum* (Aiton) Fernald – C, F, G]

Geum canadense Jacquin. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): moist slope forests, bottomland forests, swamp forests; common. May-July; July-November. Nova Scotia west to ND, south to c. GA and TX. Some authors have recognized a number of varieties in *G. canadense* (see synonymy); some (at least) of these may warrant recognition. [= RAB, C, G, GW, S, W, Z; > *G. canadense* var. *canadense* – F, K, Y; > *G. canadense* var. *brevipes* Fernald – F, Y; > *G. canadense* var. *camporum* (Rydberg) Fernald & Weatherby – F, Y; > *G. canadense* var. *grimesii* Fernald & Weatherby – F, Y]

Geum fragarioides (Michaux) Smedmark, Northern Barren Strawberry. Pd (GA?, NC, VA?): forests, streambanks; rare. Late March-May; May-June. New Brunswick west to MN, south to NC, GA, TN, IN, and MO. [= Q; = *Waldsteinia fragarioides* (Michaux) Trattinick var. *fragarioides* – C, F; < *W. fragarioides* – RAB, W, Y; = *W. fragarioides* ssp. *fragarioides* – K, Z; = ***Waldsteinia fragarioides*** – G, S; < *Geum fragarioides* (Michaux) Smedmark = V]

Geum geniculatum Michaux, Bent Avens. Mt (NC): seeps, seepy boulderfield forests, grassy balds, cliff bases, banks of cool streams up to about 5 m wide, at high to moderate elevations on Grandfather Mountain (Avery, Watauga, and Caldwell counties, NC), the Roan Mountain massif (Avery and Mitchell counties, NC and Carter County TN), and Rich Mountain (Watauga County, NC); rare, though locally fairly common (US Species of Concern, NC Threatened). July-August; August-September. *G. geniculatum* is apparently restricted to the few highest peaks in nw. NC and ne. TN: the Roan Mountain massif (Roan High Knob, Roan High Bluff, Round Bald, Jane Bald, Grassy Ridge, Little Hump Mountain, Big Yellow Mountain, and Big Hump Mountain), Grandfather Mountain, and Rich Mountain. It may be found on a few other peaks, such as Snake Mountain. The distribution of this species is peculiar. While limited to the several highest and coldest mountains in the Southern Appalachians, it extends downslope on Roan Mountain and Grandfather Mountain nearly to their bases, in situations that are apparently repeated on many other Southern Appalachian peaks. Perhaps *G. geniculatum* was more widespread in the Southern Appalachians in the cooler, moister conditions of the post-Pleistocene, but became restricted to the few coldest peaks during the warmer, drier conditions of the Hypsithermal Interval (7000-2000 B.C.). Following climatic cooling, it was able to disperse downslope from its several refugia, but has not dispersed successfully to other peaks. *G. geniculatum* is most closely related to the circumboreal *G. rivale*, with which it shares such characteristics as purplish, non-reflexed sepals, a relatively long terminal style segment, upper pedicel with long glandular hairs, and basal style segment with long glandular hairs. [= RAB, K, S, W, Y, Z]

Geum laciniatum Murray *var.* ***laciniatum.*** (VA): {info from VAHP}. This variety ranges south to VA, MD, KY, and TN. It resembles *G. laciniatum* var. *trichocarpum* but has the achenes glabrous (vs. sparsely to densely pubescent with long stiff trichomes). [= F, G, K, Z; < *G. laciniatum* – C, W, Y]

Geum laciniatum Murray *var.* ***trichocarpum*** Fernald, Rough Avens. Mt (NC, SC, VA), Pd, Cp (VA): bogs and boggy meadows, usually calcareous or basic; rare (NC Rare, VA Rare). June-July; July-August. *G. laciniatum* ranges from Nova Scotia west to MN, south to w. NC, ne. TN, MO, and KS. Var. *trichocarpum* ranges from Nova Scotia west to MN, south to w. NC, IL, MO, and KS. Var. *laciniatum*, differing in its glabrous achenes, appraches our area and should be sought; it is generally

more northern and more restricted in distribution, ranging from Nova Scotia west to s. Ontario, south to MD, WV, TN, OH, and IN. [= F, G, K, Z; < *G. laciniatum* – RAB, C, GW, W, Y]

Geum lobatum (Baldwin ex Elliott) Smedmark, Lobed Barren Strawberry. Mt (GA, NC, SC), Pd (GA, SC): forests, streambanks; rare. March-May; May-June. Sw. NC south to nw. SC and n. and c. GA. Some populations appear to be morphologically intermediate between *G. lobatum* and *G.sSpecies 1*; further study is needed. [= Q, V; = ***Waldsteinia lobata*** (Baldwin ex Elliott) Torrey & A. Gray – K, S, Y, Z]

Geum radiatum Michaux, Spreading Avens, Cliff Avens. Mt (NC): high elevation rocky summits, in thin soil at tops of cliffs and on ledges (where not trampled), in pockets of soil on nearly vertical portions of cliffs, in open grassy balds, around *Rhododendron catawbiense* in grassy balds, or in grassy areas at bases of cliffs (where succession by shrubs is prevented by accumulation of seepage ice and by stone fall); rare (US Endangered, NC Endangered). June-August; July-September. Ranging from Ashe County, NC (Phoenix Mountain) south and west to Sevier County, TN (Mount Leconte) and Transylvania County, NC (the Devil's Courthouse), restricted to "pseudo-alpine" rock outcrops and grassy meadows near the summits of the higher peaks of the Southern Blue Ridge, notably Bluff Mountain, Three Top Mountain, Phoenix Mountain, and The Peak (Ashe County, NC), Grandfather Mountain (Watauga and Avery counties, NC), Grassy Ridge (Avery County, NC), Roan High Bluff (Mitchell County, NC), Mount Craig in the Black Mountains (Yancey County, NC), Craggy Pinnacle, Craggy Dome, and Craggy Gardens (Buncombe County), the Devil's Courthouse (Transylvania County, NC), and Mount Leconte (Sevier County, TN). *G. radiatum* is closely related to three other taxa, these siblings also restricted in range and endemic to mountainous areas, collectively showing a relictual distribution: *G. peckii* Pursh (of alpine meadows and moist, rocky slopes of Nova Scotia and the higher peaks of NH and ME), *G. calthifolium* Menzies ex Smith var. *calthifolium* (of wet snow-melt meadows of w. British Columbia, w. Yukon, s. AK, and the Aleutians), and *G. calthifolium* var. *nipponicum* (of wet snow-melt meadows of s. Kamchatka and Japan). It is illegal to collect *G. radiatum* without federal and state permits, and there is no justification (scientific or otherwise) for additional collections from known sites. This is one of the few plant species that has been seriously depleted by collection by scientists (several hundred herbarium sheets from Roan Mountain alone!), though recreational over-use of its habitats, and possibly also pollution and break-up of adjoining spruce-fir forests, are the more critical threats to its continued existence. [= RAB, K, W, Z; = *Sieversia radiata* (Michaux) Greene – S; = ***Parageum radiatum*** (Michaux) H. Hara – X; = *Acomastylis radiata* (Michaux) Bolle – Y]

Geum rivale Linnaeus, Water Avens, Purple Avens. Mt (WV): calcareous bogs, swamps, seepages, and wet meadows; rare. Circumboreal, in North America from Labrador, Keewaton, and British Columbia south to NJ, MD, WV (Pocahontas, Preston, Randolph, and Tucker counties), OH, IN, IL, MN, SD, NM, and WA. It is most closely related (in our area) to *G. geniculatum*. [= C, F, G, K, Y]

Geum species 1, Southern Barren Strawberry. Pd, Mt (GA, NC, SC, VA), Cp (NC, SC): forests, streambanks; uncommon (rare in Coastal Plain and Mountains). (January-) March-May; May-June. PA south to GA, AL, and TN. [= Q; = *Waldsteinia fragarioides* (Michaux) Trattinick var. *parviflora* (Small) Fernald – C, F; = *Waldsteinia fragarioides* ssp. *doniana* (Trattinick) Teppner – K, Z; < *W. fragarioides* – RAB, W, Y; = *W. parviflora* Small – G; = ***Waldsteinia doniana*** Trattinick – S; < *Geum fragarioides* (Michaux) Smedmark – V; = ***Geum donianum*** (Trattinick) Weakley – Q, in prep.]

Geum vernum (Rafinesque) Torrey & A. Gray, Spring Avens. Mt, Pd (NC, VA): seepages, swamps, roadsides, disturbed areas; uncommon, probably both native and introduced in our area, the native occurrences now being supplemented by its spread along roads from further west. April-May; May-June. [= RAB, C, F, G, GW, K, W, Y, Z; = *Stylypus vernus* Rafinesque – S]

Geum virginianum Linnaeus, Cream Avens. Mt, Pd (NC, SC, VA), Cp (NC, VA): bottomland forests, moist slope forests, swamp forests, and extending upslope to mesic or even dry sites, especially over mafic rocks; common. June-August; July-November. MA and NY west to IN, south to SC and TN. [= RAB, C, F, G, GW, K, W, Y, Z; > *G. virginianum* – S; > *G. hirsutum* Muhlenberg ex Link – S]

Gillenia Moench 1802 (Indian-physic, Bowman's-root)

A genus of 2 species, herbs, of e. North America. There has been nomenclatural debate about whether the name *Gillenia* must be rejected because it is a later homonym of *Gillena*; the resolution appears to be that *Gillenia* can be used, and as it is older than the name *Porteranthus*, should be used (see Robertson 1974; Brummitt 1988; Parkinson 1988). References: Robertson (1974)=Z; Kalkman in Kubitzki (2004).

1 Stipules ovate, 10-20 mm long; leaves trifoliate, the leaflets of the lower leaves laciniate-toothed to divided ..... ***G. stipulata***
1 Stipules linear, 6-8 mm long; leaflets of the lower leaves; leaves trifoliate, the leaflets of the lower leaves merely toothed, like the upper leaves ..... ***G. trifoliata***

Gillenia stipulata (Muhlenberg ex Willdenow) Nuttall, Midwestern Indian-physic. Pd (GA, NC, VA), Mt (GA): dry to mesic woodlands and forests, especially over circumneutral soils derived from diabase (in NC) or greenstone (in VA); rare (NC Rare, VA Rare). May-June; July-October. NY to KS, south to nw. GA and TX, and disjunct east of the Blue Ridge in sc. VA, c. NC, and c. GA. [= RAB, F, G; = *Porteranthus stipulatus* (Muhlenberg ex Willdenow) Britton – C, K, S, W, Z]

Gillenia trifoliata (Linnaeus) Moench, Mountain Indian-physic. Mt, Pd (GA, NC, SC, VA), Cp (VA): moist forests, roadbanks, forest edges; common. April-June; August-October. Ontario west to MI, south to SC, AL, nc. GA, and MO. [= RAB, F, G; = *Porteranthus trifoliatus* (Linnaeus) Britton – C, K, S, W, Z]

Kerria A.P. de Candolle 1818 (Kerria)

A monotypic genus, a shrub, of China and Japan. References: Kalkman in Kubitzki (2004).

* ***Kerria japonica*** (Linnaeus) A.P. de Candolle, Kerria, Japanese-rose. Pd (NC, SC, VA), Cp (VA): woodland borders, suburban woodlands; rare, native of China. April-May. Single and "doubled" forms are cultivated. [= C, F, G, K]

Malus P. Miller (Apple, Crabapple)

A genus of 30-50 species, trees and shrubs, north temperate. References: Robertson (1974)=Z; Kalkman in Kubitzki (2004).

1 Twigs not thorny; leaves involute or convolute in bud; leaves unlobed; [cultivated and persistent or escaping]; [subgenus *Malus*].
  2 Leaves glabrous or nearly so; fruits small, < 3 cm in diameter ("crabapples") ..... ***M. prunifolia***
  2 Leaves densely pubescent in bud, permanently pubescent beneath; fruits large, > 5 cm in diameter ("apples") ..... ***M. pumila***
1 Twigs thorny; leaves folded in bud; leaves often lobed; [native, sometimes weedy]; [subgenus *Chloromeles*].
  3 Leaves permenantly pubescent beneath; pedicels and hypanthium pubescent; [western, disjunct east to KY and MS] ..... ***[M. ioensis]***
  3 Leaves glabrous or nearly so; pedicels and hypanthium glabrous or wiith scattered long hairs; [widespread in our area].
    4 Leaves elliptic to elliptic-lanceolate, 2.5-8 cm long, 1-4 cm wide, mostly > 2× as long as wide, subacute to obtuse at the tip ..... ***M. angustifolia***
    4 Leaves ovate to ovate lanceolate, 4-10 cm long, 2-7 cm wide, mostly < 2× as long as wide, acute to acuminate at the tip .... ***M. coronaria***

Malus angustifolia (Aiton) Michaux, Wild Crab Apple. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): forests, woodlands, fence-rows, dry hammocks; common (uncommon in Piedmont and Mountains, uncommon in FL). April-May; August-September. NJ, PA, OH, and MO, south to FL and TX. [= RAB, S, W, WH; = *Pyrus angustifolia* Aiton – C, G, Z; > *Pyrus angustifolia* var. *angustifolia* – F; > *Pyrus angustifolia* var. *spinosa* (Rehder) L.H. Bailey – F; > *M. angustifolia* var. *angustifolia* – K; > *M. angustifolia* var. *puberula* Rehder – K]

Malus coronaria (Linnaeus) P. Miller, Wild Crab Apple. Mt, Pd (GA, NC, SC, VA), Cp (GA, NC, SC): forests, woodlands, fencerows; common. May; September-October. NY, Ontario and WI south to GA and LA. [= RAB, K, W; = *Pyrus coronaria* Linnaeus – C, Z; > *Pyrus coronaria* Linnaeus var. *coronaria* – F; > *Pyrus coronaria* Linnaeus var. *elongata* Rehder – F; > *Pyrus coronaria* Linnaeus var. *dasycalyx* (Rehder) Fernald – F; > *Pyrus coronaria* Linnaeus var. *lancifolia* (Rehder) Fernald – F; = *Pyrus lancifolia* Bailey – G; > *Malus bracteata* Bailey – S; > *Malus coronaria* (Linnaeus) P. Miller – S; > *Malus lancifolia* Rehder – S; > *Malus coronaria* (Linnaeus) P. Miller var. *dasycalyx* Rehder]

* ***Malus prunifolia*** (Willdenow) Burkhardt, Chinese Apple, Crab-apple. Pd (VA), {SC}. [= K; = *Pyrus prunifolia* Willdenow]

* ***Malus pumila*** P. Miller, Common Apple. Mt, Pd, Cp (NC, SC, VA): commonly cultivated throughout, especially in the Mountains and Piedmont, and long persistent. April-May; July-October. [= RAB, K, W; = *Pyrus malus* Linnaeus – C, F, G, Z; = *Malus malus* (Linnaeus) Britton – S; = *Malus domestica* Burkhart]

Malus ioensis (Wood) Britton var. *ioensis*, Prairie Crabapple. Forests, woodlands, fence-rows. East to KY and MS. [= K; < *Pyrus ioensis* (Wood) Bailey – C, F, G] {not yet keyed; synonymy incomplete}

Neillia D. Don 1825 (Lace Shrub)

A genus of about 3 species, shrubs, of e. Asia. Oh & Potter (2005) present strong evidence for the inclusion of *Stephanandra* in *Neillia*; the combination for our species has not yet been made. References: Oh (2006)=Z; Oh & Potter (2005); Kalkman in Kubitzki (2004).

* ***Neillia incisa*** (Thunberg) S.H. Oh, Lace Shrub. Pd (VA): suburban woodlands; rare, establishing from horticultural plantings, native of Japan and Korea. [= Z; = *Stephanandra incisa* (Thunberg) Zabel – K]

Neviusia A. Gray 1858 (Snow-wreath)

A genus of 2 species, shrubs, of e. North America and California. References: Kalkman in Kubitzki (2004).

Neviusia alabamensis A. Gray, Alabama Snow-wreath. Mt (GA): limestone woodlands, where there is seasonal moisture; rare (GA Threatened). Sc. TN (Chester, Wofford, & Kral 1997), nw. GA (Jones & Coile 1988), and n. AL. [= K, S]

Photinia Lindley (Photinia, Redtip)

A genus of about 35 species, trees and shrubs, of Asia and Central America. Perhaps should be combined into *Aronia* (see discussion under that genus). References: Kalkman in Kubitzki (2004). [also see *Aronia*]

* *Photinia serratifolia* (Desfontaines) Kalkman, Taiwanese Redtip. Reported from MS and LA as long-persistent and weakly naturalizing. [= K; ***Aronia***]

* *Photinia villosa* (Thunberg) A.P. de Candolle, Redtip, Photinia. Cultivated as an ornamental landscaping plant and persists after cultivation. [= K; ***Aronia***]

Physocarpus (Cambess.) Rafinesque 1838 (Ninebark)

A genus of 3-5 species, shrubs, of North America and ne. Asia. References: Robertson (1974)=Z; Kalkman in Kubitzki (2004).

1 Follicles stellate-pubescent ..... ***Ph. opulifolius*** *var.* ***intermedius***
1 Follicles glabrous ..... ***Ph. opulifolius*** *var.* ***opulifolius***

Physocarpus opulifolius (Linnaeus) Maximowicz *var.* ***intermedius*** (Rydberg) B.L. Robinson, Midwestern Ninebark. Pd (SC, NC?): {habitat and distribution needing additional investigation}. W. NY west to MN and CO, south to SC, FL, AL, and AR. It is unclear whether the southern species recognized by Small (1933) are best allied with this taxon. Additional study is needed. [= C, F, G, K, Z; < *Ph. opulifolius* – RAB, W; > *Opulaster alabamensis* Rydberg – S; > *Opulaster stellatus* Rydberg – S; = *Opulaster intermedius* Rydberg]

Physocarpus opulifolius (Linnaeus) Maximowicz *var.* ***opulifolius***, Eastern Ninebark. Mt, Pd (NC, SC), {GA, VA}: stream banks, riverside thickets, rock outcrops, cliffs, especially over mafic or calcareous rocks; common. May-July. Québec west to WI, south to SC, TN, and n. IL. [= C, F, G, K, Z; < *Ph. opulifolius* – RAB, W; > *Opulaster opulifolius* (Linnaeus) Kuntze – S; > *Opulaster australis* Rydberg – S]

Potentilla Linnaeus 1753 (Cinquefoil, Five-fingers, Potentilla)

A genus of 400-500 species, depending on the controversial circumscription. References: Robertson (1974)=Z; Eriksson, Donoghue, & Hibbs (1998); Eriksson et al. (2003); Kalkman in Kubitzki (2004). [also see *Dasiphora, Drymocallis,* and *Sibbaldiopsis*]

1 Flowers solitary, on naked, axillary pedicels; leaves palmately 3-5-foliolate.
  2 Leaves 3-foliolate; fruit strawberry-like, fleshy and red, consisting of an expanded fleshy receptacle bearing superficial achenes .. ***P. indica***
  2 Leaves primarily 5-foliolate on a plant (some poorly developed leaves may be 3-foliolate); fruit a head of achenes, dry.
    3 Lowest flower from the axil of the second well-developed leaf ..... ***P. simplex***
    3 Lowest flower from the axil of the first well-developed cauline leaf, or from the axil of a lower and poorly-developed leaf.
      4 Middle leaflet of larger leaves 1.5-4 cm long; plants silky-pilose, the pubescence appressed or loosely ascending ..... ***P. canadensis*** *var.* ***canadensis***
      4 Middle leaflet of larger leaves 3-6 cm long; plants long-villous, the pubescence loosely spreading to reflexed ..... ***P. canadensis*** *var.* ***villosissima***
1 Flowers in terminal cymes; leaves palmately 3-9-foliolate.
  5 Leaves 3-foliolate.
    6 Petals and sepals subequal; stamens (15-) 20; achenes usually ridged ..... ***P. norvegica***
    6 Petals much shorter than the sepals; stamens 5-10 (-15); achenes smooth ..... ***P. rivalis*** *var.* ***millegrana***
  5 Leaves 5-9-foliolate.
    7 Leaves (5-) 7-9-foliolate; petals 8-18 mm long, pale (sulphur) yellow, creamy-white, or white.
      8 Leaves pinnately compound; petals 12-18 mm long, creamy-white or white ..... ***[see Drymocallis]***
      8 Leaves palmately compound; petals 8-15 mm long, pale (sulphur) yellow ..... ***P. recta***
    7 Leaves 5 (-7)-foliolate; petals 3-7 mm long, medium yellow.
      9 Leaves pubescent beneath, the surface not concealed ..... ***P. intermedia***
      9 Leaves densely tomentose beneath, the surface concealed.
        10 Pubescence of the stem and veins of the leaf undersurface tomentose only; leaves revolute ..... ***P. argentea***
        10 Pubescence of the stem and veins of the leaf undersurface tomentose and also with long, spreading hairs; leaves not revolute ..... ***P. inclinata***

* ***Potentilla argentea*** Linnaeus, Silvery Five-fingers, Hoary Five-fingers. Mt, Pd, Cp (NC, VA): disturbed areas; rare, naturalized from Europe. May-July. [= RAB, C, F, G, W; *P. argentea* var. *argentea* – K]

Potentilla canadensis Linnaeus *var.* ***canadensis***, Running Five-fingers. Mt, Pd, Cp (GA, NC, SC, VA): woodlands, forests, fields, lawns, disturbed areas; common. March-May; April-June. The relative distributions and habitats of the two varieties obscure. [= F, G, K; < *P. canadensis* – RAB, C, W; = *P. pumila* Poiret – S]

Potentilla canadensis Linnaeus *var.* ***villosissima*** Fernald, Hairy Five-fingers. Pd (NC): woodlands, forests, fields, lawns, disturbed areas; uncommon. March-May; April-June. The relative distributions and habitats of the two varieties obscure. [= F, G, K; < *P. canadensis* – RAB, C, W; = *P. caroliniana* Poiret – S]

* ***Potentilla inclinata*** Villars. Cp (NC): disturbed areas; rare, naturalized from Europe. May-June. [= C, K; ? *P. canescens* Bess. – RAB, F, G]

* ***Potentilla indica*** (Andrews) T. Wolf, Indian-strawberry. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): disturbed areas, lawns, gardens; common (uncommon in FL), naturalized from Asia. February-frost. *Duchesnea* is apparently not closely related to *Fragaria*, and is best combined with *Potentilla*, which does have other species with accrescent fruits (Eriksson, Donoghue, & Hibbs 1998). The strawberry-like fruit is not sweet; it can also be distinguished from *Fragaria* by its whitish interior flesh. The leaves are more coarsely toothed than *Fragaria*. [= *Duchesnea indica* (Andrews) Focke – RAB, C, F, G, K, S, W, WH]

* ***Potentilla intermedia*** Linnaeus. Mt (NC, VA), Pd, Cp (VA): disturbed areas; rare, naturalized from Europe. May-July. [= RAB, C, F, G, K]

Potentilla norvegica Linnaeus, Strawberry-weed. Mt (GA, NC, VA), Cp (NC, VA), Pd (GA, NC, SC, VA): pastures, fields, disturbed areas, especially where moist; common (uncommon in Piedmont and Coastal Plain). Late May-frost; June-frost. This species is apparently a complex circumboreal species complex, with both native and introduced elements now present in NC. [= RAB, C, G, W; > *P. norvegica* var. *norvegica* – F; > *P. norvegica* ssp. *monspeliensis* (Linnaeus) Ascherson & Graebner – K; > *P. monspeliensis* Linnaeus – S]

* ***Potentilla recta*** Linnaeus, Sulphur Five-fingers. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): disturbed areas; common (rare in FL), naturalized from Europe. April-July; May-August. [= RAB, C, F, G, K, W, WH]

* ***Potentilla rivalis*** Nuttall, Brook Five-fingers. Mt, Pd, Cp (VA): habitat not known; rare, adventive from further west. [= C, G, K; > *P. millegrana* Engelmann ex Lehmann – F; > *P. rivalis* var. *millegrana* (Engelmann ex Lehmann) S. Watson]

Potentilla simplex Michaux, Old-field Five-fingers. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC, VA): woodlands, fields, disturbed areas; common (rare in FL). April-June; April-July. Newfoundland and MN south to AL and TX. [= RAB, C, G, K, W; > *P. simplex* var. *simplex* – F; > *P. simplex* var. *argyrisma* Fernald – F; > *P. simplex* var. *calvescens* Fernald – F; > *P. simplex* – S; > *P. canadensis* – S, misapplied]

* *Potentilla anserina* Linnaeus, Silverweed, occurs as an introduction south to e. TN (Chester, Wofford, & Kral 1997), se. PA (Rhoads & Klein 1993), and NJ (Kartesz 1999). [= C, F; = *Argentina anserina* (Linnaeus) Rydberg – K] {not yet keyed; synonymy incomplete}

* ***Potentilla reptans*** Linnaeus, Creeping Five-fingers, native of Eurasia, is reported for VA (Cronquist 1991, Kartesz 1999) and occurs as well in se. PA (Rhoads & Klein 1993). [= C, F, K] {not yet keyed; synonymy incomplete}

Poteridium Spach 1846 (American Burnet)

A genus of 2 species, herbs, of c. and w. North America. References: Robertson (1974)=Z; Nordborg (1966, 1967)=Y; Kalkman in Kubitzki (2004).

* ***Poteridium annuum*** (Nuttall ex Hooker) Spach, Prairie Burnet. Cp (SC): roadsides; rare, native of sc. United States. April-May. [= *Sanguisorba annua* (Nuttall ex Hooker) Torrey & A. Gray – RAB, G, K, Z]

Poterium Linnaeus 1753 (Salad Burnet)

A genus of 6 or more species, herbs, of Eurasia, n. Africa, and North America. References: Robertson (1974)=Z; Nordborg (1966, 1967)=Y; Kalkman in Kubitzki (2004).

* ***Poterium sanguisorba*** Linnaeus ssp. ***muricatum*** (Spach) Rouy, Salad Burnet, Garden Burnet, Fodder Burnet. Mt (NC, VA), Pd (VA): cultivated as an herb and salad green, escaped to moist, disturbed areas; rare, native of Europe. June-July. [= *Sanguisorba minor* Scopoli ssp. *muricata* (Spach) Nordborg – K, Y, Z; < *S. minor* – RAB, C, F, G; < *Poterium sanguisorba* Linnaeus – S; = *Poterium polygamum* Waldstein & Kitaibel]

Prunus Linnaeus 1753 (Plum, Cherry, Sloe, Peach, Apricot)

A genus of about 200 species, trees and shrubs, nearly cosmopolitan. References: Robertson (1974)=Z; McVaugh (1951)= Y; Catling, McKay-Kuja, & Mitrow (1999)=X; Shaw & Small (2004); Kalkman in Kubitzki (2004).

1 Flowers in elongate racemes of (12-) 20-many flowers.
  2 Leaves evergreen, entire or serrate with few or rather many (but widely spaced) prominent teeth; petioles lacking 2 glands near junction with leaf blade; [native in maritime situations from e. NC southward, but cultivated and escaped inland); [**laurel cherries**, subgenus *Laurocerasus*] ..... ***P. caroliniana***
  2 Leaves deciduous, regularly and rather finely toothed; petioles with 2 glands near the junction with the leaf blade; [collectively widespread, native and alien]; [**black cherries**, subgenus *Padus*] ..... **Key A**
1 Flowers solitary, in fascicles, in umbellate or corymbose inflorescences, or in short racemes (*P. mahaleb*) of 1-12 flowers.
  3 Flowers and fruit pedicellate, the pedicel > 4 mm long; fruit glabrous, ovary glabrous or pubescent initially.
    4 Stones globose, not 2-edged; sepals hairy or not; inflorescences subtended by leafy bracts arising from the same bud as the flowers (except *P. pensylvanica*, *P. susquehanae*, and *P. pumila* var. *depressa*); **cherries** ..... **Key B**
    4 Stones somewhat to strongly flattened, 2-edged; sepals hairy on the upper surface (except *P. domestica*, *P. insititia*, and *P. cerasifera*); inflorescences without leafy bracts arising from the same bud as the flower; **plums** ..... **Key C**
  3 Flowers and fruit sessile or on a pedicel < 2 mm long
    5 Fruit scarlet-red, 1 cm in diameter; twigs densely tomentose; fruit and ovary glabrous or somewhat pubescent (but not velvety); leaves < 5 (-7) cm long; petals white (pink in bud), < 13 mm long; [subgenus *Lithocerasus*, section *Armeniacocerasus*] ..... ***[P. tomentosa]***
    5 Fruit yellow, peach, or orange-colored, > 2 cm in diameter; twigs glabrous; fruit and ovary velvety pubescent; leaves > 5 cm long; petals white or pink, > 11 mm long.
      6 Leaves 8-15 cm long, > 4× as long as wide, falcate; fruit peach-colored, > 5 cm in diameter; [**peach**; subgenus *Amygdalus*] ..... ***P. persica***
      6 Leaves 5-10 cm long, 1-1.5× as long as wide, not falcate; fruit yellow to orange, 3-5 cm in diameter; [**apricots**; subgenus *Prunus*, section *Armeniaca*]

7 Twigs reddish-brown; fruits 3-5 cm in diameter ..... ***P. armeniaca***
7 Twigs bright green; fruits 2-3 cm in diameter, the flesh sour and/or bitter ..... ***P. mume***

KEY A – BLACK-CHERRIES, subgenus *Padus*

1 Petals 6-10 mm long; hypanthium pubescent within; stone sculptured; [alien, rarely naturalizing] ..... ***[P. padus]***
1 Petals 4-7 mm long; hypanthium glabrous within; stone smooth; [native].
  2 Leaf teeth triangular, pointing outwards; leaves dull above; sepals conspicuously glandular-eroded on the margin, not persistent on the fruit; colonial, thicket-forming shrub from rhizomes; [montane in our area] ..... ***P. virginiana var. virginiana***
  2 Leaf teeth curved, appressed; leaves shiny above; sepals entire or slightly glandular-eroded on the margin, persistent on the fruit; small to large tree, not clonal; [collectively widespread].
    3 Leaves mostly 1.5-2× as long as wide, often blunt-tipped (except in shoot leaves); lower leaf surface rather uniformly pubescent, the midrib lacking conspicuous tufts or fringes; branchlets reddish hairy ..... ***P. alabamensis***
    3 Leaves mostly 2-2.5× as long as wide, slightly acuminate; lower leaf surface glabrous except for tufts or fringes along the midrib; branchlets glabrous ..... ***P. serotina var. serotina***

Key B – CHERRIES, subgenera *Cerasus* and *Lithocerasus*

1 Plants shrubs, to 1.5 (-3) m tall; [subgenus *Lithocerasus*; section *Microcerasus*].
  2 Inflorescences of 1-2 flowers; [exotic, persistent from cultivation] ..... ***P. glandulosa***
  2 Inflorescences of 2-4 flowers; [native].
    3 Youngest twigs glabrous; leaf blades (1.6-) 3-4× as long as wide; plants decumbent; stones fusiform, (5.5-) 7.3-9.5 (-10.2) mm long; [plants of calcareous shores and gravel bars] ..... ***[P. pumila var. depressa]***
    3 Youngest twigs minutely pubescent; leaf blades mostly 1.7-2.5× as long as wide; plants erect, stones mostly orbicular, (5.3-) 5.8-7.8 (-9.2) mm long; [plants of acid sandy or rocky upland sites] ..... ***P. susquehanae***
1 Plants trees, well over 3 m tall when mature; [subgenus *Cerasus*].
  4 Leaf serrations single to double, the tips of the serrations acuminate to attenuate.
    5 Leaf serrations attenuate; tree with upright form; [section *Sargentiella*] ..... ***P. serrulata***
    5 Leaf serrations acuminate; tree usually with weeping form; [section *Microcalymma*] ..... ***P. subhirtella***
  4 Leaf serrations small and obscure or well-developed but rounded to acute.
    6 Petals 4-7.5 mm long; fruit < 1 cm in diameter; [section *Phyllomahaleb*].
      7 Inflorescence with a central axis, thus nearly or actually racemose; fruit blackish; leaves 1-1.5× as long as wide; [exotic tree] ..... ***P. mahaleb***
      7 Inflorescence umbellate to corymbose, the central axis absent or poorly developed; fruit red; leaves 2-5× as long as wide; [native tree] ..... ***P. pensylvanica***
    6 Petals 9-15 mm long; fruit 1.3-2.5 cm in diameter; [section *Eucerasus*].
      8 Leaves 7-15 cm long, persistently hairy beneath, at least along the midrib and veins; pair of petiolar glands on the petiole near the blade; fruit sweet when ripe ..... ***P. avium***
      8 Leaves 4-8 cm long, glabrous beneath once fully-expanded; pair of petiolar glands on the base of the leaf blade; fruit sour when ripe. ..... ***P. cerasus***

KEY C – PLUMS, subgenus *Prunus*

1 Flowers 1-2 (-3) per inflorescence; stone somewhat sculptured; [exotic]; [section *Prunus*].
  2 Leaves 4-6 cm long; fruits 2-3 cm long, yellow to red when ripe; inflorescence of a solitary flower ..... ***[P. cerasifera]***
  2 Leaves 5-10 cm long; fruits 3-7 cm long, blue-black, yellow, or greenish when ripe; inflorescence of (1-) 2-3 flowers.
    3 Fruit 5-7 cm long; single-trunked small to medium tree, usually thornless ..... ***P. domestica***
    3 Fruit 3-4 cm long; thicket-forming shrub to small tree, often thorny ..... ***P. insititia***
1 Flowers (3-) 4-5 per inflorescence; stone nearly smooth; [native]; [section *Prunocerasus*].
  4 Leaf teeth gland-tipped (or with a scar where the gland has fallen); sepals with marginal glands (except *P. angustifolia*); fruit yellow to red when ripe.
    5 Leaves 3-6 cm long, often folded longitudinally; sepals lacking marginal glands ..... ***P. angustifolia var. angustifolia***
    5 Leaves 5-13 cm long, not folded; sepals with marginal glands.
      6 Leaves < 2× as long as wide; petals 10-15 mm long; [of w. VA northward] ..... ***P. nigra***
      6 Leaves > 2× as long as wide; petals 4-7 mm long; [of mw. United States, eastward into KY, TN, MS, and present as an introduction still farther eastward in NC, SC, VA, and GA].
        7 Leaf teeth triangular, ascending, the gland terminal; flowers opening with the leaves ..... ***P. hortulana***
        7 Leaf teeth depressed, the gland near the sinus; flowers opening before the leaves ..... ***P. munsoniana***
  4 Leaf teeth glandless; sepals without marginal glands; fruit yellow, red, purple-red, purple, or black when ripe
    8 Petals 10-15 mm long; leaves 6-10 cm long, acuminate; fruit 2-2.5 cm long, red or yellow.
      9 Leaves narrowly to broadly cuneate at the base; petiole usually lacking glands near its junction with the leaf blade; sepals glabrous on the lower side ..... ***P. americana***
      9 Leaves broadly rounded at the base; petiole usually with glands near its junction with the leaf blade; sepals pubescent on the lower side ..... ***P. mexicana***
    8 Petals 4-9 mm long; leaves 4-8 cm long, obtuse, acute, or slightly acuminate; fruit 1.0-1.5 cm long, dark purple, black (rarely yellow or red) ..... ***P. alleghaniensis var. alleghaniensis, P. maritima var. maritima, P. injucunda, P. umbellata***

Prunus alabamensis C. Mohr, Alabama Black Cherry. Cp (FL, GA, SC), Pd (GA), Mt (GA): sandhills, other xeric sandy or rocky forests and woodlands, often associated with *Pinus palustris* (even in the Piedmont and Mountains); uncommon (rare

north of GA). April-May; July-August. C. SC, nw. GA, n. AL south to Panhandle FL and s. AL; the NC record is based on a misidentified specimen. [= K; = *Prunus serotina* Ehrhart var. *alabamensis* (C. Mohr) Little – RAB, WH; > *Padus alabamensis* (C. Mohr) Small – S; > *Padus cuthbertii* Small – S; > *Padus australis* Beadle – S; = *Prunus serotina* ssp. *hirsuta* (Elliott) McVaugh – Y, Z]

Prunus alleghaniensis Porter *var.* ***alleghaniensis***, Allegheny Plum, Allegheny Sloe. Mt (NC, VA), Pd (VA): dry rocky woodlands, shale barrens; rare. MA and NY south to w. VA, w. NC, and e. TN. Var. *davisii* (W. Wight) Sargent is endemic to MI. [= K; < *Prunus alleghaniensis* – C, F, G, W]

Prunus americana Marshall, Wild Plum. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): upland forests, bottomland forests, fencerows; common (uncommon in FL). March-April; July-August. ME to Saskatchewan, south to n. peninsular FL, LA, OK, NM, and AZ. [= C, K, S, W, WH, Z; = *Prunus americana* var. *americana* – RAB, F, G]

Prunus angustifolia Marshall *var.* ***angustifolia***, Chickasaw Plum. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, VA): roadsides, fencerows, abandoned fields, especially sandy; common (uncommon in FL). March-April; May-early July. NJ, PA, IN, IL, MO, NE, and CO, south to FL, TX, and NM. Var. *watsonii* (Sargent) Waugh is midwestern. [= F, K; < *Prunus angustifolia* – RAB, C, G, S, W, WH, Z]

* ***Prunus armeniaca*** Linnaeus, Apricot. Cp (VA): persistent around old home sites; rare, native of n. China. [= C, K; = *Armeniaca vulgaris* Lamarck]

* ***Prunus avium*** Linnaeus, Sweet Cherry, Mazzard Cherry, Bing Cherry. Pd (NC, VA), Mt, Cp (VA), {NC, SC}: common. [= RAB, C, F, G, K, S, W, Z; = *Cerasus avium* (Linnaeus) Moench]

Prunus caroliniana (P. Miller) Aiton, Carolina Laurel Cherry. Cp (FL, GA, NC, SC), Pd, Mt (GA): native in maritime forests and sandy hammocks near the coast, escaped from cultivation to fencerows and suburban forests and thickets in more inland areas; common (uncommon in GA, NC, SC). March-April; September-October. Se. NC south to FL, west to TX, near the coast. [= RAB, K, WH, Z; = *Laurocerasus caroliniana* (P. Miller) M. Roemer – S]

* ***Prunus cerasus*** Linnaeus, Sour Cherry, Pie Cherry. Mt (NC, VA), Pd, Cp (VA), {GA}: disturbed areas; fencerows, suburban forests; commonly cultivated, rarely persistent or escaped. April-May; June. [= RAB, C, F, G, K, S, W, Z; = *Cerasus vulgaris* P. Miller]

* ***Prunus domestica*** Linnaeus, European Plum. Pd (VA): suburban forests; rare, native of Europe. Introduced at scattered locations; reported for Manassas National Battlefield Park (Virginia Botanical Associates 2005); also reported for MD, PA, NJ. [= *Prunus domestica* ssp. *domestica* – C; = *Prunus domestica* var. *domestica* – K]

* ***Prunus glandulosa*** Thunberg, Dwarf Flowering Almond. Cp (NC): persisting at abandoned homesites; rare, native of c. and n. China and Japan. [= K; = *Cerasus glandulosa* (Thunberg) Sokolov]

* ***Prunus hortulana*** Bailey, Wild-goose Plum. Mt, Pd, Cp (VA): disturbed areas; rare, presumably introduced only, native from s. OH, n. IN, n. IL, se. IA, and e. KS south to n. KY, n. AR, and ne. OK. [= C, F, G, K, S, Z]

Prunus injucunda Small, Hog Plum, Flatwood Plum. Cp, Pd (GA, NC, SC): upland rocky or sandy forests and woodlands; uncommon. March-April; August-September. S. NC south to GA and AL. [= S; = *Prunus umbellata* Elliott var. *injuncunda* (Small) Sargent – K; < *Prunus umbellata* – RAB, Z]

* ***Prunus insititia*** Linnaeus, Damson, Bullace. Pd (VA): rare, native of Europe. [= F, G, Z; = *Prunus domestica* ssp. *institia* (Linnaeus) C.K. Schneider – C; = *Prunus domestica* Linnaeus var. *insititia* (Linnaeus) Fiori & Paoletti – K]

* ***Prunus mahaleb*** Linnaeus, Mahaleb Cherry, Perfumed Cherry, St. Lucie Cherry. Mt, Pd (NC, VA): roadsides, old homesites; rare, native of Europe. April-May; July. [= RAB, C, F, G, K, W, Z; = *Cerasus mahaleb* (Linnaeus) P. Miller]

Prunus maritima Marshall *var.* ***maritima***, Beach Plum. Cp (MD, VA*?): ocean dunes and sandy coastal soils (from e. MD northward), disturbed dune-like area on shore of Chesapeake Bay (in e. VA); rare. Native from New Brunswick south to e. MD, along the coast; somewhat disjunct in e. VA in an ambiguously native occurrence. [= K; < *Prunus maritima* – C; = *Prunus maritima* – F, G]

* ***Prunus mume*** (Siebold) Siebold & Zuccarini, Japanese Apricot. Pd (NC): suburban forests; rare, native of s. Japan. April-March. Documented as naturalizing in Battle Park, University of North Carolina, Chapel Hill, where apparently spread from cultivation and reproducing as early as 1939. [= *Armeniaca mume* Siebold]

*? ***Prunus munsoniana*** W. Wight & Hedrick, Munson Plum. Pd (GA, NC, VA), Mt (VA): roadsides; rare. OH, IL, MO, and KS, south to MS and TX; disjunct (introduced?) in GA, NC, VA, and NJ. [= C, F, G, K, S, Z]

Prunus nigra Aiton, Canada Plum. Mt, Pd (VA): old fields, hedgerows, forest edges; uncommon. May; June. Newfoundland west to Manitoba, south to NY, OH, IN, IL, and IA; apparently disjunct in VA. [= C, F, G, K]

Prunus pensylvanica Linnaeus f., Fire Cherry, Pin Cherry. Mt (GA, NC, VA): high elevation forests, thickets at high elevations resulting from fire or logging; common (GA Special Concern). April-May; August-September. Newfoundland west to British Columbia, south to w. NC, n. GA, e. TN, IN, IL, IA, SD, and CO. [= RAB, C, F, G, W, Z; > *Prunus pensylvanica* var. *pensylvanica* – K; = *Prunus pennsylvanica* – S (an orthographic variant)]

* ***Prunus persica*** (Linnaeus) Batsch, Peach. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): roadsides, trash-heaps, disturbed thickets; commonly cultivated, commonly escaped or persistent (rare in FL), native of China. March-April; June-July. [= RAB, C, F, G, K, W, WH, Z; = *Amygdalus persica* Linnaeus – S]

Prunus serotina Ehrhart *var.* ***serotina***, Black Cherry. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): rich coves, bottomlands, northern hardwood forests, and in a wide variety of lower elevation habitats from dry to mesic, and weedy in fencerows; common. April-May; July-August. Nova Scotia west to ND, south to c. peninsular FL and e. TX. Several other varieties occur in sc. and sw. North America, from c. TX westwards. In the Piedmont and Coastal Plain, *P. serotina* is generally a small, scrubby tree of fencerows and an understory tree in forests and woodlands, but in the Mountains reaching large sizes and full canopy stature. [= K, WH; < *P. serotina* var. *serotina* – RAB; < *Prunus serotina* – C, F, G, W; < *Padus virginiana* – S, misapplied; = *Prunus serotina* ssp. *serotina* – Y, Z]

* ***Prunus serrulata*** Lindley, Japanese Flowering Cherry. Pd (NC): suburban forests; rare, native of Japan. [= K; = *Cerasus serrulata* (Lindley) Loudon]

* ***Prunus subhirtella*** Miquel, Higan Cherry, Weeping Higan Cherry, Winter-flowering Cherry. Pd (VA): floodplain forests in suburban areas; rare, native of e. Asia, commonly planted, rarely escaped, but locally invasive. [= K; > *P. subhirtella* var. *pendula* (Maximowicz); = *Cerasus subhirtella* (Miquel) S.Y. Sokolov]

Prunus susquehanae Willdenow, Appalachian Dwarf-cherry, Appalachian Sand Cherry, Susquehanna Cherry. Pd, Mt (NC, VA): open rocky or sandy sites; rare. Sw. ME and sw. Québec west to Manitoba, south to nc. and sw. NC, sc. TN (the Barrens region of the Eastern Highland Rim), and IL. Catling (1997) supports species status, based on the greater distinctions of this entity from the other three in the complex. [= F, X; = *Prunus pumila* Linnaeus var. *susquehanae* (Willdenow) H. Jaeger – RAB, K; = *Prunus pumila* var. *cuneata* (Rafinesque) L.H. Bailey – C, G; = *Prunus cuneata* Rafinesque – S; < *Prunus pumila* – W, Z]

Prunus umbellata Elliott, Hog Plum, Flatwoods Plum, Hog Plum. Cp (FL, GA, NC, SC), Pd (GA, NC, SC): upland, usually xeric, sandy or rocky forests and woodlands; common. March-April; August-September. S. NC, TN, and AR south to c. peninsular FL and TX. Fox, Godfrey, & Blomquist (1952) report *Prunus mitis* for s. NC (Cleveland County). [= *Prunus umbellata* Elliott var. *umbellata* – K; < *Prunus umbellata* – RAB, WH, Z; > *Prunus umbellata* – S; > *Prunus mitis* Beadle – S]

Prunus virginiana Linnaeus *var.* ***virginiana***, Choke Cherry. Mt (GA, NC, VA): forming clonal thickets in oak and northern hardwood forests; common, rare southward (GA Special Concern). Late April-June; July-August. Newfoundland and Labrador west to Manitoba, south to w. NC, n. GA, AR, and OK. Other varieties occur in w. North America. [= K, Z; < *Prunus virginiana* – RAB, C, F, G, W; = *Padus nana* (Du Roi) Roemer – S]

* *Prunus cerasifera* Ehrhart, Cherry-plum. Introduced at scattered locations; reported for TN, PA, NJ (Kartesz 1999). [= F, K]

Prunus mexicana S. Watson, Big-tree Plum, Mexican Plum. {Pd (GA, NC, SC), Cp (GA, SC): streamsides, upland forests, fencerows; rare (GA Special Concern). NC, OH, WI, IA, and SD, south to GA, AL, MS, LA, and TX.} [= C, G, K, S, Z; = *Prunus americana* Marshall var. *lanata* – F]

* *Prunus padus* Linnaeus, European Bird Cherry, is cultivated and rarely escaped at least as far south as se. PA (Rhoads & Klein 1993) and DE (Kartesz 1999). [= C, K]

Prunus pumila Linnaeus var. *depressa* (Pursh) Gleason, Prostrate Dwarf-cherry, Northern Sand Cherry. Sandy or gravelly shores and islands. South to s. PA (Rhoads & Klein 1993). [= C, G, K, X; *Prunus depressa* Pursh – F]

* *Prunus tomentosa* Thunberg, Nanking Cherry, Korean Cherry. Disturbed areas, suburban forests and woodlands. Naturalized at least as far south as MD and PA; native of Asia. April. [= K]

Pyracantha M.J. Roemer 1847 (Firethorn, Pyracantha)

A genus of about 10 species, shrubs, of s. Europe east to e. Asia. References: Lance in FNA (in prep.); Robertson (1974)=Z; Kalkman in Kubitzki (2004). Key based on FNA.

1 Leaf blades ovate to lanceolate or oblanceolate, margins finely crenulate-serrulate, apices acute; young twigs grayish pubescent ... ***P. coccinea***
1 Leaf blades obovate, oblong-obovate, oblong, or elliptic, margins remotely serrulate-crenulate or entire, apices obtuse, notched, or apiculate; young twigs brownish or rusty pubescent.
  2 Pedicels and hypanthia glabrate at flowering ... ***P. fortuneana***
  2 Pedicels and hypanthia pubescent.
    3 Leaf apices obtuse, apiculate, or aristate ... ***P. atalantioides***
    3 Leaf apices notched or truncate ... ***P. koidzumii***

* ***Pyracantha atalantioides*** (Hance) Stapf. {GA}; rarely escaped or persistent, native of China.

* ***Pyracantha coccinea*** M.J. Roemer, Scarlet Firethorn. Cp (GA, NC, SC, VA), Pd, Cp (GA, NC, SC): planted, persistent around old homesites, and rarely escaped to woodlands; rare, native of se. Europe and Asia Minor. [= K, Z; = *Cotoneaster pyracantha* (Linnaeus) Spach – F, S; = *Crataegus pyracantha* Linnaeus]

* ***Pyracantha fortuneana*** (Maximowicz) H.L. Li, Chinese Firethorn. Cp (FL), {AL, GA, NC}: planted, rarely escaped or persistent, native of China. May-July; October-December. [= K, WH; > *P. crenatiserrata* (Hance) Rehder]

* ***Pyracantha koidzumii*** (Hayata) Rehder, Formosan Firethorn. Cp (FL), Pd (GA, SC): planted, rarely escaped to woodlands, uncommon (rare in GA and SC), native of Taiwan. [= K, WH, Z]

Pyrus Linnaeus (Pear)

A genus of 10-20 species, trees and shrubs, of Eurasia and n. Africa. References: Robertson (1974)=Z; Kalkman in Kubitzki (2004). [also see *Aronia*, *Malus*, and *Sorbus*]

1 Fruit pyriform; flowers 2.5-3 cm across; leaves crenate; styles 5 ... ***P. communis***
1 Fruit subglobose; flowers either 2-2.5 cm or 3-3.5 cm across; leaves serrate; styles 2 or 5 (rarely 3 or 4).
  2 Fruit ca. 1 cm in diameter; styles 2 (-3) ... ***P. calleryana***
  2 Fruit 3-10 cm in diameter; styles (4-) 5 ... ***P. pyrifolia***

* ***Pyrus calleryana*** Decaisne, Bradford Pear, Callery Pear. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): planted and persistent; commonly cultivated, becoming an aggressive naturalizer in fields, roadsides, and disturbed areas from NC northward, commonly naturalized (uncommon in GA and SC, rare in FL), native of China. March-April. Its abundant naturalization in MD and n. VA suggests that this species has the potential to become a serious pest (see Nesom 2000c, Vincent 2005). [= K, WH]

* ***Pyrus communis*** Linnaeus, Common Pear. Mt, Pd, Cp (GA, NC, SC, VA): planted, persistent around old houses and in orchards; uncommon (rare in FL), native of Europe. April; August-October. [= RAB, C, F, G, K, S, WH, Z]
* ***Pyrus pyrifolia*** (Burmann f.) Nakai, Oriental Pear, Japanese Pear, Chinese Pear. Cp, Pd (VA): planted, persistent around old houses and in orchards; uncommon, native of Asia. April; August-October. [= F, K, Z]

Rhodotypos Siebold & Zuccarini 1841 (Jetbead)

A monotypic genus, a shrub, of Japan and China. References: Kalkman in Kubitzki (2004).

Identification notes: Distinguished by its opposite leaves and black, beadlke fruits.

* ***Rhodotypos scandens*** (Thunberg) Makino, Jetbead. Pd (NC, SC, VA): suburban woodlands, disturbed areas, roadsides, old house sites; rare, well established locally, native of e. Asia. Late March-May. [= C, F, G, K; ? *Rh. tetrapetalus* (Siebold) Makino]

Rosa Linnaeus 1753 (Rose)

A genus of more than 100 species, shrubs or woody vines; mainly of north temperate regions. Many cultivars cannot be readily identified to species. References: Joly & Bruneau (2007)=Y; Robertson (1974)=Z; Kalkman in Kubitzki (2004). Key adapted in part from Y.

Key to section *Cinnamomeae*

1 Hypanthium glabrous.
  2 Long and straight prickles present throughout the stems ..... ***[R. acicularis]***
  2 Prickles absent from the stems, or present and short or curved.
    3 Infrastipular prickles stout and broad-based ..... ***R. virginiana***
    3 Infrastipular prickles absent or not especially stout or broad-based.
      4 Lower leaf surface with generally < 2 hairs per mm²; infrastipular prickles always absent on new stems; bristles always present on new stems; leaflets 7-9 ..... ***R. arkansana***
      4 Lower leaf surface with generally >2 hairs per mm²; infrastipular prickles present or absent on new stems; bristles generally absent on new stems; leaflets 5-7 ..... ***R. blanda***
1 Hypanthium with glands.
  5 Bristles present on new branches.
    6 Infrastipular prickles absent ..... ***R. arkansana***
    6 Infrastipular prickles present ..... ***R. carolina***
  5 Bristles absent on new branches.
    7 Hypanthium typically with > 86 glands; terminal leaflet oblong, generally with > 20 small teeth per side ..... ***R. palustris***
    7 Hypanthium typically with < 86 glands; terminal leaflet ovate, elliptic, or obovate, generally with < 20 small teeth per side
      8 Bristles present or absent on new stems; auricles < 3.8 mm long; stipules < 1.1 mm wide; infrastipular prickles slender and not especially broad-based or curved ..... ***R. carolina***
      8 Bristles absent on new stems; auricles > 3.8 mm long; stipules > 1.1 mm wide; infrastipular prickles stout, broad-based, and often curved ..... ***R. virginiana***

*? ***Rosa arkansana*** Porter. Mt (NC): {habitat}; rare. Reported from North Carolina portion of the Great Smoky Mountains National Park. [= C, Y; > *R. arkansana* var. *suffulta* (Greene) Cockerell – F, K]
Rosa blanda Aiton, Smooth Rose, Meadow Rose. Pd (VA): {habitat}; rare. Also south to s. PA (Rhoads & Klein 1993), MD, and WV (Kartesz 1999). [= C, F, G, Y; > *R. blanda* var. *blanda* – K]
* ***Rosa bracteata*** J.C. Wendland, McCartney Rose, Chickasaw Rose. Cp (FL), Pd (GA, NC, SC, VA): disturbed areas, suburban borders; uncommon (rare in GA, NC, SC, VA), persistent after cultivation, introduced. May-November; July-November. [= RAB, C, F, G, K, S, WH, Z]
* ***Rosa canina*** Linnaeus, Dog Rose. Mt (NC, VA), Pd, Cp (VA): pastures; rare, introduced. May-June; September-October. [= RAB, C, F, G, K, S, W, Z]
Rosa carolina Linnaeus, Carolina Rose. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): upland forests, woodlands, pastures, roadsides; common (rare in FL). May-June; August-October. New Brunswick and Ontario south to FL and TX. [= RAB, C, G, W, Y, Z; > *R. carolina* var. *carolina* – F, K; > *R. carolina* var. *grandiflora* (Baker) Rehder – F; > *R. carolina* var. *villosa* (Best) Rehder – F; > *R. carolina* – S; > *R. lyoni* Pursh – S; > *R. serrulata* Rafinesque – S]
* ***Rosa cinnamomea*** Linnaeus, Cinnamon Rose. {VA} Reported for VA (Kartesz 1999). {investigate} [= F, G, K, Z; ? *R. majalis* Herrm. – C]
* ***Rosa damascena*** P. Miller, Damask Rose. Mt (NC): disturbed areas; rare, persistent after cultivation, introduced. May-June; September-October. [= RAB; *R.* ×*damascena* P. Miller (pro sp.) – K]
* ***Rosa gallica*** Linnaeus, French Rose. Mt (NC, VA), Pd (SC, VA): disturbed areas; rare, introduced. May-June; September-October. [= RAB, C, F, G, K, Z]
* ***Rosa laevigata*** Michaux, Cherokee Rose. Cp (FL, GA, NC, SC): roadsides, moist forests; common (rare in NC), native of China. Late March-April; September-October. [= RAB, K, S, WH, Z]

* ***Rosa micrantha*** Borrer ex J.E. Smith, Eglantine Rose. Mt, Pd (NC, SC, VA), Cp (NC, VA): pastures, streambanks, thickets; uncommon, introduced. May-June; September-October. [= RAB, C, F, G, K, S, W, Z]

* ***Rosa multiflora*** Thunberg ex Murray, Multiflora Rose. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): pastures, thickets, bottomlands, upland forests, bogs; common (uncommon in FL), native of Asia, aggressively invasive. May-June; September-October. [= RAB, C, F, G, K, S, W, WH, Z]

Rosa palustris Marshall, Swamp Rose. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): swamp forests, bogs, streamsides; common. May-July; September-October. New Brunswick and Ontario south to c. peninsular FL, MS, and AR. [= RAB, C, F, G, GW, K, W, WH, Y, Z; > *R. palustris* – S; > *R. floridana* Rydberg – S]

* ***Rosa rubiginosa*** Linnaeus, Eglantine Rose, Sweetbriar Rose. Mt (GA, NC, VA), Cp (SC), Pd (GA, VA): pastures, disturbed areas; rare, introduced. Late May-June; September-October. Brummitt (2005) rejected the name *R. eglanteria* for *R. rubiginosa* [= S; = *R. eglanteria* Linnaeus – RAB, C, F, G, K, W, Z]

* ***Rosa rubrifolia*** Villars, Red-leaf Rose. {SC} Reported for SC (Kartesz 1999). [= K]

* ***Rosa rugosa*** Thunberg, Japanese Rose, Rugosa Rose. Cp, Pd (VA): cultivated and occasionally escaped; rare, native of Asia. [= C, F, G, K, Z]

Rosa setigera Michaux, Prairie Rose. Mt (GA, NC, VA), Cp (FL, NC, SC), Pd (GA): stream banks, pastures; rare, nativity uncertain. May-June; September-October. [= RAB, C, S, W; > *R. setigera* var. *setigera* – F, G, K, Z; > *R. setigera* var. *tomentosa* Torrey & A. Gray – F, G, K, Z]

* ***Rosa spinosissima*** Linnaeus, Scotch Rose. Mt (VA): cultivated and rarely escaped; rare, introduced. [= F, G, K; > *R. pimpinellifolia* Linnaeus – C]

* ***Rosa tomentosa*** J.E. Smith. {NC} [= C, F, K, S]

Rosa virginiana P. Miller, Virginia Rose. Mt, Pd, Cp (VA), {GA, NC}: moist to dry forests and woodlands; uncommon (rare south of VA). May-June; August-October. Newfoundland and Ontario south to GA, AL, and MO. C. TN (Chester, Wofford, & Kral 1997), e. and c. KY (Clark et al. 2005). [= C, F, G, S, W, Y, Z; > *R. virginiana* var. *virginiana* – K]

* ***Rosa wichuraiana*** Crépin, Memorial Rose, Dorothy Perkins Rose. Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA), Mt (VA): roadbanks, railroad embankments, disturbed areas; uncommon, introduced. May-June; September-October. See Duncan (1985) for documentation for GA. [= C, F, G, K, W, WH, Z; = *R. wichuriana* – RAB, orthographic variant]

* ***Rosa xanthina*** Lindley, Yellow Rose. Reported for SC (Kartesz 1999). {investigate} [= K]

Rosa acicularis Lindley ssp. *sayi* (Schweinitz) W.H. Lewis, Prickly Rose. South and east to WV (Cronquist 1991, Kartesz 1999). [= K; = *R. acicularis* var. *bourgeauiana* (Crépin) Crépin – C, F; < *R. acicularis* – G, Y]

* *Rosa dumetorum* Thuill. Introduced in KY. [= K]

* *Rosa moschata* J. Herrmann, Musk Rose. Introduced in AL. [= K, S]

Rosa obtusiuscula Rydberg. Endemic to Tennessee? [= K, S]

Rubus Linnaeus 1753 (Blackberry, Raspberry, Dewberry, Wineberry, Bramble)

A genus of about 250 species (if treated conservatively) or 2000-3000 microspecies, shrubs (and a few herbs), almost cosmopolitan in temperate areas. References: Robertson (1974)=Z; Alice & Campbell (1999); Widrlechner (1998); Kalkman in Kubitzki (2004).

Identification Notes: All of our species of *Rubus* except *R. odoratus* have biennial stems. The first year the stems remain sterile and are termed **primocanes**. The second year, these stems produce lateral branches with flowers and are termed **floricanes**. Primocane and floricane leaves differ.

1 Leaves palmately lobed; petals deep pink; [subgenus *Anoplobatus* – **flowering raspberries**] ..... ***R. odoratus***
1 Leaves 3-9-foliolate (reduced simple leaves may also be present in the inflorescence); petals white or pale pink (rarely red).
  2 Fruit separating from the receptacle, the receptacle remaining on the pedicel; stems either strongly white-glaucous (*R. occidentalis*), or densely beset with slender-based prickles and bristles (*R. idaeus*), or densely pubescent with 3-5 mm long glandular hairs (*R. phoenicolasius*), or if not as above then the leaves pinnately 5-9-foliolate (*R. illecebrosus*); [subgenus *Idaeobatus* – **raspberries**].
    3 Floricane leaves pinnately 5-9-foliolate ..... ***R. illecebrosus***
    3 Floricane leaves 1-3-foliolate.
      4 Inflorescence paniculiform, many-flowered; berries sticky, purplish-red, lacking a glaucous bloom ..... ***R. phoenicolasius***
      4 Inflorescence corymbiform, few-flowered; berries not sticky, black or red (rarely purplish or yellow), with a glaucous bloom.
        5 Fruit black (rarely yellow); pedicels with stout curved prickles; stems (at least the primocanes) strongly white-glaucous ..... ***R. occidentalis***
        5 Fruit red (rarely purple or yellow); pedicels with narrow straight bristles and sometimes also glandular hairs; stems green.
          6 Inflorescence without glandular hairs or gland-tipped bristles; [alien, cultivated, sometimes escaped or persistent] ..... ***R. idaeus var. idaeus***
          6 Inflorescence with glandular hairs and gland-tipped bristles; [native in Mountains of NC and VA] ..... ***R. idaeus var. strigosus***
  2 Fruit retaining the receptacle; stems or leaves not as described above, except if beset with slender-based prickles and bristles then also < 1 m tall; [subgenus *Rubus* – **blackberries and dewberries**].
    7 Canes very coarse, scrambling, often 2-3 m long, heavily armed; inflorescence cymose-paniculate; branches and pedicels of the floricanes armed with strong, flattened prickles (or nearly straight in *R. bifrons*); [alien, generally in disturbed habitats]; [**alien blackberries**].
      8 Leaves compound, the leaflets additionally laciniately divided; leaves green beneath ..... ***R. laciniatus***
      8 Leaves compound, the leaflets toothed; leaves grayish-tomentose beneath.
        9 Prickles nearly straight; stems glabrescent; petals pale pink to red ..... ***R. bifrons***
        9 Prickles recurved; stems canescent above; petals white to pale pink ..... ***R. discolor***

7 Canes delicate to coarse, arching or trailing, 0-4 m long, unarmed to strongly armed; inflorescence racemiform; branches and pedicels of the floricanes generally unarmed; [native, though often in disturbed habitats].
10 Primocanes prostrate, creeping, or low-arching, rooting at the tip or also at the nodes; **[dewberries]**.
11 Stems primarily armed with narrow-based prickles or even narrower bristles, with or without stout-based prickles as well.
12 Inflorescence racemiform; bristles of the stem nonglandular (very small glandular hairs may be present)..... ***R. hispidus***
12 Inflorescence reduced, normally to a single flower per branch of the floricane ..... ***R. trivialis***
11 Stems armed with stout-based, usually recurved prickles, bristles lacking.
13 Inflorescence racemiform, all of the several flowers subtended by stipules only (or the lowermost subtended by a leaf)..... ***R. recurvicaulis***
13 Inflorescence with all of the 1-several flowers subtended by simple or trifoliolate leaves.
14 Trifoliolate leaves of the floricanes with the terminal leaflet oblanceolate to obovate, the base cuneate, the tip obtuse or very shortly acuminate ..... ***R. enslenii***
14 Trifoliolate leaves of the floricanes with the terminal leaflet ovate, the base broadly rounded to subcordate, the tip sharply acute to long acuminate..... ***R. flagellaris***
10 Primocanes erect, ascending, or high-arching, not rooting; **[native blackberries]**.
15 Canes armed primarily with bristles or slender-based prickles..... ***R. setosus***
15 Canes armed with heavy, stout-based, often recurved, prickles (or the canes essentially unarmed, the broad-based prickles few or almost absent).
16 Pubescence of the inflorescence rachis and pedicels predominantly gland-tipped; glandular hairs often present also on the young primocanes and the branches of the floricanes ..... ***R. allegheniensis***
16 Pubescence of the inflorescence rachis and pedicels nonglandular (or with a very few gland-tipped hairs intermixed); glandular hairs absent elsewhere.
17 Leaflets oblanceolate to obovate, definitely wider beyond the middle, generally obtuse or rounded at the tip; leaves densely white- or gray-tomentose beneath; [primarily of the Coastal Plain] ..... ***R. cuneifolius***
17 Leaflets lanceolate to ovate, widest below or near the middle, generally acute or acuminate at the tip; leaves glabrous to pubescent beneath, but the pubescence not notably tight and white or gray; [collectively widespread].
18 Leaves of the primocanes with the terminal leaflet cuneate at the base, mostly 1.8-2.5× as long as wide ..... ***R. argutus***
18 Leaves of the primocanes with the terminal leaflet rounded to cordate at the base, mostly 1.1-2.0× as long as wide.
19 Leaves glabrous (or very nearly so) beneath; canes with few and weak prickles..... ***R. canadensis***
19 Leaves softly pubescent beneath; canes with many and strong prickles..... ***R. pensilvanicus***

Rubus allegheniensis Porter, Allegheny Blackberry. Mt (GA, NC, VA), Pd (NC, VA): forests, woodlands, grassy balds; common. May-June; July. Nova Scotia west to MN, south to w. NC, n. GA, and e. TN. [= RAB, C, G, W; > *R. allegheniensis* var. *allegheniensis* – F, K; > *R. allegheniensis* var. *gravesii* Fernald – F, K; > *R. alumnus* Bailey – F, K; > *R. reravus* Bailey – F; ? *R. nigrobaccus* Bailey – S]

Rubus argutus Link, Southern Blackberry. Cp, Pd, Mt (GA, NC, SC, VA): roadsides, thickets, clearcuts, disturbed areas, pastures; common. April-May; late May-July. MA west to MO, south to FL and TX. The most common "highbush" blackberry in most of our area. [= C, G, GW; > *R. argutus* – RAB, K, S; > *R. betulifolius* Small – RAB, S; > *R. argutus* – F; > *R. blakei* Bailey – F; > *R. fatuus* Bailey – F; > *R. immanis* Bailey – K; > *R. jugosus* Bailey – F; > *R. louisianus* Berger – F; < *R. argutus* – W (also see *R. pensilvanicus*)]

* ***Rubus bifrons*** Vest ex Trattinick. Cp, Pd, Mt (NC, SC, VA), {GA}: disturbed areas, roadsides, thickets; common, native of Europe. May-June; late June-July. [= RAB, C, F, G, K, W]

Rubus canadensis Linnaeus, Smooth Blackberry, Thornless Blackberry. Mt (GA, NC, SC, VA): forests, woodlands, grassy balds, especially common at high elevations; common. June-July; July-August. Newfoundland west to MN, south (primarily in the Appalachians) to w. NC, e. TN, and n. GA. [= RAB, C, G, S, W; > *R. canadensis* – F, K]

Rubus cuneifolius Pursh, Sand Blackberry. Cp, Pd (GA, NC, SC, VA), Mt (VA): woodlands, forests, disturbed areas; common (rare in Mountains). Late April-early June; June-July. CT and NY (Long Island) south to FL and AL, primarily on the Coastal Plain. [= RAB, C, G, GW, S, W; > *R. cuneifolius* var. *cuneifolius* – F; > *R. cuneifolius* var. *subellipticus* Fernald – F; > *R. cuneifolius* – K; > *R. longii* Fernald – F, K; > *R. probabilis* Bailey – K; > *R. sejunctus* Bailey – F]

* ***Rubus discolor*** Weihe & Nees, Himalaya-berry. Cp, Pd (NC?, SC?, VA): disturbed areas, thickets; uncommon, native of Europe. [= C, K; = *R. procerus* P.J. Mueller – F; ? *R. linkianus* Seringe – S, misapplied?]

Rubus enslenii Trattinick, Southern Dewberry. {Cp, Pd, Mt (NC, SC, VA), {GA}: roadsides, disturbed areas; uncommon? {phenology} S. ME west to s. WI, south to GA and LA.} [= C, G, S; < *R. flagellaris* – RAB, W; > *R. enslenii* – F; > *R. akermani* Fernald – F; > *R. cathartium* Fernald – F; > *R. celer* Bailey – F, K; > *R. clarus* Bailey – F, K; > *R. cordifrons* Bailey – F; > *R. deamii* – K; > *R. decor* Bailey – F; > *R. felix* Fernald – F; > *R. flagellaris* – K; > *R. hypolasius* Fernald – F; > *R. imperiorum* Fernald – F; > *R. iniens* Bailey – F, K; > *R. leviculus* Bailey – F, K; > *R. longipes* Fernald – F; > *R. nefrens* Bailey – F, K; > *R. obvius* Bailey – F, K; > *R. particularis* Bailey – F, K; > *R. pernagaeus* Fernald – F, K; > *R. rosagnetis* Bailey – F; > *R. scambens* Bailey – F, K; > *R. sewardianus* – F, K; > *R. subinnoxius* Fernald – F; > *R. tetricus* Bailey – F; > *R. whartoniae* Bailey – F, K]

Rubus flagellaris Willdenow, Northern Dewberry. Cp, Pd, Mt (NC, SC, VA), {GA}: old fields, woodlands, roadsides, disturbed areas; common. April-May; May-July. Québec west to MN, south to GA and AR. [= C, G; < *R. flagellaris* – RAB, W (also see *R. enslenii*); > *R. flagellaris* – F, K, S; > *R. baileyanus* Britton – F, K, S; > *R. depavitus* Bailey – F, K; > *R. injunctus* Bailey – F; > *R. invisus* (Bailey) Britton – F, K, S; > *R. jaysmithii* – F, K; > *R. kentuckiensis* Bailey – F; > *R. plexus* Fernald – F, K; > *R. redundans* Bailey – F; > *R. roribaccus* (Bailey) Rydberg – F, K; > *R. temerarius* Bailey – F, K]

Rubus hispidus Linnaeus, Swamp Dewberry. Cp (NC, SC, VA), Mt, Pd (NC, VA): bogs, moist woodlands and forests, disturbed moist areas; common. May-June; June-July. Nova Scotia and Québec west to WI, south to n. SC and MO. [= RAB, C, G, GW, S, W; > *R. ambigens* Fernald – F; > *R. davisiorum* Bailey – F; > *R. hispidus* – K; > *R. hispidus* var. *hispidus* – F; > *R. hispidus* var. *obovalis* (Michaux) Fernald – F; > *R. huttonii* Bailey – F; > *R. paganus* Bailey – K; > *R. porteri* Bailey – F, K;

> *R. tardatus* Blanchard – F, K; > *R. vagulus* Bailey – F; > *R. vegrandis* Bailey – F; > *R. vigil* Bailey – F; > *R. zaplutus* Bailey – F]

* ***Rubus idaeus*** Linnaeus *var.* ***idaeus***, Cultivated Red Raspberry. Mt (NC, VA): disturbed areas; rare (commonly cultivated in the cooler portions of our area, rarely escaped or persistent), native of Eurasia. June-August; July-September. [= C, F; = *R. idaeus* – G; = *R. idaeus* ssp. *idaeus* – K]

Rubus idaeus Linnaeus *var.* ***strigosus*** (Michaux) Maximowicz, Red Raspberry. Mt (NC, VA): high elevation forests and thickets, adelgid-killed spruce-fir forests; rare. June-August; July-September. The species is circumboreal; var. *strigosus* ranges from Newfoundland west to AK, south to PA, IN, IA, and AZ; disjunct further south in nw. VA and ne. WV, and in w. NC and e. TN. [= C; > *R. idaeus* Linnaeus var. *canadensis* (Richardson) House – RAB, F; > *R. idaeus* var. *strigosus* – F; = *R. strigosus* Michaux – G; = *R. idaeus* ssp. *strigosus* (Michaux) Focke – K; > *R. carolinianus* Rydberg – S; > *R. idaeus* ssp. *sachalinensis* (Levl.) Focke – W; > *R. idaeus* ssp. *melanolasius* Focke var. *canadensis* – Z]

* ***Rubus illecebrosus*** Focke, Strawberry-raspberry. Mt (NC), {VA?}: disturbed areas; rare, native of Japan. [= RAB, C, F, G, K]

* ***Rubus laciniatus*** Willdenow, Cut-leaved Blackberry, Evergreen Blackberry. Mt, Pd (NC, SC, VA): disturbed areas, thickets; rare, native of Europe. May-June; June-July. [= RAB, C, F, K, W]

Rubus occidentalis Linnaeus, Black Raspberry, Blackcap. Mt, Pd, Cp (NC, SC, VA), {GA}: roadsides, woodlands, thickets, disturbed areas; common (increasingly rare southward in our area; much more common in VA than in NC, and rare in n. SC). Late April-early June; June-July. Québec to e. CO, south to n. GA and AR. [= RAB, C, F, G, K, S, W, Z]

Rubus odoratus Linnaeus, Flowering Raspberry. Mt (GA, NC, VA): moist roadsides, thickets, and forests; common. June-August; July-October. Nova Scotia west to MI, south to w. NC, n. GA, and e. TN. [= RAB, C, G, W, Z; > *Rubus odoratus* var. *odoratus* – F, K; > *Rubus odoratus* var. *columbianus* Millspaugh – F, K; = *Rubacer odoratum* (Linnaeus) Rydberg – S]

Rubus pensilvanicus Poiret, Pennsylvania Blackberry. Cp, Pd, Mt (NC?, VA), {SC?}: roadsides, thickets, woodlands; common. April-May; late May-July. ME west to MN, south to VA (NC?, SC?), IN, and MO. [> *R. pensilvanicus* – C, F, K; > *R. barbarus* Bailey – F; > *R. condensiflorus* Bailey – F; > *R. congruus* Bailey – F; > *R. cupressorum* Fernald – F; > *R. defectionis* Fernald – F, K; > *R. dissitiflorus* Fernald – F; > *R. floricomus* Blanchard – F, K; > *R. floridus* Tratt. – F, S; > *R. frondosus* Bigelow – F, K; > *R. laudatus* Berger – K; > *R. libratus* Bailey – F; > *R. orarius* Blanchard – C; > *R. pauxillus* Bailey – F, K; > *R. pergratus* Blanchard – K; > *R. praepes* Bailey – F; > *R. recurvans* Blanchard – F, K; > *R. rosarius* Bailey – K; > *R. subsolanus* Bailey – F; > *R. pensilvanicus* – G; > *R. ostryifolius* Rydberg – G]

* ***Rubus phoenicolasius*** Maximowicz, Wineberry. Mt, Pd (NC, SC, VA), Cp (VA), {GA}: roadsides, thickets; common, native of e. Asia. May-June; June-July. [= RAB, C, F, G, K, S, W]

Rubus recurvicaulis Blanchard. Mt (NC?, VA): {moist areas; uncommon? {phenology} Nova Scotia west to MN, south to MD, NC?, and IN. [= C; > *R. boyntoni* Ashe – F, orthographic variant; > *R. boyntonii* Ashe – K; *R. cordifrons* Bailey – F; *R. grimesii* Bailey – F, K; > *R. recurvicaulis* – F; > *R. arundelanus* Blanchard – G]

Rubus setosus Bigelow, Bristly Blackberry. (VA): {habitat not known}; rare? {phenology} Québec west to WI, south to VA and IL. [= C, G; > *R. angustifoliatus* Bailey – F; > *R. benneri* Bailey – F; > *R. elegantulus* Blanchard – K; > *R. nocivus* Bailey – F; > *R. racemiger* Bailey – F, K; > *R. semisetosus* Blanchard – F, K; > *R. setosus* – F, K]

Rubus trivialis Michaux, Southern Dewberry, Coastal Plain Dewberry. Cp, Pd (GA, NC, SC, VA), Mt (GA, NC, SC): roadsides, old fields, thickets, disturbed areas; common (rare in Mountains). March-April; late April-May. E. MD south to FL, west to TX, north in the interior to MO. [= RAB, C, F, G, GW, K, W; > *R. trivialis* – S; > *R. lucidus* Rydberg – S]

Rubus pubescens Rafinesque, Dwarf Blackberry, ranges south to WV and s. PA (Rhoads & Klein 1993). [= C; > *R. pubescens* var. *pubescens* – F, K]

Sanguisorba Linnaeus 1753 (Burnet)

A genus of 15 or more species, herbs, of Eurasia, n. Africa, and North America. References: Robertson (1974)=Z; Nordborg (1966, 1967)=Y; Kalkman in Kubitzki (2004). [also see *Poteridium* and *Poterium*]

1 Leaflets pinnatifid (each leaflet incised nearly to the midvein).....***[Poteridium annuum]***
1 Leaflets toothed (the incisions not nearly to the midvein).
  2 Leaflets 3-10 cm long; inflorescence 6-30 cm long, spike-like; stamens 4 per flower, the filaments 8-10 mm long; sepals white (sometimes fading greenish); [native].....***Sanguisorba canadensis***
  2 Leaflets 0.8-2 cm long; inflorescence 1-2 cm long, globose; stamens 15-20 per flower, the filaments 3-4 mm long; sepals green to pinkish-purple; [cultivated, occasionally escaped].....***[Poterium minor ssp. muricata]***

Sanguisorba canadensis Linnaeus, Canada Burnet, American Burnet, White Burnet. Mt (GA, NC, SC, VA): fens, seepage over mafic or ultramafic rocks (such as amphibolite, greenstone, serpentinite), spray zones around waterfalls; rare (GA Threatened, NC Rare, VA Rare). Late July-September. Newfoundland and Labrador west to Manitoba, south to NJ, PA, OH, and IN; disjunct southward in KY, nc. VA, and from sw. VA south to sw. NC, ne. TN, and ne. GA. First reported for SC by Hill & Horn (1997) and Hill (1999). [= RAB, C, F, G, GW, K, S, W, Z]

Sibbaldiopsis Rydberg 1901 (Mountain-cinquefoil)

A genus of several species, subshrubs, of northern North America and ne. Asia; most closely related to *Sibbaldia*. Molecular phylogenetic studies indicate that this genus is more closely related to *Alchemilla, Aphanes, Dasiphora, Drymocallis, Fragaria*, and other genera outside our area than to *Potentilla* (Eriksson et al. 2003). References: Eriksson, Donoghue, & Hibbs (1998); Eriksson et al. (2003); Kalkman in Kubitzki (2004).

Sibbaldiopsis tridentata (Aiton) Rydberg, Mountain-cinquefoil, Three-toothed Cinquefoil, Mountain White Potentilla, Wine-leaf Cinquefoil. Mt (GA, NC, VA): grassy balds, crevices of rock outcrops at high (rarely moderate) elevations, high elevation glades; rare, though sometimes locally abundant (GA Endangered, NC Watch List, VA Rare). June-August; July-September. Greenland and Newfoundland west to Northwest Territories, south to ND, IA, WI, MI, s. Ontario, and Nova Scotia, and in the mountains to w. VA, ne. TN, and ne. GA (at progressively higher elevations southward). Showy in flower, and also in leaf from late summer on, when the leaves tend to turn a rich burgundy red. Though appearing herbaceous, *S. tridentata* is really an evergreen sub-shrub. [= K, S; = *Potentilla tridentata* Aiton – RAB, C, F, G, W]

Sorbaria (Seringe) A. Braun 1860

A genus of 4 species, shrubs, of c. and e. Asia. References: Kalkman in Kubitzki (2004)

* *Sorbaria sorbifolia* (Linnaeus) A. Braun, False Spiraea, an Asian shrub, is cultivated and naturalized at least as far south as s. PA (Rhoads & Klein 1993) and WV. Reports of it in VA (Massey 1961, repeated in Kartesz 1999) are apparently based only on cultivated plants. [= C, F, G, K]

Sorbus Linnaeus (Mountain-ash, Rowan)

A genus of about 250 species, trees and shrubs, of mainly temperate Northern Hemisphere. References: McAllister (2005)=Y; Jones (1939)=Z; Aldasoro et al. (2004). [also see *Aronia*]

1 Branches and lower leaf surfaces glabrous (or inconspicuously and sparsely pubescent); winter buds glutinous; [native tree] ..... ***S. americana***
1 Branches and lower leaf surfaces densely white-villous; winter buds white-villous; [introduced tree]..... ***[S. aucuparia ssp. aucuparia]***

Sorbus americana Marshall, Mountain-ash, American Rowan. Mt (GA, NC, VA), Pd (NC): high elevation forests, balds, and high elevation rock outcrops, often with *Picea, Abies*, and/or *Betula alleghaniensis*; common (rare in Piedmont) (GA Rare). June-July; September-October (persisting well into winter). Newfoundland west to MN, south to PA, w. NC, e. TN, ne. GA, and n. IL. This small-to-medium tree is showy in most seasons; in the summer its creamy-white corymbs are attractive, the leaves turn a bright orange-red in fall, and the red berries persist well into winter. [= RAB, C, G, K, S, W, Y, Z; = *Pyrus americana* (Marshall) A.P. de Candolle – F]

* *Sorbus aucuparia* Linnaeus ssp. *aucuparia*, Rowan, European Mountain-ash, occurs as a planted tree and escape (sometimes appearing naturalized), south to s. PA (Rhoads & Klein 1993), MD, DE, WV (Kartesz 1999), and DC (Jones 1939). Also reported for SC by Kartesz (1999), supposedly based on Jones (1939), but Jones (1939) does not mention SC in his account of *S. aucuparia*. [= Y ; < *S. aucuparia* – C, G, K, Z; < *Pyrus aucuparia* (Linnaeus) Gaertner – F]

Spiraea Linnaeus 1753 (Spiraea, Meadowsweet, Hardhack)

A genus of about 80 species, shrubs, of north temperate areas (especially Asia). References: Robertson (1974)=Z; Rehder (1940); Uttal (1974); Kalkman in Kubitzki (2004).

1 Inflorescence a simple umbel; flowers white; [section *Chamaedryon*]; [introduced].
  2 Umbels sessile, 3-6-flowered; leaves 2-5 cm long, ovate, finely serrulate..... ***S. prunifolia***
  2 Umbels peduncled, many-flowered; leaves 1.5-3.5 cm long, obovate, coarsely serrate..... ***S. ×vanhouttei***
1 Inflorescence a compound corymb or panicle; flowers white, pink, or red; [native or introduced].
  3 Inflorescence a corymb, flat-topped or rounded, broader than long; [section *Calospyra*].
    4 Leaves rounded, obtuse, or acute at the apex; petals white (rarely pink); [native].
      5 Follicle 2-3 mm long; leaves 1-2× as long as wide, rounded or obtuse at apex, rounded at base; plants 3-8 (-10) dm tall; [of dry or moist forested slopes, or thin soil on rock outcrops, rarely of streambanks]..... ***S. corymbosa***
      5 Follicle 1-2 mm long; leaves 2-4× as long as wide, acute at apex, cuneate at base; plants 4-25 dm tall; [of rocky riverbanks] ..... ***S. virginiana***
    4 Leaves long-acuminate at the apex; petals pink (rarely white or red); [introduced].
      6 Leaves pubescent on the veins beneath; flowers usually pink (rarely white); shrub to 15 dm tall ..... ***S. japonica var. fortunei***
      6 Leaves glabrous; flowers usually white (rarely pink); shrub to 8 dm tall ..... ***S. ×bumalda***
  3 Inflorescence a panicle, longer than broad; [section *Spiraea*].
    7 Lower leaf surface densely tomentose with white, tawny, or rusty tomentum which obscures the surface.
      8 Follicles pubescent; [native, common in boggy wetlands] ..... ***S. tomentosa***
      8 Follicles glabrous; [introduced, rare] ..... ***S. ×billiardii***
    7 Lower leaf surface glabrous or with a few scattered hairs that do not obscure the surface.
      9 Leaves lanceolate to oblong-lanceolate, widest at or below the middle; flowers pink; [introduced, rarely escaped or persisting]..... ***S. salicifolia***

9 Leaves oblanceolate to obovate or oblong, widest above or at the middle; flowers white (rarely slightly pink); [native, of bogs, stream-banks, swampy areas, or moist to dry rocky areas].
  10 Leaves 3-5 (-8)× as long as wide, finely and sharply toothed; inflorescence, hypanthium, and sepals pubescent; sepals usually obtuse; twigs yellow-brown to brown ..... ***S. alba***
  10 Leaves 2-3× as long as wide, coarsely and bluntly toothed; inflorescence, hypanthium, and sepals usually glabrous or nearly so; sepals usually acute; twigs red-brown to purple-brown ..... ***S. latifolia***

Spiraea alba Du Roi, Narrowleaf Meadowsweet. Mt (NC, VA), Pd (VA): bogs, boggy streambanks, seepages; uncommon (NC Watch List). June-September; August-October. Ranging from Québec west to Alberta, south to NC, IN, and MO. There is considerable disagreement over whether *S. alba* and *S. latifolia* represent two species with some introgression in areas of overlap, two varieties, or a variable or clinal species. [= F, G, S, W, Z; = *S. alba* var. *alba* – RAB, C, GW, K]

* ***Spiraea ×billiardii*** Herincq [*S. douglassii ×salicifolia*]. Mt (NC, VA): cultivated, escaped or persisting; rare, introduced from cultivation, one parent from w. North America, one from Eurasia. [= K]

* ***Spiraea ×bumalda*** Burven [*S. albiflora ×japonica*]. Pd (VA): cultivated, escaped or persisting; rare, native of cultivation, both parents from Asia. [= K]

Spiraea corymbosa Rafinesque, Dwarf Spiraea, Rock Spiraea. Mt, Pd (NC, VA), {GA?}: rocky forests and woodlands, granitic domes, dry slopes of Piedmont monadnocks, rocky slopes in partial sun; common, rare in NC (NC Rare). June-August; August-October. A Southern and Central Appalachian endemic: sc. PA and w. MD south through w. VA, e. WV, to nw. NC, and perhaps also to e. TN (?), to n. AL(?), apparently fairly common only in w. VA. The species is limited to only a few counties each of NC and WV (Franklin 2004, Strausbaugh & Core 1978), and is not listed for TN in Chester, Wofford, & Kral (1997). Although Mohr (1901) listed the species for AL, it is not listed as a part of the state's woody flora by Clark (1971). *S. corymbosa* is closely related to *S. lucida* Douglas ex Greene [= *S. betulifolia* var. *lucida* (Douglas ex Greene) C.L. Hitchcock] of the Rocky Mountains, *S. betulifolia* [= *S. betulifolia* var. *betulifolia*] of ne. Asia (Japan, e. Siberia, ne. China, Sakhalin, and the Kurile Islands, and *S. aemiliana* Schneider [= *S. betulifolia* var. *aemiliana* (Schneider) Koidz.]. The group is often treated as 4 varieties or subspecies of *S. betulifolia*, but the morphological differences and strongly disjunct distribution seem to warrant treatment as a relictual complex of related species. See Uttal (1974), Greene (1892), and others listed in Robertson (1974) for additional discussion and a range of conclusions. [= F, S; < *S. betulifolia* – RAB; = *S. betulifolia* Pallas var. *corymbosa* (Rafinesque) Maximowicz – C, G, K, W, Z; = *S. betulifolia* ssp. *corymbosa* (Rafinesque) Taylor & MacBryde]

* ***Spiraea japonica*** Linnaeus f. *var.* ***fortunei*** (Planchon) Rehder, Japanese Spiraea. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): roadsides, woodland borders, old home-sites; uncommon, native of Japan and China. June-July; July-August. [= K; < *S. japonica* – RAB, C, F, G, W, Z]

Spiraea latifolia (Aiton) Burkhart, Broadleaf Meadowsweet. Mt (NC, VA), Pd, Cp (VA): bogs, seeps, and rock outcrops (glades) over amphibolite, greenstone, olivine, and granite; uncommon (GA Rare, NC Watch List). June-September; August-October. Newfoundland west to MI, south to w. NC. [= G, S, W, Z; = *S. alba* var. *latifolia* (Aiton) Dippel – RAB, C, GW, K; > *S. latifolia* var. *latifolia* – F; > *S. latifolia* var. *septentrionalis* Fernald – F]

* ***Spiraea prunifolia*** Siebold & Zuccarini, Bridal-wreath Spiraea. Mt, Pd (VA), Cp (NC, VA): cultivated, escaped or persisting; uncommon, native of China, Korea, and Taiwan. [= C, G, K]

* ***Spiraea salicifolia*** Linnaeus, Willowleaf Spiraea. Mt (NC, VA): cultivated, escaped or persisting; rare, native of Eurasia. [= C, K]

Spiraea tomentosa Linnaeus, Hardhack, Steeplebush. Mt (GA, NC, SC, VA), Pd, Cp (NC, SC, VA): bogs, wet meadows; common (rare in Piedmont) (GA Rare). July-September; September-October. Nova Scotia west to MN, south to SC, ne. GA, c. TN, and AR. [= RAB, GW, K, S, W; > *S. tomentosa* var. *rosea* (Rafinesque) Fernald – C, F, G, Z; > *S. tomentosa* var. *tomentosa* – C, F, G, Z; ? *S. subcanescens* Rydberg]

* ***Spiraea ×vanhouttei*** (C. Briot) Carrière [*S. cantoniensis* × *trilobata*], Bridal-wreath Spiraea. Pd (NC): cultivated, escaped or persisting; rare, introduced from cultivation, the two parents both from Asia. [= K, Z; = *C. vanhouttei* – C, G]

Spiraea virginiana Britton, Virginia Spiraea, Appalachian Spiraea. Mt (GA, NC, VA): riverbanks, riverside shrub thickets, where occasionally flood-scoured; rare (US Threatened, GA Threatened, NC Endangered, VA Endangered). June-July; August-September. A Southern Appalachian endemic: sw. PA, WV, and sw. VA south through w. NC and e. TN to nw. GA. Ogle (1991a, 1991b) presents an excellent discussion of the taxonomy, history, and biology of this interesting species. [= RAB, C, F, G, K, S, W, Z; > *S. virginiana* var. *serrulata* Rehder]

* ***Spiraea cantoniensis*** Loureiro. Cp (NC): roadsides; rare, native of Asia. *S. cantoniensis* has been collected twice on Fort Bragg, NC, by Phil Crutchfield (specimen at Fort Bragg) (Sorrie, pers. comm.). Also reported for other scattered states in e. North America (AL, AR, LA, NY (Kartesz 1999). [= K] {not yet keyed; synonymy incomplete}

* ***Spiraea thunbergii*** Siebold ex Blume. Mt (GA), Cp (NC): roadsides; rare, native of Asia. *S. thunbergii* has been collected from roadside at Fort Bragg, NC, by Phil Crutchfield (specimen at Fort Bragg) (Sorrie, pers. comm.). [= C, K] {not yet keyed; synonymy incomplete}

RUBIACEAE A.L. de Jussieu 1789 (Madder Family)

A family of about 630-650 genera and 10,200-13,000 species, trees, shrubs, vines, and rarely herbs, cosmopolitan, but especially diverse in tropical and subtropical areas. References: Rogers (1987, 2005).

1 Trees, shrubs, or woody vines.
  2 Woody vine; corolla lilac; [alien] ..... ***Paederia***
  2 Shrub or tree; corolla white, green, or maroon; [native].
    3 Inflorescence spherical; [widespread in our area] ..... ***Cephalanthus***

3 Inflorescence cymose or thyrsoid; [in the Coastal Plain, from s. SC southward].
4 Inflorescence cymose; some calyx lobes expanded into pink or reddish "flags"; leaves deciduous; domatia not present; [of s. SC southward]..... ***Pinckneya***
4 Inflorescences thyrsoid; calyx lobes inconspicuous; leaves evergreen; domatia present in secondary vein axils; [of ne. FL southward]
5 Lateral veins 3-6 on either side of the midvein; fruit white; flowers yellowish, > 6 mm long..... ***Chiococca***
5 Lateral veins 8-14 on either side of the midvein; fruit red; flowers white, <5 mm long..... ***Psychotria***
1 Herbs (or creeping subshrubs in *Mitchella*).
6 Leaves whorled.
7 Flowers congested into involucrate heads; corolla pink..... ***Sherardia***
7 Flowers in branched inflorescences lacking an involucre; corolla white, greenish, yellow, or brown.
8 Flowers in 2-flowered reduced cymes; flowers yellow..... ***Cruciata***
8 Flowers > 2 per cyme; flowers white, green, brown, or yellow.
9 Corolla tube much longer than the corolla lobes..... ***[Asperula]***
9 Corolla tube shorter than the corolla lobes..... ***Galium***
6 Leaves opposite
10 Flowers paired, the ovaries connate and developing into a single fleshy red fruit; leaves roundish..... ***Mitchella***
10 Flowers single or in inflorescences with multiple flowers, the fruits **either** dry **or** fleshy and yellowish or black.
11 Carpels with few to many seeds.
12 Corolla 5-lobed..... ***Pentodon***
12 Corolla 4-lobed.
13 Capsule longer than the calyx tube flowers blue, pink, or white..... ***Houstonia***
13 Capsule not longer than the calyx tube; flowers white..... ***Oldenlandia***
11 Carpels 1-seeded.
14 Flowers in dense, terminal, involucrate heads; flowers 4- or-6-lobed; styles 3..... ***Richardia***
14 Flowers in axillary or terminal clusters, or single in axils, not involucrate; flowers 4-lobed; styles 2.
15 Flowers usually solitary in leaf axils; fruit separating into 2 parts..... ***Diodia***
15 Flowers in terminal and axillary clusters; fruits not separating into 2 parts.
16 Carpels opening transversely..... ***Mitracarpus***
16 Carpels opening longitudinally..... ***Spermacoce***

Asperula Linnaeus (Woodruff)

A genus of 90-200 species, mostly European.

* *Asperula arvensis* Linnaeus, Blue Woodruff. Introduced. South to WV, MD, DE (USDA NRCS 2007), and se. PA (Rhoads & Klein 1993). [= C, G, K]

Cephalanthus Linnaeus (Buttonbush)

A genus of about 6 species, of tropical and temperate America. References: Rogers (1987)=Z; Ridsdale (1976)=Y.

Cephalanthus occidentalis Linnaeus, Buttonbush. Cp, Pd, Mt (GA, NC, SC, VA): streambanks, riverbanks, depressional wetlands, lakes, often in standing water; common. June-July. Widespread in North America, and south into Mexico, Guatemala, and Honduras. [= RAB, K, W, S, Y, Z; > *C. occidentalis* var. *occidentalis* – C, F, G; > *C. occidentalis* var. *pubescens* – C, F, G; = *C. occidentalis* var. *occidentalis* – GW (including var. *pubescens*)]

Chiococca P. Browne 1759

A genus of about 30 species, of FL and the West Indies south to s. South America. References: Rogers (2005).

Chiococca alba (Linnaeus) A.S. Hitchcock, Snowberry, Milkberry. Cp (FL): coastal hammocks, shell middens; rare. N. FL (St. Johns and Dixie counties) south to s. FL. [= K, S, WH]

Cruciata P. Miller (Crosswort)

A genus of about 10 species, herbs, of Europe and western Asia. References: Rogers (2005)=Z

* ***Cruciata pedemontana*** (Bellardi) Ehrend, Piedmont Crosswort. Mt (GA, NC, VA), Pd (GA, VA), Cp (VA), {SC}: lawns, grassy roadsides; uncommon, native of s. Europe. April-June. The Piedmont referred to in the name is the "original" Piedmont of southern Europe. In GA Mountains and Piedmont (T. Govus, pers. comm. 2005). [= K, Z; = *Galium pedemontanum* (Bellardi) Allioni – RAB, C, F, W]

Diodia Linnaeus

A genus of about 30 species, of tropical and warm temperate America and Africa. Bacigalupo & Cabral (1999) suggest that *Diodella* Small should be recognized as distinct from *Diodia*. References: Bacigalupo & Cabral (1999)=Z; Rogers (2005).

1 Sepals 4 and similar in size; style entire; [of dry habitats] ..... ***D. teres***
1 Sepals 2 (or 4, and then markedly dimorphic); style cleft; [of moist to wet habitats] ..... ***D. virginiana***

Diodia teres Walter, Poorjoe. Cp, Pd, Mt (GA, NC, SC, VA): dunes, sandy roadsides, glades, other dry habitats; common. June-December. MA, NY and WI, south to FL, TX, and CA, south through Mexico and Central America. [= RAB, C, GW, W; > *Diodia teres* var. *hirsutior* Fernald & Griscom – F, K; > *Diodia teres* var. *hystricina* Fernald & Griscom – F, G, K; > *Diodia teres* var. *oblongifolia* Fernald – F, K; > *Diodia teres* var. *teres* – F, G, K; = *Diodella teres* (Walter) Small – Z]

Diodia virginiana Linnaeus. Cp, Pd, Mt (GA, NC, SC, VA): pondshores, ditches, other moist to wet habitats; common. June-December. CT, PA, IL, and KS south to FL and TX. [= RAB, C, G, GW, W; > *D. virginiana* var. *attenuata* Fernald – F, K; > *D. virginiana* var. *latifolia* Torrey & A. Gray – K; > *D. virginiana* var. *virginiana* – F, K; > *Diodia virginiana* – S; > *Diodia tetragona* Walter – S; > *Diodia hirsuta* Pursh – S; > *Diodia harperi* Small – S]

Galium Linnaeus 1753 (Bedstraw, Cleavers, Woodruff)

A genus of ca. 300 species, herbs, cosmopolitan. References: Puff (1976, 1977)=Z; Lipscomb & Nesom (2007)=Y; Rogers (2005); Dempster (1978, 1981). [also see *Cruciata*]

1 Leaves mostly in whorls of 4 (rarely a few in whorls of 5-6) at the primary nodes ..... **Key A**
1 Leaves mostly in whorls of 5-8 or more at the primary nodes.
  2 Leaves mostly 6 per node (ranging from 4-8) at the primary nodes ..... **Key B**
  2 Leaves mostly 8 or more per node at the primary nodes ..... **Key C**

Key A – Bedstraws with leaves mostly in whorls of 4 (rarely a few in whorls of 5-6)

1 Flowers yellow; plant an annual, 0.5-3 dm tall ..... ***[Cruciata pedemontana]***
1 Flowers white, creamy, greenish-purple, maroon, or purple; plant a perennial, 1-8 dm tall.
  2 Flowers solitary, sessile or subsessile in the leaf axils; leaves 4-10 mm long ..... ***G. virgatum***
  2 Flowers on pedicels, usually in complex inflorescences; leaves >10 mm long.
    3 Larger leaves 6-25 mm wide, mostly 1.5-4× as long as wide; fruits uncinate-hispid (except smooth in *G. latifolium*); flowers greenish or purplish.
      4 Larger leaves 4-8 cm long, 1-2 cm wide, widest below the middle, tapering to a long-acuminate apex, averaging about 3-4× as long as wide.
        5 Fruits uncinate-hispid; flowers yellowish, turning maroon ..... ***G. lanceolatum***
        5 Fruits smooth; flowers purple ..... ***G. latifolium***
      4 Larger leaves 1-5 cm long, 0.6-2.5 cm wide, widest at about the middle, tapering to an obtuse (or broadly acute) apex, averaging about 2× as long as wide.
        6 Flowers (some of them) sessile or subsessile along the inflorescence branches; leaves 1.5-5 cm long, the larger usually > 2.5 cm long, not punctate.
          7 Lower leaf surface glabrous or sparsely short-hispid on the veins; larger leaves 1.5-2.5 (-4.0) cm long and 0.7-1.4 (-1.8) cm wide; [more southern] ..... ***G. circaezans var. circaezans***
          7 Lower leaf surface appressed-pilose, long-hirsute on the veins; larger leaves 2-5 cm long, 1-2.5 cm wide; [more northern] ..... ***G. circaezans var. hypomalacum***
        6 Flowers all distinctly pedicelled; leaves 1-2.5 cm long, glandular-punctate beneath.
          8 Stem glabrous ..... ***G. orizabense ssp. laevicaule***
          8 Stem pubescent.
            9 Stem and leaves pubescent with spreading, straight hairs; [more northern] ..... ***G. pilosum var. pilosum***
            9 Stem and leaves pubescent with short, upwardly incurved hairs; [more southern] ..... ***G. pilosum var. puncticulosum***
    3 Larger leaves 1-6 mm wide, mostly 4-20× as long as wide; fruits smooth or pubescent (if pubescent, the hairs not hooked at the end, though they may curve through their length), either fleshy or dry; flowers white or creamy.
      10 Fruits fleshy, blue-black; leaves firm, more-or-less evergreen, glandular-punctate beneath.
        11 Leaves elliptic, 7-18 mm long, 3-6 mm wide, 2-3.5× as long as wide ..... ***G. hispidulum***
        11 Leaves linear, 15-25 mm long, 2-4 mm wide, 5-10× as long as wide ..... ***G. uniflorum***
      10 Fruits dry, black; leaves herbaceous, deciduous, not glandular-punctate beneath.
        12 Stems erect or nearly so; leaves 15-45 mm long, 2-6 mm wide ..... ***G. boreale***
        12 Stems sprawling, matted; leaves 6-30 mm long, 0.5-5 (-6) mm wide.
          13 Corollas 4-lobed, the lobes longer than wide.
            14 Leaves (8-) 10-20 (-25) mm long, (0.5-) 0.8-2 mm wide, margin usually smooth, with strongly down-rolled margins; corolla (1.8-) 2-2.5 (-3) mm across; pedicels filiform; stems 15-50 (-60) cm long, delicate ..... ***G. obtusum var. filifolium***
            14 Leaves (10-) 15-25 (-30) mm long, (2-) 3-5 (-6) mm wide, margin scabrous, not down-rolled; corolla (2-) 2.5-3.5 (-4) mm across; pedicels thicker; stems (15-) 25-60 (-80) cm long, firm ..... ***G. obtusum var. obtusum***
          13 Corollas 3-(4)-lobed, the lobes about as wide as long, or wider than long.
            15 Flowers and fruits borne on arcuate pedicels, (5-) 7-15 (-20) mm long and densely retrorsely scabrous ..... ***[G. trifidum var. trifidum]***
            15 Flowers and fruits borne on straight pedicels, these (2-) 2.5-8 (-12) mm long and smooth.
              16 Fruiting pedicels (4-) 5-8 (-12) mm long; pairs of fruits (3-) 3.5-5 mm across at maturity; leaves 2-3 (-4) mm wide ..... ***G. tinctorium var. floridanum***

16 Fruiting pedicels (2-) 2.5-5 (-6) mm long; pairs of fruits 2-3 mm across at maturity; leaves (1.5-) 2-2.5 (-2.8) mm wide..... ***G. tinctorium** var. **tinctorium***

Key B – Bedstraws with leaves mostly 6 per node (ranging from 4-8)

1 Flowers in terminal heads, subtended by an involucre of leaves fused at the base; stem rough-hairy, but not retrorse-scabrid ..... ***[Sherardia arvensis]***
1 Flowers in axillary or terminal diffuse inflorescences, not subtended by an involucre; stems either smooth, retrorse-scabrid, or pubescent.
  2 Largest leaves < 10 mm long; fruits 0.7-1 mm across; annual; [alien].
    3 Inflorescence relatively diffuse, branches divaricate; ultimate fruits (2-) 3–6 (-7) nodes beyond primary stem axis (with largest leaves); first inflorescence internode (beyond primary stem axis) 15-50 mm long; fruit surface glabrous (without hairs)..... ***[G. divaricatum]***
    3 Inflorescence relatively strict, branches ascending; ultimate fruits 2-3 (-4) nodes beyond primary stem axis (with largest leaves); first inflorescence internode (beyond primary stem axis) 3-12 (-20) mm long; fruit surface glabrous or bristly-hispid.
      4 Fruit surface without hairs, smooth to shallowly papillate ..... ***G. anglicum***
      4 Fruit surface bristly-hispid with uncinate-tipped hairs, distinctly papillate ..... ***[G. parisiense]***
  2 Largest leaves > 10 mm long; fruits 1-2.5 mm across; perennial; [native].
    5 Fruits and ovaries uncinate-hispid; leaves 15-50 mm long, 7-10 mm wide..... ***G. triflorum***
    5 Fruits and ovaries glabrous or papillose; leaves 5-25 mm long, 1-6 mm wide.
      6 Corolla 1.5-2.5 mm across, 3-lobed; [collectively widespread in our area].
        7 Fruiting pedicels (4-) 5-8 (-12) mm long; pairs of fruits (3-) 3.5-5 mm across at maturity; leaves 2-3 (-4) mm wide..... ***G. tinctorium** var. **floridanum***
        7 Fruiting pedicels (2-) 2.5-5 (-6) mm long; pairs of fruits (2-) 2.5-3 mm across at maturity; leaves (1.5-) 2-2.5 (-2.8) mm wide ..... ***G. tinctorium** var. **tinctorium***
      6 Corolla 2.5-4.5 mm across, 4-lobed; [mostly of the Mountains in our area, extending into the Piedmont or even Coastal Plain in n. VA and northward].
        8 Leaf margins retrorsely ciliate-scabrid; leaves 3-5× as long as wide; [plants of bogs and moist thickets]..... ***G. asprellum***
        8 Leaf margins antrorsely ciliate-scabrid; leaves 4-8× as long as wide; [plants of dry forests and woodlands].
          9 Leaves sharply acute or cuspidate; corolla 2.5-3 mm across ..... ***G. concinnum***
          9 Leaves rounded, obtuse, or barely acute; corolla ca. 4 mm across ..... ***[G. palustre]***

Key C – Bedstraws with leaves mostly 8 or more per node (ranging from 5-12)

1 Leaves 8-12 per whorl (many whorls with > 8 leaves); flowers bright yellow, in a large showy terminal compound inflorescence; fruits glabrous; perennial.
  2 Flowers golden-yellow, fragrant; inflorescence dense, usually not interrupted ..... ***G. verum***
  2 Flowers lemon-yellow, odorless; inflorescence interrupted ..... ***[G. wirtgenii]***
1 Leaves (5-) 8 (-10) per whorl (few if any whorls with > 8 leaves); flowers white or greenish, in a terminal compound inflorescence or in small axillary inflorescences; fruits glabrous, papillose, or uncinate-hispid; annual or perennial.
  3 Stems retrorsely scabrous; annual.
    4 Fruits and ovaries uncinate-hispid; flowers and fruits mainly in clusters of 2-5 ..... ***G. aparine***
    4 Fruits and ovaries sharply papillose; flowers and fruits mainly in clusters of 3 ..... ***G. tricornutum***
  3 Stems glabrous or pubescent, but not scabrous; perennial.
    5 Fruits and ovaries uncinate-hispid; nodes bearded, the stem otherwise glabrous..... ***G. odoratum***
    5 Fruits and ovaries glabrous; nodes not bearded, the stem either glabrous or pubescent toward the base of the plant.
      6 Corolla 3-5 mm across, the pedicels usually shorter than the width of the corolla; inflorescence branches ascending, mostly at < 45 degrees ..... ***G. mollugo** var. **erectum***
      6 Corolla 2-3 mm across, the pedicels usually longer than the width of the corolla; inflorescence branches spreading, mostly at > 45 degrees ..... ***G. mollugo** var. **mollugo***

* ***Galium anglicum*** Hudson. Pd (NC, VA), Cp (GA, VA), Mt (VA): pastures, disturbed areas; uncommon, native of Europe. June-July. [= Y; < *G. parisiense* Linnaeus – RAB, F, G, S, W; < *G. parisiense* var. *leiocarpum* Tausch – C; < *G. divaricatum* – K; = *G. parisiense* ssp. *anglicum* (Hudson) Arcangeli]

Galium aparine Linnaeus, Cleavers. Mt, Pd, Cp (GA, NC, SC, VA): meadows, thickets, disturbed areas, forests; common. April-May. Nearly cosmopolitan, from n. North America south through Central and South America. Apparently represented in North America (including our area) by both native and introduced genotypes. [= RAB, F, G, GW, K, S, W; > *G. aparine* var. *aparine* – C; > *G. aparine* var. *echinospermum* (Wallroth) Farwell – C]

Galium asprellum Michaux, Rough Bedstraw. Mt (NC, VA), Pd, Cp (VA): bogs, streambanks, wet meadows; uncommon. July-September. Newfoundland west to MN, south to n. VA, w. NC, ne. TN (Chester, Wofford, & Kral 1997), and MO. The report for sc. TN is an error (D. Estes, pers. comm. 2005). [= RAB, C, F, G, GW, K, S, W]

Galium boreale Linnaeus, Northern Bedstraw. Mt (VA): woodlands and fields; uncommon (VA Watch List). May-August. Circumboreal, south in North America to DE, sw. VA, KY, MO, and CA. [= C, K, W; > *G. boreale* var. *intermedium* A.P. de Candolle – F, G]

Galium circaezans Michaux *var.* ***circaezans***, Southern Forest Bedstraw. Mt, Pd, Cp (GA, NC, SC, VA): moist forests; common. April-June. NY, KY, and MI, south to FL and TX. The varieties need additional study. [= C, F, G, K; < *G. circaezans* – RAB, S, W]

Galium circaezans Michaux *var.* ***hypomalacum*** Fernald, Northern Forest Bedstraw. Mt (NC, VA), Pd (VA), {GA?, SC?}: moist forests; common? April-June. Québec west to MN and NE, south to VA, w. NC, KY, MO, and TX (?). The varieties need additional study. [= C, F, G, K; < *G. circaezans* – RAB, S, W]

Galium concinnum Torrey & A. Gray, Shining Bedstraw. Mt, Pd (VA): dry woodlands; uncommon. June-August. NJ west to MN and NE, south to sw. VA, e. TN, nc. TN, and AR. [= C, F, G, K, W]

Galium hispidulum Michaux. Cp (GA, NC, SC, VA), Mt (NC): maritime forests, sandhills, dry sandy forests; common, rare in Mountains, rare in VA (VA Watch List). June-August; August-September. S. NJ south to FL, west to LA, primarily on the Coastal Plain. [= RAB, C, F, G, K, W; = *G. bermudense* Linnaeus – S, misapplied]

Galium lanceolatum Torrey, Wild-licorice. Mt (NC, SC, VA), Pd (VA), Cp (VA): moist hardwood forests; uncommon (rare in Coastal Plain and Piedmont). June-July. Québec west to MN, south to w. NC and e. TN. [= RAB, C, F, G, K, S, W]

Galium latifolium Michaux, Wideleaf Bedstraw. Mt (GA, NC, SC, VA), Pd (NC, VA): moist hardwood forests; common (uncommon in Piedmont). May-July. C. PA and KY south to n. GA and n. AL, a Southern and Central Appalachian endemic. The closely related *G. arkansanum* A. Gray is the Ozarkian sibling of the Appalachian *G. latifolium*. Var. *hispidum*, named from VA, needs additional study. [= RAB, C, K, S, W; > *G. latifolium* var. *latifolium* – F, G; > *G. latifolium* var. *hispidum* Small – F, G]

* ***Galium mollugo*** Linnaeus *var.* ***erectum*** (Hudson) Domin. Mt?, Pd?, Cp? (NC?, VA?): moist roadsides, disturbed areas; ??, native of Europe. May-June. The varieties need additional study. [= C, G; < *G. mollugo* – RAB, K, W; = *G. erectum* Hudson – F; ? *G. album* P. Miller]

* ***Galium mollugo*** Linnaeus *var.* ***mollugo***. Mt (NC, VA), Pd?, Cp? (VA?), {GA}: moist roadsides, disturbed areas; uncommon, native of Europe. May-June. The varieties need additional study. [= C, G; < *G. mollugo* – RAB, K, W; = *G. mollugo* – F]

Galium obtusum Bigelow *var.* ***filifolium*** (Wiegand) Fernald, Carolina Bedstraw. Cp (GA, NC, SC, VA), Pd (GA?, NC, SC, VA), Mt (VA): marshes, swamps, creekbanks, alluvial forests; common. April-May. S. NJ south to c. GA, primarily on the Coastal Plain. [= RAB, C, F, W; < *G. obtusum* – GW; = *G. obtusum* ssp. *filifolium* (Wiegand) Puff – K, Z; = *G. filifolium* (Wiegand) Small – S]

Galium obtusum Bigelow *var.* ***obtusum***, Bluntleaf Bedstraw. Cp, Pd, Mt (GA, NC, SC, VA): marshes, swamps; common. April-May. Nova Scotia west to SD, south to FL and TX. "Ssp. *australe* Puff", cited in Kartesz (1999) and allegedly endemic to GA, was never published and is not now considered a useful entity by its putative author (Puff, pers. comm. 2004). [= RAB, C, F, W; < *G. obtusum* – GW; > *G. obtusum* var. *obtusum* – G; > *G. obtusum* var. *ramosum* Gleason – G; > *G. obtusum* ssp. *obtusum* – K, Z; > *G. obtusum* "ssp. *australe*" – K, Z, not validly published; = *G. tinctorium* – S, misapplied]

* ***Galium odoratum*** (Linnaeus) Scopoli, Sweet Woodruff, Waldmeister. Mt, Pd (NC, VA): commonly cultivated, rarely escaped or persistent, native of Europe. May. Used fresh as a flavoring for May-wine. [= C, K; = *Asperula odorata* Linnaeus – F, G]

Galium orizabense Hemsley *ssp.* ***laevicaule*** (Weatherby & Blake) Dempster. Cp (GA, NC, SC, VA): forests; uncommon? (VA Watch List) May-August. Se. VA south to FL, west to se. TX; West Indies. The typic subspecies, ssp. *orizabense*, is distributed from Tamaulipas south through Mexico, Central America, to northern South America (Dempster 1981). [= K; < *G. pilosum* – RAB, S; = *G. pilosum* Aiton var. *laevicaule* Weatherby & Blake – F]

Galium pilosum Aiton *var.* ***pilosum***. Mt, Pd, Cp (NC, SC?, VA), {GA}: forests, woodland borders, clearings; common. May-August. S. NH west to MI, south to NC, TN, MO, and TX. The varieties need additional study. [= C, F, G, K; < *G. pilosum* – RAB, S, W]

Galium pilosum Aiton *var.* ***puncticulosum*** (Michaux) Torrey & A. Gray. Cp (GA, NC, SC, VA), Pd?: forests, woodland borders, clearings; common. May-August. S. NJ south to FL, west to MS. The varieties need additional study. [= C, F, G, K; < *G. pilosum* – RAB, S, W]

Galium tinctorium (Linnaeus) Scopoli *var.* ***floridanum*** Wiegand, Florida Three-lobed Bedstraw. Cp (GA, NC, SC, VA), Mt (NC, SC, VA), Pd (NC, SC): swamps, marshes, and ditches; common (VA Watch List). April-June. MA south to FL, west to e. TX, mostly on the Coastal Plain, but extending inland to w. VA, w. NC, se. KY, s. IL, and se. MO. See Puff (1976) for additional information. [= F; < *G. tinctorium* – RAB, C, K, W; = *G. obtusum* var. *floridanum* (Wiegand) Fernald – G; < *G. claytonii* Michaux – S; = *G. tinctorium* ssp. *floridanum* (Wiegand) Puff – Z]

Galium tinctorium (Linnaeus) Scopoli *var.* ***tinctorium***, Southern Three-lobed Bedstraw. Mt (GA, NC, SC, VA), Pd, Cp? (NC, SC, VA): swamps, marshes, and ditches; common. April-June. Newfoundland west to MN and NE, south to SC, n. GA, KY, and ne. MO. See Puff (1976) for additional information. [= F, G, GW; < *G. tinctorium* – RAB, C, K, W; < *G. claytonii* Michaux – S; = *G. tinctorium* ssp. *tinctorium* – Z]

* ***Galium tricornutum*** Dandy, Small Bedstraw. Pd (GA, SC): disturbed areas; rare, introduced. This species has been reported from Cherokee and Greenwood counties, SC, nearby GA, and se. PA (Rhoads & Klein 1993). [= K; < *G. tricorne* Stokes – F]

Galium triflorum Michaux, Sweet-scented Bedstraw. Mt, Pd, Cp (GA, NC, SC, VA): woodlands, roadsides, disturbed areas; common. July-August. Circumboreal, south in North America to FL and Mexico (Veracruz). [= RAB, K, S, W; > *G. triflorum* var. *triflorum* – C, F, G; > *G. triflorum* var. *asprelliforme* Fernald – C, F, G]

Galium uniflorum Michaux. Cp, Pd (GA, NC, SC, VA): moist slope forests and alluvial forests; uncommon. April-September. Ranging from se. VA south to FL, west to TX. [= RAB, C, F, G, K, S]

* ***Galium verum*** Linnaeus, Yellow Bedstraw, Our Lady's Bedstraw. Mt (NC, VA), Pd (VA): meadows, pastures, roadsides; uncommon (rare in NC), native of Europe. June-July. [= C, F, G, K; < *G. verum* – RAB, W (also see *G. wirtgenii*)]

Galium virgatum Nuttall, Ozark Bedstraw. Cp (GA, *SC): (in GA) open blackland prairies, (in SC) waif around wool-combing mill; rare. Native from TN, c. GA (Houston County), and AL west to KS, OK, and TX. [= C, F, G, K; > *G. virgatum* var. *leiocarpum* Torrey & A. Gray – S; > *G. virgatum* var. *virgatum* – S]

* *Galium divaricatum* Pourret ex Lamarck. {AL, KY, TN} [= Y ; < *G. parisiense* var. *leiocarpum* Tausch – C ; < *G. parisiense* Linnaeus – F, G, S; < *G. divaricatum* – K; = *G. parisiense* var. *divaricatum* (Pourret ex Lamarck) Koch; = *G. anglicum* var. *divaricatum* (Pourret ex Lamarck) Reichenbach; = *G. parisiense* ssp. *divaricatum* (Pourret ex Lamarck) Rouy] {add to synonymy}

Galium palustre Linnaeus, Marsh Bedstraw, Ditch Bedstraw, ranges south to NJ, s. PA (Rhoads & Klein 1993), MD, and WV (Kartesz 1999). [= C, F, G, K]

* *Galium parisiense* Linnaeus. {AL, MS, TN} [= K, Y; = *G. parisiense* ssp. *parisiense*] {add to synonymy}

Galium trifidum Linnaeus var. *trifidum*, Northern Three-lobed Bedstraw. Moist places, bogs, and swamps, circumboreal, south in North America to MD, DE, PA, and NJ. [= C, F, G; = *G. trifidum* ssp. *trifidum* – K, Z]

* *Galium wirtgenii* F.W. Schultz, Yellow Bedstraw. Not definitely known from our area, but likely to be present. [= C, F, G, K; < *G. verum* – W]

Houstonia Linnaeus 1753 (Bluet)

The generic limits of *Houstonia, Hedyotis, Oldenlandia*, and *Stenaria* remain unclear. References: Terrell (1959)=Z; Terrell (1991)=Y; Terrell (1996)=X; Rogers (1987)=Q; Ward (2004c)=V; Church & Taylor (2005); Church (2003); Turner (1995b)=U; Terrell (2001)=M; Rogers (2005); Terrell (2007). Key adapted in part from the references.

Identification notes: In the key below, all leaf measurements and length/width ratios are based on median cauline leaves.

1 Flowers solitary on terminal (rarely axillary) pedicels (2-) 6-50 (-70) mm long; corolla salverform; leaves 2-15 mm long; [subgenus *Houstonia*].
  2 Stems prostrate and creeping.
    3 Corolla white (rarely pale lavender); capsule (2.3-) 3.0-6.3 mm across; leaves 2-13 mm wise; pedicels usually single, 2-25 mm long; flowers chasmogamous and cleistogamous (these borne underground); [of the outer Coastal Plain]; [section *Mullera*] ..... ***H. procumbens***
    3 Corolla blue (rarely white); capsule 2.5-5.0 mm across; leaves 0.5-7 mm wide; pedicels single or paired, to 60 mm long; flowers all chasmogamous and aerial; [of the Mountains]; [section *Houstonia*] ..... ***H. serpyllifolia***
  2 Stems erect or spreading.
    4 Stems 1-4 (-7) cm tall; leaves mostly oblanceolate, 0.3-3.0 mm wide; corolla 5-12 mm long, white to pale pink; seeds with a hilar ridge in an elliptical depression; [section *Mullera*] ..... ***[H. rosea]***
    4 Stems 1-26 cm tall; leaves elliptic, ovate or spatulate, 0.3-9.0 mm wide (at least some on a plant generally > 3 mm wide); corolla 2-21 mm long, purple, pale blue, pink, or white; seeds subglobose with a ventral cavity; [section *Houstonia*].
      5 Plants perennial, with a well-developed, persistent basal rosette; corolla 5.8-16 (-21) mm long, the tube (2-) 4-11 (-12) mm long ..... ***H. caerulea***
      5 Plants annual, with at most a few short-lived basal leaves; corolla 2-10 (-12) mm long, the tube 0.8-5.5 mm long.
        6 Calyx lobes 1/5 as long as to slightly longer than the corolla tube; corollas purple or violet (rarely white), 3.5-10 (-12.5) mm long, the tube 2.0-5.5 mm long ..... ***H. micrantha***
        6 Calyx lobes slightly shorter than to slightly longer than the corolla tube; corollas white, 2.0-5.5 mm long, the tube 0.8–2.5 mm long ..... ***H. pusilla***
1 Flowers several to many, in terminal cymes; corolla funnelform; leaves (8-) 10-60 mm long; [subgenus *Chamisme*, section *Amphiotis*].
  7 Capsule obovoid-cylindric, longer than wide, the free calyx lobes distinctly shorter than the capsule; stipules of mid-cauline leaves ciliate or fringed, and also often bristle-tipped; leaves 1-3 mm wide; [plants of calcareous glades and barrens] ..... ***H. nigricans var. nigricans***
  7 Capsule as long as wide or wider, depressed globose, the free calyx lobes about as long as the capsule; stipules of mid-cauline leaves not cilate, fringed, or bristle-tipped; leaves 0.5-34 mm wide; [plants of various habitats, including calcareous glades and barrens]
    8 Basal leaves persistent in a rosette until and past flowering; leaves distinctly ciliate ..... ***H. canadensis***
    8 Basal leaves absent at the onset of flowering; leaves smooth-margined or ciliate.
      9 Leaves ovate or lanceolate, 1-6× as long as wide, 4-34 mm wide, widest toward the base or at the middle; calyx lobes 1-7 mm long.
        10 Calyx lobes 4-7 mm long; leaves mostly lanceolate (varying from narrowly lanceolate to broadly ovate), 1.7-3.3 cm long, 0.4-1.0 cm wide, 3.3-6× as long as wide ..... ***H. purpurea var. calycosa***
        10 Calyx lobes 1-4 mm long; leaves mostly ovate (varying from broadly ovate to ovate-lanceolate), 0.8-6.3 cm long, 0.6-3.4 cm wide, 1-3.2× as long as wide.
          11 Corollas light purple to white, (4-) 5-8 (-10) mm long; leaves (10-) 25-50 (-60) mm long, (6-) 12-30 (-34) mm wide; stems sparsely to densely pubescent; median internodes 2-9 cm long; leaves with pubescence ciliate on the leaf margin, on the midrib, and scattered on the surface; [of various habitats, widely distributed] ..... ***H. purpurea var. purpurea***
          11 Corollas deep purple, 8-12 mm long; leaves 8-20 (-30) mm long, 3-8 (-13) mm wide; stems glabrous (or slightly short-pubescent on the lower nodes only); median internodes 0.5-4 cm long; leaves entirely glabrous or with pubescence ciliate on the leaf margin, on the midrib, but lacking from the leaf surface; [of high elevation rocky summits and adjacent grassy balds in w. NC and e. TN] ..... ***H. montana***
      9 Leaves linear to narrowly elliptic, 4-20× as long as wide, 0.5-6 mm wide, widest at the middle or near the apex or nearly equally wide for most of their lengths; calyx lobes 0.5-3 mm long.
        12 Leaves 1.3-4.7 cm long, 0.5-4.0 mm wide (mostly < 2.5 mm wide), 7-20× as long as wide; inflorescence very diffuse and open, to 20 cm long, the branches ascending, spreading, or deflexed, slender and often ultimately filiform, with 1-4 remote nodes bearing reduced leaves, the pedicels to 14 mm long; internodes mostly 4-9; mature capsules mostly 1.5-2.5 mm long and wide; stem densely cinereous-puberulent, especially at the nodes ..... ***H. tenuifolia***
        12 Leaves 1.6-4.0 cm long, 1.5-6.0 mm wide (mostly > 2.5 mm wide), 4-11× as long as wide; inflorescence rather open to rather compact, < 12 cm long, the branches ascending or spreading, slender, pedicels to 8 mm long; internodes mostly 7-11; mature capsules mostly 1.8-3.0 mm long and wide; stem densely cinereous-puberulent, glabrate, or glabrous.
          13 Stems glabrous or glabrate (sometimes puberulent on the nodes only); internodes 7-10, the median internodes (1.1-) 2.0-4.5 (-6.0) cm long; [of seasonally wet soil mats on moderate to high elevation granitic domes in sw. NC, nw. SC, and ne. GA] ..... ***H. longifolia var. glabra***
          13 Stems densely cinereous-puberulent; internodes (6-) 7-11 (-13), the median internodes (1.0-) 1.5-3.5 (-4.4) cm long; [of dry sandy, shaley, gravelly, or rocky soil, widely distributed] ..... ***H. longifolia var. compacta***

Houstonia caerulea Linnaeus, Quaker Ladies, Innocence, Common Bluet. Mt, Pd, Cp (GA, NC, SC, VA): forests, woodlands, openings, lawns, a wide variety of disturbed sites; common. April-May; May-June. This species is widespread in e.

North America. The flowers of this species and *H. serpyllifolia* are very similar; *H. caerulea* is a somewhat duller blue. [= RAB, G, K, S, W, X, Y; = *Houstonia caerulea* var. *caerulea* – F; = *Hedyotis caerulea* (Linnaeus) Hooker – C, GW; < *Hedyotis caerulea* – Q]

Houstonia canadensis Willdenow ex Roemer & J.A. Schultes, Canada Bluet. Mt (GA, VA): dry limestone barrens, locally abundant in shallow soils over limestone; rare (VA Rare). April-June. Ranging from ME and s. Ontario west to MN, south to sw. VA, se. and c. TN, nw. GA, and AR. Terrell (1959) determined that *Houstonia setiscaphia* (allegedly a narrow endemic of sw. VA) fell within the range of variation of southern populations of *H. canadensis*. Further study is perhaps warranted. [= G, K, W, X, Y, Z; = *Hedyotis canadensis* (Willdenow ex Roemer & J.A. Schultes) Fosberg – C, Q; > *Houstonia canadensis* – F; > *Houstonia setiscaphia* L.G. Carr – F; > *Houstonia canadensis* var. *setiscaphia* (L.G. Carr) C.F. Reed]

Houstonia longifolia Gaertner *var.* ***compacta*** Terrell, Eastern Longleaf Bluet. Mt (GA, NC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry rock outcrops and adjacent open woodlands, dry sandy woodlands, dry roadbanks, glades and barrens; uncommon. Early June-August; September-October. Var. *compacta* is centered in the central Appalachians of VA, WV, e. KY, and se. OH, with extensions north to VT, west into n. IL, and south in the Piedmont and adjacent Coastal Plain to SC, GA, and Panhandle FL). The typic variety is more northern, apparently reaching its southern limit in IN, not reaching our area. [= Z; < *Houstonia longifolia* – RAB, C, F, G, S, W; < *Hedyotis longifolia* (Gaertner) Hooker – C, Q, WH; < *Houstonia longifolia* var. *longifolia* – Y; = *Houstonia longifolia*, "Appalachian Group" – X; < *Houstonia longifolia* – K (also see *H. tenuifolia*)]

Houstonia longifolia Gaertner *var.* ***glabra*** Terrell, Granite Dome Bluet. Mt (GA, NC, SC): seasonally and periodically wet soils of shallow soil mats and crevices of granitic domes; rare (NC Watch List). June-August; September-October. Var. *glabra* is endemic to the granitic dome district centered around Highlands, NC, occurring in sw. NC, nw. SC, and ne. GA. Terrell (1959) says "the lower internodes [are often] so smooth they appear to have been polished," and gives an altitudinal range of 850-1750m. Although the morphological differences between var. *glabra* and var. *compacta* are not great, the combination of distinctive morphology correlated with a distinctive habitat and a disjunct range seem to warrant recognition at the varietal level. [= Z; < *Houstonia longifolia* – RAB, S, W; < *Hedyotis longifolia* (Gaertner) Hooker – C, Q; < *Houstonia longifolia* var. *longifolia* – Y; = *Houstonia longifolia*, "Glabra Group" – X; < *Houstonia longifolia* – K (also see *H. tenuifolia*)]

Houstonia micrantha (Shinners) Terrell. Cp (FL, GA), Pd (GA): dunes, sandy soils, granitic flatrocks; uncommon (rare in FL and GA). February-April. E. and c. GA west to sw. TN, nw. AR, south to w. FL Panhandle, s. MS, s. LA, and e. TX. [= K, X; = *Hedyotis australis* W.H. Lewis & D.M. Moore – Q; = *Houstonia pusilla* – S, misapplied]

Houstonia montana Small, Roan Mountain Bluet. Mt (NC): in crevices of rock outcrops at the summits of high elevation peaks of the Southern Blue Ridge, also in thin, frost-heaved, gravelly soils of grassy balds near summit outcrops, from 1250-1950m in elevation; rare (US Endangered, NC Endangered). June-July; July-August. This species is endemic to the high Blue Ridge of nw. NC and ne. TN, most notably occurring on Roan Mountain, Grandfather Mountain, Bluff Mountain, and Three Top Mountain. It was first noted by Asa Gray in 1841, who described it as "a remarkable dwarfish form." There has been debate over whether it is not indeed merely a weather-induced form, but it sometimes occurs in close proximity to *H. purpurea*, with no sign of intergradation. In addition to the characters given above in the key, *H. montana* also differs from *H. purpurea* in having larger calyx lobes, corolla, capsules, and seeds. See Terrell (1959), Yelton (1974), and Terrell (1978) for further discussion. [= S, W; < *Houstonia purpurea* – RAB; = *Houstonia purpurea* Linnaeus var. *montana* (Small) Terrell – K, X, Y, Z; < *Hedyotis purpurea* – Q; = *Hedyotis purpurea* (Linnaeus) Torrey & A. Gray var. *montana* (Small) Fosberg]

Houstonia nigricans (Lamarck) Fernald *var.* ***nigricans***, Diamond-flower. Mt (VA), Cp (GA): limestone barrens dominated by *Andropogon gerardii*, blackland prairies; rare. Sw. VA (Ludwig 1999), s. MI, IA, NE, and e. CO, south to s. FL, TX, e. NM, and along the Sierra Madre Oriental to Hidalgo, Mexico. This species has been variously placed in *Houstonia*, *Hedyotis*, and *Stenaria*. Based primarily on seed characters and chromosome numbers, Terrell (2001) has concluded that this taxon is not congeneric with the Sri Lankan type of the genus *Hedyotis*, and is also not a *Houstonia*, so has published the new genus *Stenaria* for *Hedyotis nigricans* and its close relatives. Church (2003) considers *Stenaria* congeneric with *Houstonia*, based on molecular phylogeny. The resolution of generic limits in this group is still unresolved. As interpreted by Terrell (1991, 2001) and Turner (1995b), *Houstonia nigricans* is a polymorphic species, with *Houstonia nigricans* var. *nigricans* as a widespread "matrix variety," and other, much more local varieties warranting recognition. Turner (1995b) reports *Houstonia nigricans* var. *nigricans* (as *Hedyotis nigricans* var. *nigricans*) from Pickens County, SC; the documentation is not known to me, and suitable habitats there are unlikely. [= *Hedyotis nigricans* (Lamarck) Fosberg var. *nigricans* – K, U, Y; = *Stenaria nigricans* (Lamarck) Terrell var. *nigricans* – M; < *Hedyotis nigricans* – C, Q; < *Houstonia nigricans* (Lamarck) Fernald – F, G; > *Houstonia angustifolia* Michaux – S; > *Houstonia filifolia* (Chapman) Small – S; < *Stenaria nigricans* (Lamarck) Terrell var. *nigricans* – WH]

Houstonia procumbens (Walter ex J.F. Gmelin) Standley, Creeping Bluet, Fairy-footprints, Roundleaf Bluet. Cp (FL, GA, SC): beach dunes, moist to wet sandy pinelands; common. October-April. Se. SC south to s. FL, west to se. LA. Gaddy & Rayner (1980) note that this plant is fairly common on SC barrier islands, but flowers in the winter and is easily overlooked in other seasons (when botanists are more likely to be afield). See Wilbur (1968) and Ward (2004c) for differing opinions about the merits of the taxonomic recognition of the glabrous and pubescent plants. [= RAB, K, S, WH, X, Y; = *Hedyotis procumbens* (Walter ex J.F. Gmelin) Fosberg – Q; = *Houstonia rotundifolia* Michaux; > *Houstonia procumbens* var. *procumbens* – V; > *Houstonia procumbens* var. *hirsuta* (W.H. Lewis) D. B. Ward – V]

Houstonia purpurea Linnaeus *var.* ***calycosa*** Shuttleworth ex A. Gray, Midwestern Summer Bluet. Mt (GA, NC): dry woodlands, banks, rock outcrops, shallow soils around mafic and calcareous rock outcrops; rare (NC Watch List). May-July; July-August. The distribution and ecology of var. *calycosa* in our area are poorly known; it apparently occupies drier and typically more circumneutral sites than var. *purpurea*. Var. *calycosa* ranges from s. ME and w. NY west to s. OH, and sw. MO, south to w. NC, n. GA, AL, MS, AR, and e. OK. [= G, K, X, Y, Z; < *Houstonia purpurea* – RAB, W; < *Hedyotis purpurea* (Linnaeus) Torrey & A. Gray – C, Q; = *Houstonia lanceolata* (Poiret) Britton – F, S; = *Hedyotis purpurea* (Linnaeus) Torrey & A. Gray var. *calycosa* (Shuttleworth ex A. Gray) Fosberg]

Houstonia purpurea Linnaeus *var.* ***purpurea***, Summer Bluet. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist and dry woodlands and forests, roadbanks, thinner soils around rock outcrops, a variety of disturbed sites; common, rare in Coastal Plain. May-July; July-August. Var. *purpurea* ranges from MD and s. PA west to s. OH, s. IL, and sw. MO south to SC, sw. GA, Panhandle FL, MS, s. LA, e. TX, and e. OK. Plants growing in high elevation and exposed sites are sometimes dwarfed, and in that respect only, superficially resemble *H. montana*. [= G, K, X, Y, Z; < *Houstonia purpurea* – RAB, W, WH; = *Houstonia purpurea* – F, S; < *Hedyotis purpurea* (Linnaeus) Torrey & A. Gray – C, Q; = *Hedyotis purpurea* (Linnaeus) Torrey & A. Gray var. *purpurea*]

Houstonia pusilla Schoepf, Tiny Bluet. Pd, Cp (GA, NC, SC, VA), Mt (GA, NC): woodlands, lawns, and other disturbed sites; common (uncommon in FL). March-April. MD south to Panhandle FL, west to TX, and inland from IL west to NE, south to TN and TX. [= RAB, G, K, S, W, WH, X, Y; = *Houstonia patens* Elliott – F; = *Hedyotis crassifolia* Rafinesque – C, GW; < *Hedyotis caerulea* (Linnaeus) Hooker – Q; = *Houstonia minima* L.C. Beck – S]

Houstonia serpyllifolia Michaux, Appalachian Bluet, Thyme-leaf Bluet. Mt (GA, NC, SC, VA): streambanks, grassy balds, moist forests, seepy rock outcrops, spray cliffs, and moist disturbed areas; common (VA Watch List). (March-) May-June. A Southern and Central Appalachian endemic: PA south to nw. SC and ne. GA. The flowers are very similar to, but usually a brighter blue than, the more widespread *H. caerulea*. [= RAB, F, G, K, S, W, X, Y; = *Hedyotis michauxii* Fosberg – C, GW, Q]

Houstonia tenuifolia Nuttall, Diffuse-branched Bluet. Pd, Mt (GA, NC, SC, VA), Cp (NC, SC, VA): usually in dry woodlands, often rocky (especially mafic rocks) or sandy; uncommon (rare in Coastal Plain). May-July; July-October. This species is centered in the Southern Appalachians and the Ozarks, extending into provinces adjacent to both areas of concentration, ranging overall from PA west to MO and OK, south to SC, GA, and TX. [= RAB, F, G, S, W, Z; = *Hedyotis nuttalliana* Fosberg – C; < *Hedyotis longifolia* (Gaertner) Hooker – Q; = *Houstonia longifolia* var. *tenuifolia* (Nuttall) Wood; = *Houstonia longifolia*, "Tenuifolia Group" – X; < *Houstonia longifolia* – K]

Houstonia rosea (Rafinesque) Terrell. AL west to TX. [= K; = *Hedyotis rosea* Rafinesque] {synonymy incomplete}

Mitchella Linnaeus (Partridge-berry)

A genus of 2 species, perennials, ours and 1 in e. Asia. References: Rogers (2005)=Z.

Mitchella repens Linnaeus, Partidge-berry. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): deciduous and coniferous forests, stream-banks, heath balds, maritime forests, on rotten logs; common. May-June; June-July. Nova Scotia west to MN, south to c. peninsular FL and TX; disjunct in Guatemala. Plants in maritime forests are more robust than others and often have an ascending habit, the stems sometimes 20-30 cm tall. [= RAB, C, F, G, GW, K, S, W, WH, Z]

Mitracarpus Zuccarini (Girdle-pod)

A genus of about 30 species, of tropical America. References: Rogers (2005).

* ***Mitracarpus hirtus*** (Linnaeus) A.P. de Candolle, Girdle-pod. Cp (FL, GA, LA): disturbed areas; uncommon (rare in GA and LA), native of tropical America. [= K, WH; ? *M. villosus* (Swartz) Chamisso & Schlechtendahl ex A.P. de Candolle]

Oldenlandia Linnaeus (Oldenlandia)

A genus of about 100 species, pantropical, but circumscription is controversial and uncertain. References: Terrell & Robinson (2006)=X; Terrell (1991)=Z; Rogers (1987)=Y; GW; Rogers (2005).

1 Creeping, mat-forming perennial, rooting at nodes; leaves 1.5-5.2 mm long; flowers solitary on slender axillary pedicels; seeds 4-14 per capsule ..... ***O. salzmannii***
1 Erect, spreading, decumbent, or prostrate annual or perennial, not rooting at nodes; leaves 3-40 mm long; flowers usually > 1, in axillary clusters or pedunculate umbels; seeds > 50 per capsule.
  2 Flowers (1) 2-5 in pedunculate axillary umbels, the filiform peduncle 5-10 mm long, the filiform pedicels 3-5 mm long ..... ***O. corymbosa***
  2 Flowers 1-10 in sessile or subsessile axillary clusters.
    3 Stem glabrous or nearly so; leaves mostly linear or linear-oblanceolate, 1-3 mm wide, generally 5-10× as long as wide; flowers solitary or (rarely) in 2-3-flowered clusters; plant a perennial ..... ***O. boscii***
    3 Stem pilose or villous (rarely glabrous); leaves mostly ovate or broadly lanceolate, 4-10 mm wide, generally 2-3× as long as wide; flowers in compact clusters of 3-10, rarely solitary; plant an annual ..... ***O. uniflora***

Oldenlandia boscii (A.P. de Candolle) Chapman, Bosc's Bluet. Cp (FL, GA, NC, SC, VA), Mt (GA): clay-based Carolina bays, rivershore and millpond drawdown shores, sagponds, other seasonally saturated habitats; uncommon (rare in GA, NC, SC, and VA). August-September. A Southeastern Coastal Plain endemic, ranging from se. VA south to FL and west to TX. Similar in vegetative condition to *Polypremum procumbens*. [= RAB, G, K, S, WH, X, Z; = *Hedyotis boscii* A.P. de Candolle – C, F, GW, Y]

* ***Oldenlandia corymbosa*** Linnaeus, Diamond-flower. Cp (FL, GA, NC, SC), Pd (NC): moist lawns, gardens; common (rare in GA, NC, SC), native of South America. July-October. Reported for NC by Nesom (2000e). [= RAB, K, S, WH, X, Z; = *Hedyotis corymbosa* (Linnaeus) Lamarck – GW, Y]

* ***Oldenlandia salzmannii*** (de Candolle) Bentham & Hooker ex B.D. Jackson. Cp (FL): roadside ditches, marshes; rare, native of South America. Introduced in s. AL and w. Panhandle FL. [= K, WH, X]

Oldenlandia uniflora Linnaeus, Oldenlandia. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): pondshores, muddy drawdown shores, moist to wet ecotones of Coastal Plain streamheads, other moist to wet places; common (uncommon north of FL, rare in Piedmont). August-October. Mostly a species of the Southeastern Coastal Plain: NY (Long Island) south to s. FL and west to TX, north in the interior to MO. [= RAB, G, K, S, WH, X, Z; = *Hedyotis uniflora* (Linnaeus) Lamarck – C, F, GW, Y]

Paederia Linnaeus (Skunk-vine)

A genus of about 30 species, woody vines, of the Tropics. References: Rogers (2005)=Z; Diamond (1999).

* ***Paederia foetida*** Linnaeus, Skunk-vine. Cp (FL, LA, SC), Pd (NC): disturbed areas, rarely spreading from plantings; uncommon (rare in LA, NC, and SC), native of se. Asia. Diamond (1999) reports its naturalization in Randolph Co., NC. [= RAB, K, S, WH, Z]

Pentodon Hochstetter in Krauss 1844

A genus of 2 species, herbs, of tropical and warm temperate America and Africa. References: Terrell (1991)=Z; Rogers (1987)=Y; Rogers (2005).

* ***Pentodon pentandrus*** (K. Schumacher & Thonning) Vatke. Cp (FL, GA, SC): pond edges, wet meadows, moist ground; uncommon (rare in GA and SC), apparently native of Africa (GA Special Concern). July-September. In North America, ranging from e. SC south to s. FL, west to se. TX. [= GW, K, WH, Y, Z; ? *P. halei* (Torrey & A. Gray) A. Gray – S; ? *Oldenlandia halei* (Torrey & A. Gray) Chapman]

Pinckneya Michaux (Pinckneya, Fever-tree)

Pinckneya is a monotypic genus, a small tree of the se. United States. References: Godfrey (1988); Rogers (1987)=Z.

Identification notes: *Pinckneya* is showy when in flower because of the development of 1 of the 5 calyx lobes of some of the flowers of the inflorescence into a large (to 7 cm by 5 cm), petaloid (pink or cream) appendage.

Pinckneya bracteata (Bartram) Rafinesque, Pinckneya, Fever-tree. Cp (FL, GA, SC): margins of acidic, peaty (blackwater) swamps; uncommon (rare in GA and SC). May-June (-July); September. Se. SC south to ne. FL and Panhandle FL. [= GW, K, WH, Z; = *P. pubens* Michaux – RAB, S]

Psychotria Linnaeus 1759 (Wild Coffee)

A genus of about 2000 species, mostly shrubs, tropical and subtropical. References: Rogers (2005)=Z.

Psychotria nervosa Swartz, Wild Coffee. Cp (FL): hammocks; rare. Ne. FL (Duval County) south to s. FL, West Indies, Central America, and South America. [= K, S, WH, Z]

Richardia Linnaeus (Richardia)

A genus of about 15 species, of subtropical and tropical America, and introduced in the Old World. References: Lewis & Oliver (1974)=Z; Krings (2002). Key based in part on Krings (2002).

1 Mericarps smooth; corolla 4-lobed; [section *Asterophyton*] ..... ***R. humistrata***
1 Mericarps **either** conspicuously and densely hispidulous to strigose **or** papillose to tuberculate; corolla 6-lobed; [section *Richardia*].
  2 Stems hirsute, generally densely and evenly so from tip to base; adaxial leaf surface evenly strigose; mericarps conspicuously and densely hispidulous to strigose, the adaxial face broad, with a pronounced median keel; perennial from a woody rhizome (or annual) ..... ***R. brasiliensis***
  2 Stems hirsute or villous near the tips, but progressively more sparsely so to glabrate toward the base; adaxial leaf surface glabrous to strigillose near the margins only, the median portion of the leaf blade glabrous; mericarps papillose to tuberculate, the adaxial surface closed to a narrow groove; annual ..... ***R. scabra***

* ***Richardia brasiliensis*** Gomes. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): roadsides, fields, vacant lots, urban areas, disturbed areas; common, native of South America. May-November. [=RAB, C, F, K, S, WH, Z]

* ***Richardia humistrata*** (Chamisso & Schlechtendahl) J.A. & J.H. Schultes. Cp (FL) {AL, MS}: disturbed areas, savannas, pine flatwoods; rare, native of South America. Also collected in 1886 as a ballast waif in Camden County, NJ; first noted on the Gulf Coast only in 1941, but perhaps early introduced there on ballast as well, such as at Pensacola. [= K, WH, Z]

* ***Richardia scabra*** Linnaeus. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): roadsides, fields, vacant lots, urban areas, disturbed areas; common, native of South America. June -December. Lewis & Oliver (1974) consider this species to be native from our area south through Central America into northern South America, based on the semi-contiguous distribution, but occurrences in our region seem to be in altered habitats. [= RAB, C, F, G, K, S, WH, Z]

Sherardia Linnaeus (Field-madder)

A monotypic genus, an herb, native of Europe and w. Asia. References: Rogers (2005)=Z.

Identification notes: Similar in habit to *Galium*, but differing in its involucrate inflorescence and the more tubular, pink to purple flowers.

* ***Sherardia arvensis*** Linnaeus, Field-madder. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (NC, SC, VA): lawns, disturbed areas; uncommon (rare in FL), native of Europe. February-August. [= RAB, C, F, G, K, S, W, WH, Z]

Spermacoce Linnaeus (Buttonweed)

A genus of about 50 species, herbs, of tropical and warm-temperate Old and New World. References: Rogers (2005).

1 Calyx with 2 long lobes, the other 2 absent or vestigial ..... ***S. densiflora***
1 Calyx with 4 lobes of nearly equal length.
  2 Calyx lobes with a conspicuous white margin ..... ***S. prostrata***
  2 Calyx lobes green throughout.
    3 Fruit pubescent ..... ***S. assurgens***
    3 Fruit glabrous ..... ***S. glabra***

Spermacoce assurgens Ruiz & Pavón. Cp (FL, GA): wet hammocks, bottomland forests, marshes; uncommon (rare in GA). July-September. In sw. GA (Jones & Coile 1988), AL, and FL; also in the New World tropics? [> *S. assurgens* – K; ? *Borreria laevis* (Lamarck) Grisebach – GW, S, misapplied; ? *Spermacoce remota* Lamarck – WH; *Borreria brachysepala*, misapplied] {add to synonymy}

* ***Spermacoce densiflora*** (deCandolle) Alain. Cp (FL): disturbed areas; rare, native of the Neotropics. [= K, WH; = *Borreria densiflora* deCandolle] {add to synonymy}

Spermacoce glabra Michaux, Smooth Buttonweed. Mt (VA), Cp (FL, GA, SC*, VA*): rocky riversides in the mountains, disturbed areas in the Coastal Plain; rare (GA Rare). Perhaps only introduced in at least some parts of our area; see Wieboldt et al. (1998) for discussion. [= RAB, C, F, G, GW, K, S, WH]

Spermacoce prostrata Aublet. Cp (FL): wet pine flatwoods, floodplain forests; uncommon. FL, AL, MS, south through the New World tropics. July-September. [= K, WH; = *Borreria ocimoides* (Burmann f.) de Candolle – S, misapplied] {add to synonymy}

Spermacoce tenuior Linnaeus, reported from sw. GA (Kartesz 1999). {ID needs checking} [= K; ? *S. riparia* Chamisso & Schlechtendahl] {not yet keyed; add to synonymy}

RUTACEAE A.L. de Jussieu 1789 (Citrus Family)

A family of about 156 genera and 1800 species, trees, shrubs, vines, and rarely herbs, cosmopolitan.

1 Leaves unifoliolate (appearing simple); [subfamily *Aurantioideae*] ..... ***Citrus***
1 Leaves pinnately or palmately compound.
  2 Leaves 2-pinnatifid; suffrutescent herb or shrub to 1.5 m tall; [subfamily *Rutoideae*, tribe *Ruteae*] ..... ***Ruta***
  2 Leaves palmately 3-foliolate or 1-pinnate (5-19-foliolate); shrub or tree, usually over 1.5 m tall (potentially to 20 m in *Zanthoxylum*).
    3 Leaves pinnately 5-19-foliolate; [subgenus *Rutoideae*, tribe *Zanthoxyleae*] ..... ***Zanthoxylum***
    3 Leaves palmately 3-foliolate.
      4 Branches conspicuously armed with stout spines; [subfamily *Aurantioideae*] ..... ***Citrus***
      4 Branches not armed with spines; [subfamily *Toddalioideae*] ..... ***Ptelea***

Citrus Linnaeus 1753 (Citrus, Orange, Grapefruit, Lemon, Lime)

A genus of about 17 species, trees, of s. and se. Asia. The circumscription is uncertain, but Freitas de Araújo, Paganucci de Queiroz, & Machado (2003) favor a broad circumscription (followed here), including *Poncirus*, based on DNA analyses. References: Mabberley (1997b)=Z; Freitas de Araújo, Paganucci de Queiroz, & Machado (2003)=Y.

Identification notes: *Citrus* has simple to trifoliolate, evergreen, coriaceous, acuminate, glossy green leaves, and the familiar spherical fruits.

1 Leaves trifoliolate; fruit densely pubescent, 3-6 cm long ..... ***C. trifoliata***
1 Leaves unifoliolate; fruit glabrous, 4.5-25 cm long.
  2 Petiole winged, and with an articulation at the juncture with the blade; fruit 4.5-15 cm long ..... ***C. ×aurantium***
  2 Petiole not winged, and lacking an articulation at the juncture with the blade; fruit 15-25 cm long ..... ***C. medica***

* ***Citrus ×aurantium*** Linnaeus (pro sp.), Sour Orange, Grapefruit, Sweet Orange. Cp (FL, GA): cultivated horticulturally, sometimes persistent; rare. Reported from several counties in s. and e. GA (Jones & Coile 1988). [= WH, Z; = *C. aurantium* – K (as species)]

* ***Citrus medica*** Linnaeus, Citron. Cp (FL): disturbed hammocks; rare, native of se. Asia. Apparently naturalized in the FL Panhandle (Franklin County) (Wunderlin & Hansen 2003). [= K, S, WH]

* ***Citrus trifoliata*** Linnaeus, Trifoliate Orange, Hardy Orange. Pd (GA, NC, SC, VA), Cp (FL, GA, SC, VA), Mt (VA): woodlands, thickets, and streambanks, especially in suburban areas; rare, native of China. March-April; September-October. Planted in our area as an ornamental, also used as a grafting stock for citrus, *C. trifoliata* is a small tree or shrub that seems to be made up almost entirely of thorns. The fruits closely resemble an orange, but are small (ca. 4 cm in diameter), densely pubescent, and sour. *Citrus trifoliata* is often considered a separate genus, *Poncirus*, but differs very little from *Citrus* morphologically and has been shown to be phylogenetically nested within Citrus. [= Y; = *Poncirus trifoliata* (Linnaeus) Rafinesque – RAB, F, G, K, S, WH]

* *Citrus ×limon* (Linnaeus) Burmann f., Lemon, *C. ×paradisi* Macfadyen in Hooker (pro sp.), Grapefruit, and *C. sinensis* (Linnaeus) Osbeck, Orange, have been grown on the Outer Banks of North Carolina in Buxton, Dare County, NC (Brown 1959). They are apparently not naturalized, being killed outright or severely damaged by occasional colder winters. {not keyed}

Ptelea Linnaeus 1753 (Hop-tree, Wafer-ash, Stinking Ash)

A genus of about 11 species, of North America (south into Mexico). References: Bailey (1962)=Z.

1 Twigs densely pubescent; leaflets densely soft-pubescent beneath ..... ***P. trifoliata*** *var.* ***mollis***
1 Twigs glabrous or glabrescent; leaflets usually glabrous or glabrate ..... ***P. trifoliata*** *var.* ***trifoliata***

Ptelea trifoliata Linnaeus *var.* ***mollis*** Torrey & A. Gray, Hairy Hop-tree. Cp (FL, GA, NC, SC), Pd, Mt (GA, NC, SC, VA): rocky bluffs, especially calcareous or mafic, open woodlands, calcareous Coastal Plain river bluffs, granitic domes; uncommon. The relative distribution and habitats of the two varieties in our area need further study. April-June; June-August. MD, w. NC, n. GA, n. AL, and c. TX south to e. GA, Panhandle FL, and s. TX. Our varieties are both placed by Bailey (1962) as quadrinomials in the eastern ssp. *trifoliata*. [= F; < *P. trifoliata* – RAB, WH; = *P. trifoliata* ssp. *trifoliata* var. *mollis* Torrey & A. Gray – C, K, Z; < *P. trifoliata* var. *trifoliata* – G; >< *P. trifoliata* – S, in part]

Ptelea trifoliata Linnaeus *var.* ***trifoliata***, Smooth Hop-tree. Mt (GA, NC, VA), Pd (GA, SC, VA), Cp (FL, GA, VA): rocky bluffs, especially calcareous or mafic, open woodlands, calcareous Coastal Plain river bluffs, granitic domes; uncommon. April-June; June-August. NJ, w. NY, MI, s. WI, and NE south to c. peninsular FL, c. AL, c. MS, e. TX. The relative distribution and habitats of the two varieties in our area need further study. Bailey discusses some odd forms, corresponding in part to Small's species, which she does not recognize taxonomically; further study is warranted. [= F; < *P. trifoliata* – RAB, WH; = *P. trifoliata* ssp. *trifoliata* var. *trifoliata* – C, K, Z; < *P. trifoliata* var. *trifoliata* – G; > *P. trifoliata* – S, in part; > *P. serrata* Small – S; > *P. microcarpa* Small – S; > *P. baldwinii* Torrey & A. Gray – S]

Ruta Linnaeus 1753 (Rue)

A genus of about 7 species, of the Old World.

* ***Ruta graveolens*** Linnaeus, Rue. Pd (NC, VA), Mt (VA): cultivated in gardens as a medicinal herb, persistent and rarely escaping, sometimes locally abundant in pastures over limestone; rare, native of Eurasia. May-August; June-September. This plant causes dermatitis in some people, apparently by removing the skin's sun-resistance. *Ruta* has a disagreeable smell, and has toxic properties. [= RAB, C, F, G, K, S]

Zanthoxylum Linnaeus 1753 (Prickly-ash, Toothache Tree)

A genus of about 250 species, of America, Africa, Asia, and Australia. References: Porter (1976)=Z.

1 Leaves thin in texture, pubescent; flowers in small axillary clusters ..... ***Z. americanum***
1 Leaves coriaceous in texture, glabrous and waxy; flowers in large terminal compound cymes ..... ***Z. clava-herculis***

Zanthoxylum americanum P. Miller, Prickly-ash, Toothache Tree, Northern Prickly-ash. Mt (VA), Pd (GA, VA), Cp (FL, GA, SC): woodlands and forests over calcareous or mafic rocks, often forming extensive colonies near outcrops; rare. March-April; July-August. S. Québec west to e. ND, south to e. SC, c. GA, Panhandle FL, e. TN, c. TN, and OK. Sometimes planted. There is only a single known site in SC. [= RAB, C, K, W, S, WH, Z; = *Xanthoxylum americanum* – F, orthographic variant]

Zanthoxylum clava-herculis Linnaeus, Toothache Tree, Hercules'-club, Sea-ash, Southern Prickly-ash, Pepper-bark, Tickle-tongue. Cp (FL, GA, NC, SC, VA): maritime forests, dunes, shell middens, shell hammocks, maritime scrub, inland (in FL and GA) in hammocks; uncommon (rare in VA). April-May; July-September. A Southeastern Coastal Plain endemic: se. VA south to FL and west to TX, AR, and OK. The compound leaves are armed with stout prickles along the rachis. The twigs are also spiny. On the larger branches and trunks, the spines become elevated on conical, pyramidal, or cylindrical corky bases up to 5 cm long and 4 cm in diameter, giving the trunk a very peculiar appearance. Many of the common names come from the numbing effect on the mouth of chewing the leaf or twig, the flavor, smell, and effect being very similar to *Ctenium aromaticum*, Toothache Grass. In our area it is restricted to the outer Coastal Plain, nearly entirely on the barrier islands. Although normally a small tree, it can reach considerable size, up to about 60 cm DBH. In the 5 km immediately north of Buxton, Dare County, NC one can see several hundred individuals growing on open, *Uniola*-dominated dunes. Because of salt-pruning, the trees often have 5 times as wide a spread as they are tall. Some trees have a basal diameter of 30-40 cm, a short trunk less than a meter tall, a total height of 2-3 m, and a spread of 10 m. [= RAB, C, G, K, S, WH, Z; = *Xanthoxylum clava-herculis* – F, orthographic variant]

SALICACEAE de Mirbel 1815 (Willow Family)

A family of 2 genera and about 435 species, trees, shrubs, and subshrubs, nearly cosmopolitan.

1 Leaf blades 0.8-2 (-3)× as long as wide; stamens 5-80; buds covered by several, overlapping scales; flowering catkins arching or drooping ..... ***Populus***
1 Leaf blades (2-) 3-30× as long as wide; stamens 1-9; buds covered by a single scale; flowering catkins usually erect or ascending ..... ***Salix***

Populus Linnaeus 1753 (Poplar, Aspen, Cottonwood)

A genus of about 35 species, trees, largely north temperate. References: Eckenwalder (1977)=Z; Eckenwalder (1984)=Y; Eckenwalder (1996); Hamzeh & Dayanandan (2004).

1 Winter buds not viscid; stamens 5-20.
  2 Stamens 12-20; scales of the catkins deeply fimbriate; petioles terete; [section *Leucoides*] ..... ***P. heterophylla***
  2 Stamens 5-12; scales of the catkins dentate or with only 3-7 linear-trianglar lobes; petioles strongly flattened laterally (90 degrees to the plane of the leaf blade), especially near the junction with the blade; [section *Populus*].
    3 Petioles strongly flattened laterally; leaves glabrous when mature (pubescent when young in *P. grandidentata*); [native trees].
      4 Leaf margins coarsely crenate- or undulate-toothed, with fewer than 12 (-15) teeth per side, the sinuses of the larger teeth 1.5-6 mm deep; leaves puberulent beneath when young (glabrate in age); buds gray-pubescent ..... ***P. grandidentata***
      4 Leaf margins finely crenulate-serrulate, with 15-35 (-70) teeth per side, the sinuses 0.5-1.0 mm deep; leaves glabrous; buds glossy brown ..... ***P. tremuloides***
    3 Petioles terete or nearly so; leaves densely pubescent (*P. alba*) or glabrescent (*P. ×canescens*); [exotic trees].
      5 Leaves of vigorous shoots palmately 3-7-lobed (and also toothed); leaves densely white-tomentose beneath when young and mature.. ..... ***P. alba***
      5 Leaves of vigorous shoots merely toothed; leaves glabrescent when mature ..... ***P. ×canescens***
1 Winter buds viscid (sticky and shiny as if recently varnished); stamens (15-) 20-80.
  6 Petiole terete or dorsally flattened (in the plane of the leaf blade), and often also channeled above; leaf blades dark green above, glaucous white beneath; leaf margin not translucent, finely serrate with teeth < 1 mm deep; [section *Tacamahaca*].
    7 Petioles 7-10 cm long; leaves ovate, broader below the midpoint; leaf base rounded to subcordate; twigs terete or slightly angled in cross-section ..... ***P. balsamifera***
    7 Petioles < 2 cm long; leaves obovate, broader past the midpoint; leaf base cuneate to rounded; twigs strongly angled in cross-section ..... ***P. simonii***
  6 Petiole laterally flattened (90 degrees to the plane of the leaf blade), especially near the junction with the blade; leaf blades light green above, often paler beneath but not distinctly whitened; leaf margin translucent, finely to coarsely serrate with teeth > 1 mm deep.
    8 First-year branches reddish-brown; leaves noticeably paler beneath; flattened portion of petiole < 2× as deep as wide; early leaves with > 20 teeth per side, the largest < 2.5 mm deep; [probable intersectional hybrid of section *Aegeiros* and section *Tacamahaca*]... ***P. ×jackii***
    8 First-year branches yellow- to orange- brown; leaves nearly the same color above and below; flattened portion of petiole > 2× as deep as wide; early leaves usually with < 20 teeth per side, the largest < 2.5 mm deep; [section *Aegeiros*].
      9 Stigmas 3-4; stamens (30-) 40-80; [native tree, common] ..... ***P. deltoides ssp. deltoides***
      9 Stigmas 2-3; stamens (15-) 20-30; [alien trees, rare out of cultivation].
        10 Floral disk 2-4 mm wide; stigmas 2-3; ovules and seeds 6-14 (-20) per placenta ..... ***P. ×canadensis***
        10 Floral disk 1-2 mm wide; stigmas 2; ovules and seeds 4-8 per placenta ..... ***P. nigra***

* ***Populus alba*** Linnaeus, Silver Poplar, White Poplar. Mt, Pd, Cp (GA, NC, SC, VA): disturbed areas, suburban woodlands; uncommon, native of Europe. March-April. [= RAB, C, F, G, K, S, W]

* ***Populus ×canadensis*** Moench (pro sp.) [*P. deltoides* × *nigra*], Hybrid Black Poplar. Pd (GA) {NC, VA}: disturbed areas; rare. Reported for a county in c. GA (Jones & Coile 1988) and for NC and VA (Kartesz 1999). [= C, K]

* ***Populus ×canescens*** (Aiton) Sm. (pro sp.) [*P. alba* × *tremula*], Gray Poplar. Mt (GA, NC), Pd (GA, NC), Cp (NC), {SC, VA}: roadsides, disturbed areas; uncommon, native of Europe. March-April. Occurs at scattered locations in TN, n. GA (Jones & Coile 1988), se. PA (Rhoads & Klein 1993), and NC, SC, and VA (Kartesz 1999). See Poindexter (2006). [= C, K; = *P. canescens* (Aiton) Sm. – F, G]

Populus deltoides Bartram ex Marshall *var. deltoides*, Eastern Cottonwood. Pd, Cp (GA, NC, SC, VA), Mt (GA, VA): riverbanks, bottomland forests (not found along blackwater streams); common. March-April. Var. *deltoides* ranges from Québec

west to MN, south to FL and TX. Var. *occidentalis* Rydberg [ssp. *monilifera* (Aiton) Eckenwalder] is more western, primarily of the Great Plains. [= C, GW; < *P. deltoides* – RAB, G, W; > *P. deltoides* var. *deltoides* F; > *P. deltoides* var. *missouriensis* (A. Henry) A. Henry – F; = *P. deltoides* ssp. *deltoides* – K, Z; = *P. balsamifera* Linnaeus – S, misapplied]

Populus grandidentata Michaux, Bigtooth Aspen. Mt (NC, VA), Pd, Cp (VA): dry, rocky, upland forests; common, rare south of VA (NC Watch List). April-May. Nova Scotia west to MN, south to w. NC, sc. TN, and n. MO. [= RAB, C, F, G, K, S, W]

Populus heterophylla Linnaeus, Swamp Cottonwood. Cp (GA, NC, SC, VA), Pd (NC, VA): blackwater and brownwater swamp forests; common (rare in Piedmont). March-April. CT west to MI, south to n. FL and LA, scattered and irregular in distribution, absent from the Appalachians. [= RAB, C, G, GW, K, S]

* ***Populus ×jackii*** Sargent [probably *P. balsamifera* × *deltoides*], Balm-of-Gilead. Mt (NC, VA): bottomlands, riverbanks, streambanks; rare or locally abundant, spread from cultivation. April. This cultivar is of uncertain origin, considered by some to be a hybrid *P. balsamifera* × *deltoides*, by others to be an atypical pistillate clone of *P. balsamifera* Linnaeus. The cultivar '*gileadensis*' is distinguished from the typical form by the petioles densely and stiffly pubescent (vs. petioles glabrous). *P. ×jackii* is locally abundant along the New River in Watauga, Ashe, and Alleghany counties, NC and downstream into VA. [= C, K, Y; = *P. candicans* Aiton – RAB, G, S, misapplied; > *P. ×gileadensis* Rouleau – F, W]

* ***Populus nigra*** Linnaeus, Black Poplar, Lombardy Poplar. Pd (GA, VA), Cp (GA): disturbed suburban areas; rare, native of s. Europe. Cultivated in many forms, including the columnar "Lombardy Poplar;" short-lived and only weakly spreading to disturbed areas in the vicinity of plantings. [= C, F, G, K; > *P. italica* (Du Roi) Moench – S]

* ***Populus simonii*** Carrière, Chinese Poplar, Simon's Poplar. Mt (NC): riverbanks; rare, native of China. Naturalized in the Mountains of NC.

Populus tremuloides Michaux, Quaking Aspen. Mt (NC, VA), Pd (VA): heath balds, rocky woodlands, exposed rock oucrops, and clearings; rare (VA Rare). April-May. Labrador west to AK, south to NJ, VA, w. NC, WV, MO, and (in the Rockies) to TX and Mexico. [= C, G, K, S, W; > *P. tremuloides* var. *tremuloides* – F]

Populus balsamifera Linnaeus, Balsam Poplar, Hackmatack, ranges south to s. PA (Rhoads & Klein 1993), e. and c. KY (Clark et al. 2005), and to VA (according to Kartesz 1999). Also reported for n. GA (Jones & Coile 1988) and provisionally for SC (Kartesz 1999). I have been unable to locate herbarium specimens documenting its occurrence in our primary area. {further investigate}. [= C, G; = *P. balsamifera* ssp. *balsamifera* – K; > *P. balsamifera* var. *balsamifera* – F; > *P. balsamifera* var. *magnifica* Victorin – F; > *P. balsamifera* var. *subcordata* Hylander; > *P. balsamifera* var. *michauxii* (Dode) Henry]

Populus ×smithii Boivin [*P. grandidentata* × *tremuloides*]. South to MD and WV. [= C, K] {not yet keyed}

Salix Linnaeus 1753 (Willow)

A genus of about 400 species, trees, shrubs, and subshrubs, mostly north temperate and boreal. References: Argus (1986)=Z; Dorn (1995)=Y; Argus (1997). Key adapted from Z.

1 Leaves mostly alternate, but some opposite or subopposite; [subgenus *Vetrix*, section *Helix*] ..... ***S. purpurea***
1 Leaves all alternate.
  2 Bud apex sharp-pointed; bud scale margin free and overlapping; leaf blades 2.5-16× as long as wide; [subgenus *Salix*].
    3 Leaf blades (4-) 7-10 (-16)× as long as wide; leaf undersurface glaucous or not; [section *Humboldtianae*].
      4 Leaves glaucous beneath; pistils borne on stipes averaging 2 mm long (range 1-5 mm); stipules usually prominent and persistent, to 15 mm long; leaf blades (4-) avg. 7.5 (-13)× as long as wide ..... ***S. caroliniana***
      4 Leaves not (or thinly) glaucous beneath; pistils borne on stipes averaging 1 mm long (range 0.5-1.5 mm); stipules usually small and caducous, to 12 mm long; leaf blades (4-) avg. 9 (-16)× as long as wide ..... ***S. nigra***
    3 Leaf blades 2.5–5 (-6)× as long as wide; leaf undersurface glaucous.
      5 Leaf apex acuminate to caudate; branchlets yellow; [midwestern species east to w. KY]; [section *Humboldtianae*] ..... ***[S. amygdaloides]***
      5 Leaf apex acute; branchlets reddish brown or green; [rare plant of sphagnous seepage of GA and FL]; [section *Floridanae*] ..... ***S. floridana***
  2 Bud apex blunt; bud scale margin fused; leaf blades 2-30× as long as wide.
    6 Leaves green or pale green beneath.
      7 Leaves linear, (7-) 11-19 (-30)× as long as wide; leaf margin distinctly glandular-denticulate; stomates present on the upper leaf surface; pistils pubescent to glabrescent; stamens 2, the staminate floral bracts tawny, the aments on leafy branches; [subgenus *Longifoliae*, section *Longifoliae*] ..... ***S. exigua var. sericans***
      7 Leaves lanceolate or elliptic-lanceolate, 2-6× as long as wide; leaf margin serrate; stomates usually absent on the upper leaf surface; pistils glabrous; stamens 3, or if 2 (*S. eriocephala*), the staminate floral bracts dark brown, the aments sessile with a few leafy bracts.
        8 Stipules not glandular on their margins; pistillate floral bracts present after flowering; petioles not glandular; stamens 2; [subgenus *Vetrix*, section *Cordatae*] ..... ***S. eriocephala var. eriocephala***
        8 Stipules glandular on their margins (stipules caducous and often absent in *S. pentandra*); pistillate floral bracts deciduous after flowering; petioles glandular near the junction with the blade; stamens 3-9; subgenus *Salix*, section *Salicaster*].
          9 Stipules persistent and prominently glandular; young leaves and twigs with reddish-brown hairs, glabrescent or glabrous later; leaves long-acuminate; capsules 5-7 mm long ..... ***S. lucida***
          9 Stipules caducous, inconspicuously glandular; young leaves and twigs glabrous; leaves short-acuminate; capsules 8-9 mm long ..... ***S. pentandra***
    6 Leaves glaucous beneath.
      10 Leaf margin serrulate or serrate.
        11 Shrubs to 6 m tall; leaves lacking stomates on the upper surface; [native to our area]; [subgenus *Vetrix*].
          12 Stipules prominent, 5-15 mm long; branches flexible; mature leaves glabrous or glabrescent beneath; staminate aments borne on short, leafy branches; [section *Cordatae*] ..... ***S. eriocephala var. eriocephala***

12 Stipules absent or of small glands (rarely to 4 mm long on vigorous shoots); branches brittle; mature leaves short-sericeous beneath; staminate aments sessile, sometimes with a few leafy bracts; [section *Griseae*] ..... ***S. sericea***

11 Trees; leaves with stomates on the upper surface; [introduced in our area]; [subgenus *Salix*].

13 Leaf margin coarsely and irregularly serrate; leaves glabrous beneath; leaf blade 4-7 (-10)× as long as wide; petioles (7-) 10-20 mm long, glabrous; [section *Salix*] ..... ***S. fragilis***

13 Leaf margin minutely and uniformly serrulate; leaves long-sericeous or glabrate beneath; leaf blade 5-13× as long as wide; petioles 3-12 mm long, tomentose or sericeous.

14 Leaves long-sericeous beneath; branches ascending (rarely pendulous); leaves narrowly lanceolate, with length/width ratio of 5-6.5; petioles 3-6 mm long; petioles 3-6 mm long, sericeous; flowering branchlets 1-1.5 cm long; [section *Salix*]... ***S. alba***

14 Leaves glabrate beneath; branches normally pendulous; leaves very narrowly lanceolate, with length/width ratio of 6.5-13; petioles 7-12 mm long; petioles 7-12 mm long, tomentose; flowering branchlets ca. 0.3 cm long; [section *Subalbae*] ..... ***S. babylonica***

10 Leaf margin entire or crenate (to slightly and irregularly serrate); [subgenus *Vetrix*, section *Cinerella*].

15 Leaves glabrate (sparsely pubescent when young), not revolute ..... ***S. discolor***

15 Leaves permanently pubescent, at least on the lower surface (densely villous or tomentose when young), revolute.

16 Leaf margin entire and undulate; pistillate aments 1-3.5 cm long; pistils borne on stipes mostly < 2 mm long; staminate aments 0.5-2 cm long; shrubs, < 2 m tall.

17 Leaves stipulate; leaf blades (5-) avg. 7 (-13) cm long, (12-) avg. 17 (-35) mm wide; staminate aments 1-2 cm long; pistillate aments 2-3.5 cm long... ..... ***S. humilis***

17 Leaves exstipulate; leaf blades (2.5-) avg. 4 (-5) cm long, (5-) avg. 7 (-10) mm wide; staminate aments 0.5-1.1 cm long; pistillate aments 1-2 cm long ..... ***S. occidentalis***

16 Leaf margin crenate or irregularly serrate (rarely nearly entire); pistillate aments 3-8 cm long; pistils borne on stipes mostly > 2 mm long; staminate aments 2-5 cm long; shrubs to small trees, mostly 3-15 m tall.

18 Trees or tall shrubs, to 15 m tall; decorticated wood of 1-4 year old branches smooth or with a few ridges usually < 5 mm long ..... ***S. caprea***

18 Shrubs, 3-7 (12) m tall; decorticated wood of 1-4 year old branches with numerous ridges, many of them longer than 2 cm.

19 Leaves tomentose beneath with a mixture of white and rusty hairs ..... ***S. atrocinerea***

19 Leaves tomentose beneath with white or gray hairs ..... ***S. cinerea***

* ***Salix alba*** Linnaeus, European White Willow. Mt (GA, NC, VA), Pd (GA, NC, VA), Cp (VA): disturbed areas; rare, native of Eurasia. March-April. [= RAB, C, F, G, K, S, W, Z]

* ***Salix atrocinerea*** Brotero, Common Sallow, Olive-leaf Willow, Large Gray Willow. Mt (NC): disturbed areas; rare, native of western Europe. April. Also reported as naturalized in KY (Clark et al. 2005) and PA (Kartesz 1999). [= K; = *S. cinerea* Linnaeus ssp. *oleifolia* (Smith) Macreight – Z; < *S. cinerea* – RAB, C, F, G]

* ***Salix babylonica*** Linnaeus, Weeping Willow. Mt, Pd, Cp (GA, NC, SC, VA): disturbed areas; common, native of Asia. March-April. [= RAB, C, F, G, K, S, W, Z; > *S.* ×*pendulina* Wenderoth (*fragilis* × *?sepulcralis*) – K; > *S.* ×*sepulcralis* Simonkai (*alba* × *?pendulina*) – K]

* ***Salix caprea*** Linnaeus, Goat Willow, Great Sallow. Mt (NC, VA), Pd (VA): disturbed areas; rare, native of Eurasia. April. [= C, F, G, K, Z]

Salix caroliniana Michaux, Carolina Willow, Coastal Plain Willow. Cp, Pd, Mt (GA, NC, SC, VA): riverbanks, sandbars, other wet sites; common (uncomomon to rare in Piedmont and Mountains). March-April. Widespread in the Southeast, *S. caroliniana* has a somewhat peculiar range, with three main centers of distribution, the Coastal Plain from VA south to FL, the Interior Low Plateau of TN, KY, and n. AL, and the Ozark-Ouachita Highlands of AR and MO. [= RAB, C, F, G, GW, K, Z; = *S. longipes* Andersson – S]

* ***Salix cinerea*** Linnaeus, Gray Willow. Mt (NC, SC, VA), Pd (GA, NC, SC, VA), Cp (NC): disturbed areas; rare, native of Eurasia. April. [= K; = *S. cinerea* ssp. *cinerea* – Z; < *S. cinerea* – RAB, C, F, G (circumscription uncertain but apparently including *S. atrocinerea*)]

Salix discolor Muhlenberg, Pussy Willow. Mt (VA), Pd (NC): calcareous wetlands, disturbed areas; rare, apparently native in VA, introduced only in NC (VA Rare). April. Newfoundland and Alberta south to DE, w. VA, KY, MO, SD, and MT. [= C, K, S, Z; > *S. discolor* var. *discolor* – F, G]

Salix eriocephala Michaux *var.* ***eriocephala***, Heart-leaved Willow. Mt, Pd, Cp (GA, VA): seepage areas, ditches, alluvial areas; common. April-May. Newfoundland and Québec west to Yukon and British Columbia, south to e., c., and w. VA, n. KY, w. TN, n. AR, ne. KS, and CA; disjunct in AL and adjacent w. GA, s. GA, and panhandle FL. Var. *eriocephala* is the more eastern of six varieties, and ranges from Newfoundland west to ND, south to w. FL and s. KS (Dorn 1995). [< *S. eriocephala* – C, K, W, Z; > *S. rigida* Muhlenberg var. *rigida* – F, G; > *S. rigida* var. *angustata* (Pursh) Fernald – F; > *S. rigida* var. *vestita* (Andersson) Ball – G; = *S. cordata* Muhlenberg – S, misapplied; = *S. eriocephala* ssp. *eriocephala* var. *eriocephala* – Y]

Salix exigua Nuttall *var.* ***sericans*** (Nees) Nesom, Sandbar Willow. Mt, Pd, Cp (VA): sandbars, riverbanks, creekbanks; rare (VA Rare). March-mid May and June-August. *S. exigua* occurs throughout North America except most of the Southeast, south to DE, w. VA, e. TN, MS, LA, TX, and Mexico; var. *sericans* is the more eastern variety of the complex (Nesom 2002). [< *Salix exigua* – W, Z; > *S. exigua* ssp. *interior* (Rowlee) Cronquist var. *angustissima* (Andersson) Reveal & Broome – C; > *S. interior* Rowlee var. *interior* – F, G; = *S. interior* Rowlee – GW, K, S]

Salix floridana Chapman, Florida Willow. Cp (GA): sphagnous seepages; rare (GA Endangered). March-April. C. GA south to c. peninsular and Panhandle FL. [= GW, K, S, Z]

* ***Salix fragilis*** Linnaeus, Crack Willow, Brittle Willow. Pd (VA): low areas; rare, native to Asia Minor, introduced to Europe and thence to here. [= C, F, G, K, S, Z]

Salix humilis Marshall, Upland Willow, Prairie Willow. Mt, Pd (GA, NC, VA), Cp (GA, NC, SC, VA): upland areas, often in open or semi-open sites, in barrens, fens, and grassy balds over mafic rocks (such as amphibolite) up to at least 1800m elevation, also in powerline rights-of-way, woodland borders, and other miscellaneous habitats; uncommon. March-May. This

species is widespread in e. North America. [= C, G, S; < *S. humilis* – RAB, GW (also see *S. occidentalis*); = *S. humilis* var. *humilis* – K, W, Z; > *S. humilis* var. *humilis* – F; > *S. humilis* var. *hyporhysa* Fernald – F]

* ***Salix lucida*** Muhlenberg, Shining Willow. Mt (VA): low areas; rare (VA Watch List). May. Doubtfully indigenous to the one known population in Roanoke County, VA. [= C, W, Z; > *S. lucida* var. *lucida* – F, G; = *S. lucida* ssp. *lucida* – K]

Salix nigra Marshall, Black Willow. Pd, Mt, Cp (GA, NC, SC, VA): riverbanks, sandbars, other moist areas; common. March-April. *S. nigra* occurs nearly throughout e. North America. [= RAB, F, G, GW, K, S, W, Z; *S. nigra* var. *nigra* – C]

Salix occidentalis Walter, Dwarf Upland Willow, Sage Willow. Mt, Pd (GA, NC, VA), Cp (GA, NC, SC, VA): upland areas, often over mafic (amphibolite) or ultramafic (olivine) rocks; uncommon. March-May. This species is less widespread than the related *S. humilis,* with a distribution centered in the central Appalachians. [= C; < *S. humilis* – RAB, GW; = *S. humilis* var. *microphylla* (Andersson) Fernald – F, W, Z; = *S. tristis* Aiton – G, S; = *S. humilis* var. *tristis* (Aiton) Griggs – K]

* ***Salix pentandra*** Linnaeus, Bay Willow. Pd, Mt (NC, VA): disturbed areas; rare (perhaps not established), native of Eurasia. April. [= C, F, G, K, Z]

* ***Salix purpurea*** Linnaeus, Basket Willow, Purple Willow, Purple Osier. Mt (NC, VA), Pd (GA, VA): disturbed areas; rare, native of Europe. April. [= RAB, C, F, G, K, S, Z]

Salix sericea Marshall, Silky Willow. Mt (GA, NC, SC, VA), Pd, Cp (NC, SC, VA): bogs, peaty swamps, banks of small streams; uncommon. March-April. *S. sericea* is a northeastern species, ranging south to w. NC, ne. GA, e. TN, sc. TN, AL, and AR. [= RAB, C, F, G, GW, K, S, W, Z]

Salix amygdaloides Andersson, Peachleaf Willow. East to w. KY. [= C, F, G, K, Z] {add to synonymy}

Salix bebbiana Sargent, Long-beaked Willow, Gray Willow, is widespread and rather common in PA (Rhoads & Klein 1993) and also occurs in MD (Argus 1986). [= C, K, Z; > *S. bebbiana* var. *bebbiana* – F] {subgenus *Salix*, section *Fulvae*}

Salix cordata Michaux, south to MD, PA (Kartesz 1999). {investigate} [= C, K; > S. cordata var. cordata – F] {not yet keyed}

* ***Salix elaeagnos*** Scopoli is reported for SC (Kartesz 1999). [= K] {subgenus *Vetrix*, section *Canae*} {not keyed}

* ***Salix matsudana*** Koidzumi, Corkscrew Willow, is reported for VA (Fairfax and Fauquier counties). [= K] {not keyed}

SAMOLACEAE Rafinesque 1820 (Water-pimpernel Family)

A monogeneric family of 10-15 species, herbs and subshrubs, cosmopolitan. *Samolus* was previously generally treated as an aberrant component of Primulaceae. The traditional families Primulaceae, Myrsinaceae, and Theophrastaceae have been repartitioned by Källersjö, Bergqvist, & Anderberg (2000) in order to create monophyletic groups, with *Samolus* placed in Theophrastaceae. However, *Samolus* remains aberrant in Theophrastaceae and is basal; it is probably best placed in its own family, Samolaceae (Ståhl in Kubitzki 2004). References: Källersjö, Bergqvist, and Anderberg (2000); Ståhl in Kubitzki (2004).

Samolus Linnaeus 1753 (Water-pimpernel)

A genus of about 10-15 species, herbs and subshrubs, nearly cosmopolitan. References: Ståhl in Kubitzki (2004).

1 Pedicels ebracteate; corolla 3-7.5 mm long, the flowers 5-7 mm across; leaves all below the inflorescence; calyx lobes equaling or longer than tube; staminodes absent ..... ***S. ebracteatus***
1 Pedicels with a minute bract near the middle; corolla 1.2-3 mm long, the flowers 2-3 mm across; leaves extending into the inflorescence; calyx lobes equaling or shorter than tube; staminodes present ..... ***S. floribundus***

Samolus ebracteatus Humboldt, Bonpland, & Kunth, Limewater Brookweed. Cp (FL): brackish marshes, swamps over calcareous substrate; rare. Peninsular FL, coastal Panhandle FL, sw. LA, and TX, south into Mexico; West Indies. [= GW, WH; > *S. ebracteatus* ssp. *ebracteatus* – K; > *S. ebracteatus* ssp. *alyssoides* – K]

Samolus floribundus Humboldt, Bonpland, & Kunth, Water-pimpernel, Brookweed. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, VA): stream banks, brackish marshes, pools in floodplains, interdune ponds; common. April-October. New Brunswick west to British Columbia, south to Central America; also in c. and s. South America. Sometimes treated as a subspecies of the European *S. valerandi*; the American plant is sufficiently distinct to warrant specific status. *S. floribundus* has priority over *S. parviflorus* by a month. [= C, G, S; = *S. parviflorus* Rafinesque – RAB, F, GW, W; = *S. valerandi* Linnaeus ssp. *parviflorus* (Rafinesque) Hultén – K, WH]

SANTALACEAE R. Brown 1820 (Sandalwood Family)

A family of about 34 genera and 540 species, trees, shrubs, and herbs, primarily of tropical and warm temperate regions of the Old World and New World. All members of the family are hemiparasitic, attaching to the roots of other plants. Viscaceae are closely related and should perhaps be included in the Santalaceae (Angiosperm Phylogeny Group 2003). References: Nickrent & Malécot (2001).

1 Leaves alternate; monoecious herb or shrub.
  2 Herb, < 2 (-3) dm tall; leaves 1-4 cm long; inflorescence a terminal panicle of cymes; [tribe *Comandreae*] ..... ***Comandra***
  2 Shrub, > 4 dm tall; leaves 5-15 cm long; inflorescence a terminal raceme; [tribe *Pyrularieae*] ..... ***Pyrularia***
1 Leaves opposite; dioecious shrub.
  3 Staminate flowers in terminal umbel-like dichasia; pistillate flowers solitary, terminal; clumped shrub to 4 m tall; [tribe *Thesiae*] .....

.....*Buckleya*
3 Staminate flowers in axillary umbels; pistillate flowers solitary, axillary; rhizomatous shrub to 1 m tall; [tribe *Santaleae*].....*Nestronia*

Buckleya Torrey (Piratebush)

A genus of 4 species, shrubs, of temperate e. North America and e. Asia – the 3 other species are *B. lanceolata* (Siebold & Zuccarini) Miquel of Japan, and *B. henryi* Diels and *B. graebneriana* Diels of China. References: Carvell & Eshbaugh 1982=Z; Massey et al. (1983).

Buckleya distichophylla (Nuttall) Torrey, Piratebush. Mt (NC, VA): dry or rocky bluffs and slopes; rare. April-May; June-October. A Southern Appalachian endemic: sw. VA south through ne. TN to sw. NC, in the western edge of the Blue Ridge and to the west in the Ridge and Valley. It is apparently parasitic on a variety of hosts – not limited to *Tsuga*, as has sometimes been reported. The branches are often mistaken for a compound leaf. [= RAB, C, F, G, K, S, W, Z]

Comandra Nuttall (Bastard-toadflax)

A genus of 2 species (the only other species European).

Comandra umbellata (Linnaeus) Nuttall *var.* ***umbellata***, Eastern Bastard-toadflax. Pd, Mt (GA, NC, SC, VA), Cp (NC, SC, VA): dry forests and woodlands, woodland borders; common. April-early June; July. Ssp. *umbellata* ranges from ME to MI, south to n. GA and AL; other subspecies are western. [= C; < *C. umbellata* – RAB, W; = *C. umbellata* ssp. *umbellata* – K; ? *C. umbellata* – S; > *C. umbellata* – F, G; > *C. richardsiana* – F, G]

Nestronia Rafinesque (Nestronia)

A monotypic genus, a shrub, endemic to se. United States. References: Libby & Bloom (1998).

Identification notes: In its clonal, usually knee-high growth, *Nestronia* has something of the aspect of an opposite-leaved lowbush blueberry.

Nestronia umbellula Rafinesque, Nestronia, Conjurer's-nut, Leechbrush. Pd (GA, NC, SC, VA), Cp (GA, NC, SC): relatively mesic sites in sandhills in the upper Coastal Plain, mesic to dry Piedmont oak forests; rare. April-May; July. Sc. VA south and west to sc. GA, se. AL, nc. AL, and sc. TN; disjunct in sc. KY. See Libby & Bloom (1998) for an interesting discussion and county distribution map. It sometimes forms colonies (presumably clones) several hectares in size. [= RAB, C, F, G, K, S, W]

Pyrularia Michaux (Buffalo-nut)

A genus of 4 species, shrubs, of e. North America and e. Asia (the other 3 species are of e. Asia).

Pyrularia pubera Michaux, Buffalo-nut, Oil-nut. Mt, Pd (GA, NC, SC, VA): moist forests; common. April-May; July-October. A Southern and Central Appalachian endemic, *Pyrularia* ranges from sw. PA (Rhoads & Klein 1993), e. WV, and w. VA south and west to e. KY, w. NC, e. TN, and n. and wc. GA. The oil in the fruits is very poisonous. [= RAB, C, F, G, K, S, W]

SAPINDACEAE A.L. de Jussieu 1789 (Soapberry Family)

A family of about 133 genera and 1465 species, trees, shrubs, vines, and herbs, primarily of tropical (rarely temperate) regions of the Old World and New World. Evidence increasingly suggests that the inclusion of the Hippocastanaceae and Aceraceae in the Sapindaceae is warranted.

1 Leaves simple (lobed and/or toothed).....*Acer*
1 Leaves compound.
  2 Leaves palmately compound.....*Aesculus*
  2 Leaves pinnately or biternately compound.
    3 Vine; leaves biternately compound.....*Cardiospermum*
    3 Tree or shrub; leaves pinnately compound.
      4 Leaflets entire; fruit drupe-like; [native, of coastal hammocks of se. SC southward].....*Sapindus*
      4 Leaflets coarsely toothed; fruit a samara or inflated "pod;" [native or alien, collectively widespread].
        5 Fruit a samara; [native or alien].....*Acer*
        5 Fruit inflated; [alien ornamental, rarely escaped].....*Koelreuteria*

Acer Linnaeus 1753 (Maple)

A genus of about 111 species, primarily north temperate. References: Murray (1970)=Z; van Gelderen, de Jong, and Oterdoom 1994).

Section *Parviflora*, Series Caudata: *spicatum*
Section Palmata, Series Palmata: *palmatum*
Section Negundo, Series Negundo: *negundo*
Section Rubra: *drummondii, rubrum, saccharinum*
Section Macrantha: *pensylvanicum*
Section Platanoidea: *platanoides*, [*campestre*]
Section Acer, Series Acer: [*pseudoplatanus*]
Section Acer, Series Saccharodendron:
Section Ginnala: *ginnala*

1 Leaves compound, divided into 3-7 (-9) leaflets; [section *Negundo*].
  2 Twigs glabrous ..... ***A. negundo** var. **negundo***
  2 Twigs puberulent ..... ***A. negundo** var. **texanum***
1 Leaves simple, generally shallowly to deeply 3-5 (-7) lobed.
  3 Leaves not toothed, or often with a few rounded, coarse, and irregular teeth on the principal lobes, these teeth 0-5 per principal lobe; sinuses between the principal leaf lobes generally broadly rounded, the sinus broader than deep.
    4 Petioles and young twigs exuding milky sap when broken; inflorescence peduncled, the flowers on ascending, moderately stout pedicels; [section *Platanoidea*].
      5 Leaves 3-5-lobed, 5-10 cm wide ..... ***[A. campestre]***
      5 Leaves 5-7-lobed, 10-18 cm wide ..... ***A. platanoides***
    4 Petioles and young twigs exuding clear sap when broken; inflorescence sessile, the flowers on drooping, filiform pedicels; [section *Acer*, series *Saccharodendron*].
      6 Leaves pale, grayish, silvery-gray, or strongly heavily glaucous beneath, glabrous, pubescent on the veins, or pubescent across the surface; leaf sinuses on either side of the terminal lobe deep, the two sides of each sinus forming an angle of < 70 degrees (the terminal lobe typically with parallel margins, or even narrower toward the base than toward the tip); leaves usually planar, but sometimes with drooping lobe tips, especially in *A. barbatum*, and especially in sun-exposed individuals.
        7 Leaves small, (3.5-) avg. 8 (-11) cm broad; leaf undersurface usually pubescent; fruits 20-25 mm long; medium to large trees; bark gray, smooth and beech-like, becoming irregularly furrowed or plated in large individuals; [primarily of the Coastal Plain and Piedmont, extending into the Mountains in GA] ..... ***A. floridanum***
        7 Leaves large, (8-) avg. 15 (-20) cm broad; leaf undersurface glabrous or pubescent only on the veins; fruits 25-30 mm long; large trees; bark grayish-brown, with loose-edged plates; [primarily of the Mountains and upper Piedmont] ..... ***A. saccharum***
      6 Leaves green beneath, moderately to densely pubescent across the surface; leaf sinuses on either side of the terminal lobe shallow, the two sides of each sinus forming an angle of > 90 degrees (the terminal lobe typically broadly triangular); leaves sometimes planar, more usually with drooping lobe tips.
        8 Leaves small, (3-) avg. 6 (-11) cm broad; small trees, often multi-trunked and crooked; bark whitish (in part because of dense growth of crustose lichens), becoming cracked and blackened on larger stems; [primarily of the Piedmont, extending into the lower Mountains in w. SC and n. GA] ..... ***A. leucoderme***
        8 Leaves large, (8-) avg. 15 (-20) cm broad; large trees, single-trunked; bark dark brown or blackish, becoming furrowed in large individuals; [primarily of the Mountains and westward] ..... ***A. nigrum***
  3 Leaves finely to coarsely toothed, the toothing often regular, the teeth 8-50 per principal lobe; sinuses between the principal leaf lobes generally sharp, forming a definite angle (or if rounded, then the sinus much deeper than broad).
      9 Leaves deeply lobed, the two sinuses on either side of the central lobe deep and narrow, approaching the midrib, the terminal lobe thus narrower at its base than at its middle; leaves silvery white beneath; flowers **either** with petals (*A. palmatum*) **or** without petals (*A. saccharinum*).
        10 Leaves green beneath (or purplish in many forms); main leaf lobes 5-9, these main lobes merely toothed or variously further divided; small exotic tree, commonly planted and weakly naturalizing]; [section *Palmata*] ..... ***A. palmatum***
        10 Leaves silvery white beneath; main leaf lobes 3-5, these main lobes with coarse teeth and smaller lateral lobes; large native tree (also extensively planted); [section *Rubra*] ..... ***A. saccharinum***
      9 Leaves shallowly lobed, the two sinuses on either side of the central lobe broadly wedge-shaped, not approaching the midrib, the terminal lobe thus broadest at its base and progressively (though often irregularly) narrowing toward the tip; leaves green, pale-green, greenish-white, or strongly glaucous-whitened beneath; flowers with petals.
        11 Winter buds stalked, with 2-4 valvate scales; inflorescence an elongate drooping raceme or erect panicle; petals green to bright yellow, 2-10 mm long; fruits maturing in midsummer to autumn; leaves green beneath; shrub, small tree, or medium tree (to 35 cm DBH).
          12 Bark with narrow white stripes on a green background (best seen on stems 3-10 cm in diameter); leaf blades 12-20 (-30) cm long and wide, finely serrate (5-10 teeth per cm), pubescent beneath with yellow to orange hairs 0.1-0.3 mm long (as seen at 10× magnification); inflorescence a drooping raceme; [section *Macrantha*] ..... ***A. pensylvanicum***
          12 Bark brownish, never conspicuously striped; leaf blades 8-12 (-14) cm long and wide, coarsely serrate (2-3 teeth per cm), pubescent beneath with whitish hairs 0.3-1.0 mm long (as seen at 10× magnification); inflorescence an erect panicle; [section *Parviflora*] ..... ***A. spicatum***
        11 Winter buds sessile, with 4-10 imbricate scales; inflorescence **either** a drooping panicle (*A. pseudoplatanus*) **or** a sessile or subsessile cluster or fascicle; fruits maturing **either** in midsummer to autumn (*A. pseudoplatanus*) **or** spring; leaves slightly to strongly glaucous-whitened beneath; medium to large tree (to 100 cm DBH).
          13 Inflorescence a drooping panicle, flowering in May-June, fruiting August-September (and persisting overwinter); petals yellowish-green; leaf blades 8-17 cm long; [section *Acer*, series *Acer*] ..... ***[A. pseudoplatanus]***
          13 Inflorescence a sessile or subsessile cluster or fascicle, flowering in January-March, fruiting April-July (and dropping); petals red (rarely yellowish), 1-3 mm long; leaf blades < 10 cm long; [section *Rubra*].
            14 Mature leaves densely felty-pubescent beneath; mature samaras 2.7-5 cm long ..... ***A. drummondii***

14 Mature leaves glabrous (or nearly so) beneath; mature samaras 1.5-3 cm long.
  15 Leaves (3-) 5 (-9)-lobed, the central lobe 4-8 cm long, the 2 upper lateral lobes 2-5 cm long; leaf base generally cordate (rarely rounded); leaves 7-18 cm wide; [widespread, in nearly all habitats, except peaty wetlands of the Coastal Plain] ..... ***A. rubrum var. rubrum***
  15 Leaves unlobed or 3 (-5)-lobed, the central lobe 1-5 cm long, the lateral lobes (if present) 0.5-2 (-3) cm long; leaf base broadly cuneate to rounded or subcordate; leaves 2-10 cm wide; [primarily of wetlands, especially in the Coastal Plain] ..... ***A. rubrum var. trilobum***

Acer drummondii Hooker & Arnott ex Nuttall, Swamp Red Maple, Drummond Red Maple. Cp (GA, NC, SC, VA): swamps and floodplains; uncommon. January-March; April-June. *A. drummondii* is mostly southern, ranging north to NJ (?), IN, and MO. It reaches its greatest abundance in the basin of the Mississippi River. Because this taxon is more distinctive than the other taxa in the *A. rubrum* complex, it is often (as here) given specific status. [< *A. rubrum* – RAB, C, GW, WH; = *A. rubrum* Linnaeus var. *drummondii* (Hooker & Arnott ex Nuttall) Sargent – F, G, K; = *Rufacer drummondii* (Hooker & Arnott ex Nuttall) Small – S; = *A. rubrum* ssp. *drummondii* (Nuttall) Murray – Z]

Acer floridanum (Chapman) Pax, Southern Sugar Maple, Florida Maple. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): bottomland forests, mesic slopes, especially common over mafic or calcareous rocks, but not at all limited to such situations; common, rare in Mountains. April-May; June-October. S. VA, w. TN, w. KY (Clark et al. 2005), se. MO, and e. OK south to FL and TX. It is widely planted in southern cities and towns as a street tree. Ward (2004b) discusses the reasons for accepting *A. floridanum* as the correct name for this species. The Michauxian name *A. barbatum* is associated with specimens that are demonstrably *A. saccharum*. [= *A. saccharum* ssp. *floridanum* (Chapman) Desmarais – RAB, WH, Z; = *Acer barbatum* Michaux – C, K; > *A. barbatum* var. *barbatum* – F, G; > *A. barbatum* var. *longii* (Fernald) Fernald – F, G; = *Saccharodendron floridanum* (Chapman) Nieuwland – S]

Acer leucoderme Small, Chalk Maple. Pd, Mt (GA, NC, SC), Cp (GA): rocky slopes and bluffs, particularly over mafic or calcareous rock; uncommon (rare in Mountains and Coastal Plain). March-April; May-September. A species of se. North America, primarily of the Piedmont from NC to AL, less commonly in the Ridge and Valley of se. TN (Chester, Wofford, & Kral 1997), low Blue Ridge of w. NC and adjacent TN and GA, Coastal Plain of GA, AL, MS, LA, and se. TX, and in sw. AR and se. OK. The leaves, at least those on lower and inner branches, tend to dry a tawny color and remain on the tree until spring, reminiscent of beech. [= K, W; = *A. saccharum* ssp.*leucoderme* (Small) Desmarais – RAB, WH, Z; = *Saccharodendron leucoderme* (Small) Nieuwland – S]

Acer negundo Linnaeus var. ***negundo***, Eastern Box Elder, Ash-leaved Maple. Pd, Cp, Mt (GA, NC, SC, VA): riverbanks, swamps, bottomlands; common (uncommon in Coastal Plain and Mountains). March-April; May-October. The species, broadly treated, ranges nearly across North America, including well into the arid west along rivers. Var. *negundo* is the typical eastern variety, occurring throughout e. North America. *A. negundo* often grows on the banks of rivers, leaning out over the water at a 45 degree angle. The leaves can resemble poison ivy (*Toxicodendron radicans*), which has alternate leaves. The coarse toothing (approaching lobing) distinguishes it from any of our ashes (*Fraxinus*). [= C; < *A. negundo* – RAB, GW, W, WH; > *A. negundo* var. *negundo* – F, G, K, Z; > *A. negundo* Linnaeus var. *violaceum* (Kirchner) Jaeger – F, G, K, Z; < *Negundo negundo* (Linnaeus) Karsten – S; < *Negundo aceroides* (Linnaeus) Moench]

Acer negundo Linnaeus var. ***texanum*** Pax, Texas Box Elder. Mt (NC): riverbanks and bottomlands: rare. April; June-October. The status of this variety in our area is poorly known at present. Var. *texanum* is primarily southcentral in distribution (Texan and Ozarkian), but apparently scattered as far east as w. NC and s. OH. [= C, F, G, K, Z; < *A. negundo* – RAB, GW, W; < *Negundo negundo* (Linnaeus) Karsten – S; < *Negundo aceroides* (Linnaeus) Moench]

Acer nigrum Michaux f., Black Maple. Mt (GA, NC, VA): riverbanks, streambanks, cove forests, river slope forests; uncommon in VA (rare in GA and NC). May-June; June-September. Fairly widespread in nc. North America, *A. nigrum* ranges primarily west of the Appalachians. [= C, F, G, K, W; = *A. saccharum* Marshall ssp. *nigrum* (Michaux f.) Desmarais – RAB, Z; = *Saccharodendron nigrum* (Michaux f.) Small – S; *A. saccharum* Marshall var. *viride* (Scmidt) E. Murray]

* ***Acer palmatum*** Thunberg, Japanese Maple. Pd (NC, VA): suburban woodlands; rare, native of e. Asia. April; August-September. Frequently planted in its numerous cultivars. Infraspecific taxa are recognized in its native area. It is also reported as escaped in the DC area (Shetler & Orli 2000). [= K, Z]

Acer pensylvanicum Linnaeus, Striped Maple. Mt (GA, NC, SC, VA), Pd (VA): dry to mesic forests; common (rare in Piedmont, rare in SC). May; June-September. Primarily a broad Appalachian species, but extending into the Great Lakes region, south to PA and OH, and, in the mountains, to w. NC, e. TN, ne. GA, and nw. SC. The prominently striped bark of this common, mid-elevation understory tree is unmistakable. [= RAB, C, F, G, K, S, W, Z]

* ***Acer platanoides*** Linnaeus, Norway Maple. Mt, Pd, Cp (VA): suburban woodlands, disturbed forests, hedgerows; uncommon, native of Europe. March-April. In much of the ne. United States, *A. platanoides* has become a noxious weed tree. A commonly planted cultivar has purple foliage. [= C, F, G, K, W, Z]

Acer rubrum Linnaeus var. ***rubrum***, Eastern Red Maple. Mt, Pd, Cp (GA, NC, SC, VA): upland deciduous forests, up to at least 1500m elevation, moist bottomlands and slopes; common. January-March; April-July. This variety is the most widespread and common in NC; indeed it is one of the most ubiquitous and common trees in the state. It is probably more abundant than formerly, because of its weedy abilities. Overall, it ranges throughout e. North America. Whether the varieties of *A. rubrum* are worthy of recognition is a matter of disagreement; I choose here to try to distinguish them. [= F, K, Z; < *A. rubrum* – RAB, C, GW, W, WH; < *A. rubrum* var. *rubrum* – G (also see var. *trilobum*); = *Rufacer rubrum* (Linnaeus) Small – S]

Acer rubrum Linnaeus var. ***trilobum*** Torrey & A. Gray ex K. Koch, Carolina Red Maple. Cp (GA, NC, SC, VA): wetlands, especially peaty, acid sites; common. January-March; April-June. Primarily a Southeastern Coastal Plain variety, the range of var. *trilobum* is unclear, possibly extending well inland and northward (see F). This variety has greatly increased in abundance in the Coastal Plain of our area because of fire suppression and mechanical disturbance of peaty wetlands. Former

large pocosin tracts, such as the Dismal Swamp, are now largely dominated by this tree. [= F, K, Z; < *A. rubrum* – RAB, C, GW, WH; < *A. rubrum* var. *rubrum* – G; = *Rufacer carolinianum* (Walter) Small – S]

Acer saccharinum Linnaeus, Silver Maple, Soft Maple. Mt, Pd, Cp (GA, NC, SC, VA): bottomlands, riverbanks, and disturbed areas; uncommon (locally common). February-April; April-July. Widespread in ne. North America, south to AL and MS west of the Appalachians, east of the Appalachians and south of VA, rare and mostly introduced. This is an abundant tree along major rivers in the Piedmont of VA. In our area (particularly from c. NC south), the species is more common as a street tree or an escape from cultivation than as a native tree. On the Coastal Plain of NC and SC, *A. saccharinum* is largely confined to the banks and levees of large brownwater rivers, such as the Roanoke and Congaree. The silvery undersides of the leaves are obvious in windy conditions. [= RAB, C, F, G, GW, K, W, WH, Z; = *Argentacer saccharinum* (Linnaeus) Small – S]

Acer saccharum Marshall, Sugar Maple, Hard Maple, Sugar Tree. Mt (GA, NC, VA), Pd (*GA, *NC, *SC, VA): cove forests, other rich forests, especially over mafic and calcareous rocks, on calcareous soils common and typical in dry-mesic forests and dry woodlands as well, less typically extending to high elevation northern hardwood forests where sometimes in acidic situations (as in Highlands County, VA); common (rare in Piedmont, where perhaps only introduced south of VA). April-June; June-September. Two varieties are sometimes recognized. Var. *saccharum* is widespread in ne. and nc. North America. Var. *schneckii* Rehder, with petioles and lower leaf surfaces densely pubescent, is alleged to occur in s. PA (Rhoads & Klein 1993), IN, IL, and MO; it is probably only a form. *A. saccharum* is the primary source of maple sugar and maple syrup; formerly, commercial sugaring was done in w. NC and w. VA. Large individuals of this species are the favorite substrate of a number of lichens, including *Lobaria pulmonaria*. The brown, platy bark is often similar to that of *Aesculus flava*. For its bright orange fall color, *A. saccharum* is one of our most prized ornamental trees. In NC, it is most common northward and on mafic rocks, thus reaching perhaps its best development in the amphibolite peaks of Ashe, Watauga, Avery, and Mitchell counties; it is more general in VA. [= C; > *A. saccharum* var. *saccharum* – F, G, K, Z; = *A. saccharum* ssp. *saccharum* – RAB, W; = *Saccharodendron barbatum* (Michaux) Nieuwland – S]

Acer spicatum Lamarck, Mountain Maple. Mt (GA, NC, VA): high elevation forests (northern hardwoods or spruce-fir), generally above 1500 m in NC, above 1000 m in VA, especially common in periglacial boulderfields; uncommon (rare in GA). May-July; August-October. Widespread in ne. North America, south to PA and OH, and in the mountains to w. NC, e. TN, ne. GA, and ne. AL. The foliage is quite similar to that of *A. rubrum* var. *rubrum*, with which it can occur; in addition to the key characters, *A spicatum* can be distinguished from *A. rubrum* by its leaves which have a strongly rugose texture, the secondary and tertiary veins impressed on the upper surface, distinctly raised on the lower (vs. not rugose, the secondary and tertiary veins only slightly impressed on the upper surface, and slightly raised on the lower). *A. spicatum* is also sometimes confused with *A. pensylvanicum*, but these two species are readily distinguished by their leaves (see key). [= RAB, C, F, G, K, S, W, Z]

* *Acer campestre* Linnaeus, Hedge Maple, native of Europe and w. Asia, is reported to be "occasionally spreading from cultivation to moist, rocky, disturbed woods" in sc. and se. PA (Rhoads & Klein 1993). Infraspecific taxa are often recognized in its native area. [= C, F, G, K, Z]
* *Acer ginnala* Maximowicz, Amur Maple, native of e. Asia, is reported as "cultivated and escaped" in s. PA (Rhoads & Klein 1993). Infraspecific taxa are often recognized in its native area. [subgenus *Acer*, section *Ginnala*] [= F, K, Z] {not yet keyed}
* *Acer mono*. Mt (TN): moist forests; rare, native of Eurasia. {not yet keyed}
* *Acer pseudoplatanus* Linnaeus, Sycamore Maple, native of Europe, is planted in our area as a street and yard tree, especially in the mountains. It may be naturalized in our area; northward it is a noxious weed tree. [= C, G, K, Z; = *Acer pseudo-platanus* – F, orthographic variant]

The hybrid *Acer* ×*freemanii* E. Murray [*A. rubrum* × *saccharinum*] has been collected at scattered locations in our area.

Aesculus Linnaeus (Buckeye)

A genus of about 13 species, trees and shrubs, of temperate North America, e. Asia, and se. Europe. References: Hardin (1957a, 1957b)=Z.

1 Petals usually 5, white with a reddish mark near the cordate base of the petal blade; buds glutinous (sticky); fruit spiny; leaflets 7 (-9) per leaf; [alien, uncommonly planted, rarely naturalized]; [section *Aesculus*] ..... ***Ae. hippocastanum***
1 Petals 4 (or 4-5 in *Ae. parviflora*), cream-colored, yellow, red; or white (and then lacking a red blaze); buds not glutinous; fruit smooth (or with some prickles in *Ae. glabra* var. *glabra*); leaflets 5 (-7) per leaf; [native].
  2 Petals white, unmarked with red; stamens exserted, 2-4× as long as the petals; inflorescence 2-5 dm long; [section *Macrothyrsus*] ..... ***Ae. parviflora***
  2 Petals cream-colored, yellow, or red; stamens included or exserted, 1-2× as long as the petals; inflorescence 1-2.5 dm long; [section *Pavia*].
    3 Stamens about 2× as long as the petals, well-exserted beyond the corolla; petals only slightly unequal in size; fruit spiny with short prickles (rarely essentially smooth) ..... ***Ae. glabra var. glabra***
    3 Stamens about 1× as long as the petals, included or barely exserted beyond the corolla; petals markedly unequal in size; fruit smooth.
      4 Petal margins stipitate-glandular; petals scarlet; fruits 3-6 cm in diameter ..... ***Ae. pavia var. pavia***
      4 Petal margins villous, not glandular; petals yellow; fruits 2-8 cm in diameter.
        5 Calyx and pedicels stipitate-glandular; large tree; petiolules 2-3 (-4) mm long; fruits 5-8 cm in diameter ..... ***Ae. flava***
        5 Calyx and pedicels puberulent; shrub to small tree; petiolules 3-12 mm long; fruits 2-4 cm in diameter ..... ***Ae. sylvatica***

Aesculus flava Solander, Yellow Buckeye. Mt, Pd (GA, NC, SC, VA): moist forests, up to nearly 2000m, especially prominent in seepy cove forests, in the Piedmont only in "montane" habitats; common (rare in Piedmont). Late April-mid June; August-September. A broad Southern Appalachian endemic: sw. PA, s. OH, s. IN, and s. IL south through KY, WV, sw. VA, and TN to n. AL, n. GA, nw. SC, and w. NC. *A. flava* is one of the largest, most massive, and commonest trees in Southern

Appalachian coves, recognizable in winter by the bark of large plate-like slabs, thick twigs, and massive form. Meyer & Hardin (1987) discuss the nomenclatural issues relating to the names "*A. flava*" and "*A. octandra*." [= C, K, W; = *A. octandra* Marshall – RAB, F, G, Z; < *A. octandra* – S (also see *A. sylvatica*)]

Aesculus glabra Willdenow *var.* ***glabra***, Ohio Buckeye. Mt (GA): mesic forests over limestone; rare (GA Special Concern). Largely midwestern, but ranges east to sw. PA, e. TN, and nw. GA (Jones & Coile 1988); it is also sometimes introduced eastward of that distribution. It occurs in TN counties adjacent to both VA and NC. [= C, F, G, K, Z; < *Ae. glabra* – S]

* ***Aesculus hippocastanum*** Linnaeus, Horsechestnut. Mt (NC), Pd (NC, SC): urban and suburban areas, perhaps not definitely naturalized, but fairly often planted as a street tree and escaping as seedlings in the vicinity of plantings; rare, native of se. Europe. [= C, F, G, K, Z]

Aesculus parviflora Walter, Bottlebrush Buckeye. Cp (GA), Pd (GA, SC): mesic forests on bluffs and in ravines (the SC occurrence is on Fall Line river bluffs, with shaley, subcalcareous soils); rare (GA Special Concern, SC Rare). Wc. GA west to nc. AL, south to sw. GA and sw. AL; disjunct in wc. SC (Aiken County). See Wyatt (1985) for a discussion of the interesting, relictual occurrence in SC. Occasionally planted outside its native range. [= K, S, Z]

Aesculus pavia Linnaeus *var.* ***pavia***, Red Buckeye. Cp (FL, GA, NC, SC), Pd (GA), Mt (GA): swamp forests, usually stagnant, usually blackwater (not receiving significant alluvium), and especially over marl (coquina limestone); common (uncommon in NC, rare in Piedmont). April-early May; July-August. Var. *pavia* ranges from se. NC south to n. FL and west to e. TX, extending north in the Missisippi Embayment to se. MO and s. IL, and in scattered occurrences off the Coastal Plain, as in sc. TN. Var. *flavescens* (Sargent) Correll occurs in the Edwards Plateau of c. TX. Fernald reports this species from VA and WV, but there is likely taxonomic or nomenclatural confusion. [= K, Z; < *A. pavia* – RAB, C, G, S, W; >< *A. pavia* – F; >< *A. discolor* Pursh – F]

Aesculus sylvatica Bartram, Painted Buckeye. Pd (GA, NC, SC, VA), Cp (GA, NC, VA), Mt (GA, NC, SC): in the Piedmont in mesic, nutrient-rich forests, on bottomlands, lower slopes, and in ravines, in the Coastal Plain primarily on floodplains of brownwater (alluvium-carrying) rivers (most notably the Roanoke River in NC), in the Mountains only at low elevations; common. April-mid May; July-August. Primarily a Southeastern Piedmont endemic, occurring primarily in the Piedmont from sc. VA south through c. NC, c. SC, and nc. GA to nc. AL, with an extension north into e. TN. [= RAB, C, F, K, W, Z; = *A. neglecta* Lindley – G, misapplied; < *A. octandra* – S (also see *A. flava*); > *Ae. georgiana* Sargent]

The following hybrids are known from our area: *Aesculus* ×*neglecta* Lindley [*flava* × *sylvatica*] and *Aesculus* ×*mutabilis* (Spach) Scheele [*pavia* × *sylvatica*]. They can be recognized by their intermediate morphology.

Cardiospermum Linnaeus (Balloon Vine)

A genus of about 14 species, vines, of tropical regions (especially America).

* ***Cardiospermum halicacabum*** Linnaeus, Balloon Vine, Heartseed. Mt (GA), Pd (SC): disturbed areas; rare, native of tropical America. August-September. [= RAB, F, G, K, S; = *C. halicababum* – C, orthographic error]

Koelreuteria Laxmann (Golden Rain Tree)

A genus of 3 species, trees, of temperate China and Taiwan. References: Meyer (1976)=Z. Key based on Meyer (1976).

1 Leaves pinnate (rarely bipinnate in part), the leaflets coarsely crenate to lobulate; capsule valves ovate, ca. 2 × as long as wide; capsules greenish to tawny when young, aging to dark brown ..... ***K. paniculata***
1 Leaves bipinnate, the leaflets entire to shallowly serrate; capsule valves orbicular, 0.9-1.4 × as long as wide; capsules rose-purple when young, aging to tawny-brown.
  2 Leaflets weakly oblique, acute to short-acuminate, entire to uniformly serrate; petals 4 (-5) ..... ***[K. bipinnata]***
  2 Leaflets strongly oblique, long acuminate to caudate, entire to irregularly crenate-serrate; petals (4-) 5 ..... ***[K. henryi]***

* ***Koelreuteria paniculata*** Laxmann, Golden Rain Tree. Pd (NC, VA), Mt (TN), Ip (TN): disturbed areas, roadsides; rare, native of n. China (frequently cultivated as an ornamental tree, rarely escaped). June; September. [= RAB, C, F, G, K]

* *Koelreuteria bipinnata* Franchet, Bougainvillea Golden Rain Tree. Becoming popular horticulturally, and producing abundant seedlings near the planted specimens; potentially invasive. Native of s. China. [= Z]

* *Koelreuteria henryi* Dümmer, Flamegold. This taxon appears to be distinct morphologically and geographically from *K. elegans*, and warrants recognition at the species level. Becoming popular horticulturally, and producing abundant seedlings near the planted specimens; potentially invasive. Native of Taiwan. [= *Koelreuteria elegans* (Seem.) A.C. Smith ssp. *formosana* (Hayata) F.G. Meyer – K, Z]

Sapindus Linnaeus (Soapberry)

A genus of about 13 species, trees, of tropical and warm temperate regions of the Old and New World.

Sapindus marginatus Willdenow, Florida Soapberry. Cp (FL, GA, SC?): coastal marsh hammocks, shell middens; rare (GA Special Concern). May-June. Se. SC (?) and e. GA south to c. peninsular FL (Lee and Brevard counties). Small (1933)

reports this species from SC, but there is doubt whether this species was actually ever documented to occur in SC; there are no recent records. Although sometimes combined (as by K) with the tropical *Sapindus saponaria*, I follow most recent Florida authors (Clewell 1985, Tomlinson 1986, Godfrey 1988, Nelson 1994, Nelson 1996) in maintaining it as distinct. *S. marginatus* is a species of n. FL, e. GA, and possibly SC and has wingless rachises, acuminate leaflets, and globose fruits; *S. saponaria* is a species of s. FL and tropical America and has winged rachises, rounded leaflet tips, and ovoid to globose fruits. [= RAB, S; < *S. saponaria* Linnaeus var. *saponaria* – K]

SAPOTACEAE A.L. de Jussieu 1789 (Sapodilla Family)

A family of about 53-54 genera and 1100-1250 species, trees and shrubs, primarily tropical (rarely temperate), of Old World and New World. References: Pennington in Kubitzki (2004); Govaerts, Frodin, & Pennington (2001).

Sideroxylon Linnaeus 1754 (Bumelia, Buckthorn, Bully)

As defined broadly by Pennington (1991), *Sideroxylon* includes about 75 species, widely distributed in the New World and Old World Tropics (our species are the northern tip of a "tropical iceberg"). Pennington found that no consistent set of characters could be used to separate *Bumelia* from other New World genera (such as *Mastichodendron* and *Dipholis*), and that the New World segregate genera were also not separable from several Old World genera. The Linnaean *Sideroxylon* has nomenclatural priority. Four of the five taxa in or approaching our area were originally named in *Sideroxylon*. References: Clark (1945)=V; Cronquist (1945)=Q; Pennington (1991)=Z; Godfrey (1988)=Y; Govaerts, Frodin & Pennington (2001)=X; Allison (2006)=U. Key adapted from Y.

1 First-year twigs persistently pubescent; leaves pubescent beneath with appressed to tomentose hairs, ranging in color (depending partly on age) from silvery through coppery to dark brown;.
  2 Mature leaves densely pubescent beneath, the hairs sericeous, matted and shiny; leaves 2-5 (-7) cm long, 0.5-2 (-3) cm wide ..... ***S. tenax***
  2 Mature leaves pubescent beneath, the hairs woolly-tomentose, neither matted nor shiny; leaves 1-10 cm long, 0.5-4 cm wide.
    3 Low shrub, 0.1-0.3 (-1) m tall, clonal from subterranean stems; berries (8-) 10-13 mm long ..... ***S. rufohirtum***
    3 Shrub or small tree, to 12 m tall, sometimes multistemmed but not extensively clonal; berries 6-8 mm long.
      4 Leaf pubescence persistently tawny or red..... ***S. lanuginosum ssp. lanuginosum***
      4 Leaf pubescence slightly tawny when leaves are first emerging, later becoming gray or white ... ***[S. lanuginosum ssp. oblongifolium]***
1 First-year twigs pubescent when young, soon becoming glabrous or nearly so; leaves glabrous, glabrate, or sparsely pubescent beneath with appressed blond hairs or cottony white hairs (or densely appressed metallic-silvery pubescent in *S. alachuense*);.
  5 Low shrub, 0.1-0.5 (-1) m tall, clonal from subterranean stems; leaves 1-4 (-5.2) cm long; [endemic to xeric sands in GA] ..... ***S. macrocarpum***
  5 Shrub or small tree, to 20 m tall, sometimes multistemmed but not extensively clonal; leaves 1-12 (-15) cm long; [collectively widespread].
    6 Lower leaf surface with dense, metallic-silvery, appressed pubescence; stems of shoots of the season pale gray or silvery ..... ***S. alachuense***
    6 Lower leaf surface glabrous or glabrescent, green; {stems…}.
      7 Upper surfaces of the mature leaf blades faintly and coarsely reticulate-veined (at 20× or greater magnification), the veins of the reticulum not at all raised, usually somewhat impressed, and, although pale, not bony-cartilaginous..... ***S. thornei***
      7 Upper surfaces of the mature leaf blades notably finely reticulate-veined (at 20× or greater magnification), the veins of the reticulum usually raised above the enclosed islets, and bony-cartilaginous in contrast to the green islets.
        8 Larger leaf blades 8-12 (-15) cm long; large shrub or small tree, the stem usually solitary; berries 10-15 mm long, 10-12 mm in diameter; [of NC, SC, and VA and southward]..... ***S. lycioides***
        8 Larger leaf blades 2-5 (-7) cm long; small to large shrub, usually multi-stemmed; berries 5-8 mm long, ca. 5 mm in diameter; [of SC and southward] ..... ***S. reclinatum ssp. reclinatum***

Sideroxylon alachuense L.C. Anderson, Alachua Bully, Silver Buckthorn. Cp (FL, GA): sandy hammocks, shell middens; rare. S. GA south to c. peninsular FL. [= K; = *Bumelia anomala* (Sargent) R.B. Clark – V, Y; = *S. alachense* – X, misspelled; = *B. lanuginosa* (Michaux) Persoon var. *anomala* Sargent]

Sideroxylon lanuginosum Michaux *ssp.* ***lanuginosum***, Eastern Gum Bumelia, Eastern Gum Bully. Cp (FL, GA), Pd (GA): mesic to floodplain forests; common (uncommon in GA, rare in SC). E. GA south to nc. FL, west to LA. Other subspecies are more western. Reported for SC by Kartesz (1999). {investigate} [= X; > *S. lanuginosum* ssp. *lanuginosum* – K; > *S. lanuginosum* ssp. *albicans* (Sargent) Kartesz & Gandhi – K; = *Bumelia lanuginosa* ssp. *typica* Q; < *Bumelia lanuginosa* (Michaux) Persoon – S; > *B. lanuginosa* var. *lanuginosa* – V; > *B. rufa* Rafinesque – V; = *B. lanuginosa* ssp. *lanuginosa* – Y; < *S. lanuginosum* – Z]

Sideroxylon lycioides Linnaeus, Buckthorn Bumelia, Buckthorn Bully. Cp (FL, GA, NC, SC, VA), Pd (GA, NC), Mt (GA): maritime forests, maritime scrub, river bluffs, swamp margins, usually in circumneutral soil (over shell hash, coquina limestone, marl, or limestone), in the Piedmont and Mountains in rich, mesic forests over mafic or calcareous rocks; uncommon (NC Watch List, VA Watch List). June-July; September-October. Se. VA south to panhandle FL, west to se. TX, north in the interior to s. IL and se. MO, mostly on the Coastal Plain, but extending (in our area in NC and SC) to the upper Piedmont and north in the interior (primarily on limestone) to KY and TN. This species is extremely variable in leaf shape; though described in most works as up to 10-12 cm long and up to 4 cm wide, the leaves can be to 15 cm long and 8 cm wide. The leaf apex can be acuminate, acute, rounded, or notched. [= K, X, Z; = *Bumelia lycioides* (Linnaeus) Persoon – RAB, C, G, GW, S, Y; > *B. lycioides* var.

lycioides – F, V; > *B. lycioides* var. *virginiana* Fernald – F, V; > *B. lycioides* var. *ellipsoidalis* R.B. Clark – V; > *B. smallii* R.B. Clark – F]

Sideroxylon macrocarpum (Nuttall) J.R. Allison, Big-fruited Buckthorn, Ohoopee Bumelia, Ohoopee Bully. Cp (GA): longleaf pine sandhills; rare. Endemic to sc. GA (Appling, Candler, Emanuel, Evans, Jeff Davis, Laurens, Long, Montgomery, Pierce, Tattnall, Toombs, Treutlen, and Wheeler counties). [= *Sideroxylon macrocarpum* (Nuttall) J.R. Allison – U; < *B. reclinata* (Michaux) Ventenat var. *reclinata* – Q, Y; < *B. reclinata* – V; = *Bumelia macrocarpa* Nuttall]

Sideroxylon reclinatum Michaux *ssp.* ***reclinatum***, Smooth Bumelia, Florida Bully. Cp (FL, GA, SC): floodplain forests and river margins; common (rare in GA and SC). Ssp. *reclinatum* ranges from s. SC and se. GA south to s. peninsular FL. Ssp. *austrofloridense* (Whetstone) Kartesz & Gandhi [= K; *Bumelia reclinata* (Michaux) Ventenat var. *austrofloridensis* Whetstone] occurs in peninsular FL. [= K, X; > *Bumelia reclinata* – S; > *B. microcarpa* Small – S; < *B. reclinata* (Michaux) Ventenat var. *reclinata* – Q, Y; < *B. reclinata* – V; < *S. reclinatum* – Z]

Sideroxylon rufohirtum Herring & Judd, Red-haired Bully. Cp (FL): hammocks; rare. Endemic to FL: ne. FL south to c. peninsular FL. [= *S. reclinatum* Michaux ssp. *rufotomentosum* (Small) Kartesz & Gandhi – K, X; = *Bumelia rufotomentosa* Small – V, S, Y; = *B. reclinata* (Michaux) Ventenat var. *rufotomentosa* (Small) Cronquist – Q]

Sideroxylon tenax Linnaeus, Tough Buckthorn, Tough Bumelia, Tough Bully. Cp (FL, GA, NC, SC): maritime scrub, maritime forests, also inland; uncommon (rare north of GA). May-June; September-October. Se. NC south to s. peninsular FL. [= K, X, Z; = *Bumelia tenax* (Linnaeus) Willdenow – RAB, Q, V, Y; > *B. tenax* – S; > *B. lacuum* Small – S]

Sideroxylon thornei (Cronquist) Pennington, Thorne's Bumelia, Swamp Bumelia. Cp (AL, FL, GA): bottomlands and limesink depressions, particularly over calcareous substrates; rare (GA Endangered). May-June; August-early October. Ne. GA south to Panhandle FL, and west to AL. The validity of this species has been supported by Anderson (1996). [= K, X, Z; = *Bumelia thornei* Cronquist – Y]

Sideroxylon lanuginosum Michaux ssp. *oblongifolium* (Nuttall) T.D. Pennington, Western Gum Bumelia, Western Gum Bully. AL and KY west to KS, OK, and TX. [= K, X; = *Bumelia lanuginosa* (Michaux) Persoon var. *oblongifolia* (Nuttall) R.B. Clark – C, F, G, V; = *Bumelia lanuginosa* ssp. *oblongifolia* (Nuttall) Cronquist var. *oblongifolia* (Nuttall) R.B. Clark – Q; < *S. lanuginosum* – Z]

SARRACENIACEAE Dumortier 1829 (Pitcherplant Family)

A family of 3 genera and about 20 species, perennial insectivorous herbs, of e. North America (*Sarracenia*), w. North America (*Darlingtonia*), and ne. South America (*Heliamphora*). References: Kubitzki in Kubitzki (2004).

Sarracenia Linnaeus 1753 (Pitcherplant)

A genus of about 11 species, perennial insectivorous herbs, of e. North America. References: Mellichamp & Case in FNA (in press); McDaniel (1971)=U; Wood (1960)=Z; Schnell & Determann (1997)=Y; Schnell (2002b)=X; Bell (1949)=Q; Case & Case (1976)=V; McPherson (2007); Schnell (1979, 1981, 1993, 1998, 2002a); Bell (1952); Bell & Case (1956); Reveal (1993); Cheek (1994, 2001); Godt & Hamrick (1999); Naczi et al. (1999); Romanowski (2002); Catalani (2004).

1 Pitchers mostly decumbent; lateral wing of the pitcher very prominent; petals maroon to pink; [section *Sarracenia*].
  2 Pitchers prominently marked with white on the hood; hood of the pitcher globose; orifice formed by the fusion of the hood margins ..... ***S. psittacina***
  2 Pitchers not marked with white on the hood; hood of the pitcher expanded and erect; orifice not involving the hood margins.
    3 Petals pale pink; lip of pitcher 2.6-7.5 mm thick at thickest point; scape 16.3-35.1 cm high; style arm 2.6-4.1 cm long; [of the Gulf Coastal Plain, from sw. GA westward] ..... ***S. rosea***
    3 Petals red to deep maroon; lip of pitcher 0.7-3.1 mm thick at thickest point; scape 22-79 cm high; style arm 1.7-2.9 (-3.8) cm long; [of e. GA northward]
      4 Pitchers > 3× as long as broad; pitchers glabrous on the outer surface; petals dark maroon (occasionally red); rhizomes generally vertical, and with relatively many pitchers per crown (often 6-10); [of e. VA northward] ..... ***S. purpurea var. purpurea***
      4 Pitchers < 3× as long as broad; pitchers bristly-pubescent on the outer surface; petals bright red; rhizomes generally horizontal, and with relatively few pitchers per crown (often 4-5); [of the Coastal Plain of se. VA southward, and in the Mountains and Piedmont of NC and SC].
        5 Hood lobes closely incurved, touching each other or nearly so, obscuring the hood opening; hairs lining the hood averaging 0.8-1.0 mm long; [of the Mountains of sw. NC, nw. SC, and ne. GA] ..... ***S. purpurea var. montana***
        5 Hood lobes not closely incurved and touching; hairs lining the inner surface of the hood (1.0-) 1.5-3.0 mm long; [of the Atlantic Coastal Plain of VA, NC, and SC south to e. GA] ..... ***S. purpurea var. venosa***
1 Pitchers erect; lateral wing of the pitcher generally not prominent; petals maroon, red, or yellow; [section *Erectae*].
  6 Pitchers with white (or whitish and translucent) patches toward the summit of the pitcher and behind the orifice and/or on the hood.
    7 Areas of white tissue all around the summit of the pitcher and throughout the hood, the areas of bright white tissue surrounded by a conspicuous network of reddish venation; hood erect or ascending; petals maroon ..... ***S. leucophylla***
    7 Areas of whitish, translucent tissue toward the summit of the pitcher and on the lower portion of the hood, behind the orifice, the areas of translucent white tissue not enclosed within a conspicuous network of reddish venation; hood arching horizontally over the orifice; petals pale lemon yellow
      8 Pitchers and scapes < 35 cm tall; unwinged petiolar base of pitchers (3-) avg. 6 (-11) cm long, abruptly widened into the pitcher; [of pine savannas]; [widespread from se. NC southward] ..... ***S. minor var. minor***
      8 Pitchers and scapes 40-120 cm tall; unwinged petiolar base of pitchers (12-) avg. 17 (-21) cm long, gradually widened into the pitcher; [of floating peat mats and otrher very wet sites; [endemic to the Okeefenokee Swamp, se. GA] ..... ***S. minor var. okeefenokeensis***

6 Pitchers without white or translucent patches toward the summit of the pitcher.
9 Petals yellow; pitcher hood 4-10 (-14) cm wide.
10 Phyllodia (nonpitcher leaves) many per plant and forming a rosette, 5-18 cm long, strongly curved, usually curving 45-90 degrees; scapes taller than the pitchers; [inland, from sw. NC and e. TN south and west to n. and wc. GA and c. AL] ..... ***S. oreophila***
10 Phyllodia (nonpitcher leaves) rare, only a few per plant (if present at all), 12-30 cm long, straight to slightly curved; scapes shorter than the pitchers; [of the Coastal Plain and rarely Piedmont, from se. VA southward to n. FL and west to e. TX].
11 Narrowed base of the hood not purple-spotted, its sides revolute but not rolled backwards and nearly touching; blade of the hood ovate, slightly cordate basally; [of the Coastal Plain, from s. AL west to e. TX] ..... ***S. alata***
11 Narrowed base of the hood usually purple-spotted, its sides strongly rolled backwards (away from the orifice) such that they nearly touch; blade of the hood broadly reniform to orbicular-reniform, broadly cordate basally; [of the Coastal Plain and rarely Piedmont, from se. VA southward to n. FL and west to se. MS] ..... ***S. flava***
9 Petals maroon; pitcher hood < 4 cm wide (except *S. alabamensis* ssp. *alabamensis*, which can be up to 8.8 cm wide).
12 Orifice wing loosely rolled, with a pronounced "spout" over the wing; summer pitchers ca. 10× as long as the width of the pitcher mouth; orifice yellow-green; [of the Coastal Plain of c. and s. AL and s. MS]
13 Pitcher background color yellow, the upper pitcher weakly or not veined on the outer surface; [of c. AL (Autauga, Elmore, and Chilton counties] ..... ***S. alabamensis ssp. alabamensis***
13 Pitchers background color tan, the upper pitcher strongly reticulately veined on the outer surface; [of s. AL, s. MS, and w. FL] ..... ***S. alabamensis ssp. wherryi***
12 Orifice rim tightly rolled, with a very slight "spout" over the wing; summer pitchers narrow and elongate, ca. 20× as long as the width of the pitcher mouth; [of the Coastal Plain of NC, SC, GA, and Panhandle FL, and the Mountains of sw. NC and nw. SC].
14 Pitchers (25-) avg. 40-50 (-75) cm tall; scapes about the same height as the pitchers; hood ascending, leaving the orifice exposed, 1.5-6.5 cm long, 2.0-5.4 cm wide; orifice 2.8-4.2 cm wide; [of the Mountains of NC and SC] ..... ***S. jonesii***
14 Pitchers (7-) avg. 15-60 cm tall (-55) cm tall; scapes 1.5-2× the height of the leaves (pitchers); hood horizontal, held closely over the orifice, 0.7-4.5 cm long, 0.7-3.9 cm wide; orifice 1.5-3.5 cm wide; [of the Coastal Plain of NC, SC, and GA].
15 Pitchers (7-) 15-43 cm tall; orifice 1.5-2.3 cm wide; [se. and sc. NC south through SC to sc. GA] ..... ***S. rubra ssp. rubra***
15 Pitchers 47-61 cm tall; orifice 2.4-3.5 cm wide; [sw. GA west to FL Panhandle] ..... ***S. rubra ssp. gulfensis***

Sarracenia alabamensis F.W. and R.B. Case *ssp.* ***alabamensis***, Alabama Pitcherplant. Cp (AL): seepage bogs; rare. Endemic to c. AL. See Case (2005). [= FNA, V; = *S. rubra* Walter ssp. *alabamensis* (F.W. & R.B. Case) Schnell – K, X; < *S. rubra* – GW, S, U, Z]

Sarracenia alabamensis F.W. & R.B. Case *ssp.* ***wherryi*** F.W. & R.B. Case, Wherry's Pitcherplant. Cp (AL, FL, MA): seepage bogs and savannas; rare. FL Panhandle, s. AL, s. MS. April-May. See Case (2005). [= FNA, V; = *S. rubra* Walter ssp. *wherryi* (F.W. & R.B. Case) Schnell – K, WH, X; < *S. rubra* – GW, S, U, Z]

Sarracenia alata Wood, Pale Pitcherplant. Cp (AL, MS, LA): savannas, seepage bogs; uncommon. S. AL west to e. TX. [= FNA, GW, K, U, X, Z; = *S. sledgei* Macfarlane – Q, S]

Sarracenia flava Linnaeus, Yellow Pitcherplant, Trumpets. Cp, Pd (FL, GA, NC, SC, VA): savannas, seepage bogs, pocosins; common (rare in Piedmont, rare in VA). March-April; May-June. Se. VA south to n. FL and west to s. AL and se. MS. In the centers of peat domes and large peat-filled Carolina bays, *S. flava* is sometimes very abundant, occasionally the dominant plant over areas exceeding several square kilometers. [= RAB, C, F, FNA, G, GW, K, Q, U, W, Z; < *S. flava* – S (also see *S. oreophila*); > *S. flava* var. *flava* – X; > *S. flava* var. *atropurpurea* (Bull) Bell – X; > *S. flava* var. *maxima* Bull ex Masters – X; > *S. flava* var. *ornata* Bull ex Masters – X; > *S. flava* var. *cuprea* Schnell – X; > *S. flava* var. *rugelii* (Shuttleworth ex de Candolle) Masters – X; > *S. flava* var. *rubricorpora* Schnell – X]

Sarracenia jonesii Wherry, Mountain Sweet Pitcherplant. Mt (NC, SC): bogs, cataract seeps; rare. May; July. Endemic to a small area in sw. NC and nw. SC. There has been a great deal of disagreement over the taxonomic treatment of this taxon, a montane sibling of *S. rubra*. See Wherry (1929), Bell (1949), McDaniel (1971), Wherry (1972), Case and Case (1976), Schnell (1977), Massey et al. (1983), and McDaniel (1986) for further discussion. [= FNA, V, W; < *S. rubra* – RAB, GW, Q, U, Z; = *S. rubra* ssp. *jonesii* (Wherry) Wherry – K, X]

Sarracenia leucophylla Rafinesque, Whitetop Pitcherplant, Crimson Pitcherplant. Cp (AL, FL, GA, MS, *NC): wet pine savannas; common (rare in GA). Sw. GA, w. FL, s. AL, and se. MS, a Gulf Coastal Plain endemic; introduced in eastern NC. The NC population (on Croatan National Forest, Carteret Co.) was apparently introduced in the 1980s; it is not known whether this species will spread in NC, but it is persisting and has been independently "discovered" several times. [= FNA, GW, K, U, X, Z; = *S. drummondii* Croom – Q, S]

Sarracenia minor Walter *var.* ***minor***, Hooded Pitcherplant. Cp (FL, GA, NC, SC): wet savannas; uncommon (rare in NC). April-May; June-July. Se. NC south through SC and GA to c. peninsular and e. panhandle FL. [< RAB, FNA, GW, K, Q, S, U, X, Z]

Sarracenia minor Walter *var.* ***okefenokeensis*** Schnell, Okeefenokee Hooded Pitcherplant. Cp (GA): on floating vegetation mats, ditches, and other very wet sites; rare (endemic to Okeefenokee Swamp, se. GA). See Schnell (2002a) for additional information. [< FNA, GW, K, Q, S, U, X, Z]

Sarracenia oreophila (Kearney) Wherry, Green Pitcherplant. Mt (AL, GA, NC): seepage bogs; rare. April-May; June-July. A montane-piedmontane sibling of *S. flava*, known from sw. NC, se. TN (where presumed extirpated from the state), n. GA, and c. and ne. AL (Govus 1987, Wherry 1933, Schnell 1980b, Dennis 1980, Catalani 2004). [= FNA, GW, K, Q, U, W, X, Z; < *S. flava* – S]

Sarracenia psittacina Michaux, Parrot Pitcherplant. Cp (AL, FL, GA, LA, MS): savannas; common (uncommon in GA) (GA Threatened). This distinctive species is distributed primarily in the East Gulf Coastal Plain, but ranges east to the Atlantic Coastal Plain of e. GA (Bullock County), in close proximity to the SC border. [= FNA, GW, K, Q, S, U, X, Z]

Sarracenia purpurea Linnaeus *var.* ***montana*** Schnell & Determann, Southern Appalachian Purple Pitcherplant. Mt (GA, NC, SC), Pd (NC, SC): mountain bogs, seepage bogs; rare. May; July. Var. *montana* is restricted to a few dozen populations in sw. NC (south of Asheville), nw. SC, and ne. GA (Rabun County). These montane populations (in sw. NC, nw. SC, and ne. GA)

show some consistent differences and appear to warrant taxonomic distinction (Schnell & Determann 1997); further study is warranted. For those tolerant of quadrinomial taxonomy, plants in our area can be called *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *montana* Schnell & Determann. Allozyme studies by Godt and Hamrick (1999) show striking genetic differences between var. *montana*, var. *purpurea*, var. *venosa* and the Gulf Coast var. *burkii*, supporting their taxonomic recognition. In fact, the genetic differentiation is greater than that between taxa in the *S. rubra* complex. [< *S. purpurea* – RAB, GW, Q, S, W, Z; < *S. purpurea* var. *purpurea* – Reveal (1993); = *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *montana* Schnell & Determann – FNA, K, Y]

Sarracenia purpurea Linnaeus *var.* ***purpurea***, Northern Purple Pitcherplant. Cp (DE, MD, NJ, VA): bogs; rare. April-May; June-July. The species as a whole is widespread in e. North America, the only *Sarracenia* to extend north of se. VA. Var. *purpurea* is northeastern, extending south to ne. VA, MD, DE, and NJ. A nomenclatural battle about the application of the typic variety has been resolved, with var. *purpurea* applying to the northern variety (Reveal 1993, Cheek 1994, Kartesz & Gandhi 1995, Cheek 2001). [= C, F, G, Z; < *S. purpurea* – RAB, GW, Q, S, U, W; = *S. purpurea* ssp. *gibbosa* (Rafinesque) Wherry – K; = *S. purpurea* var. *terrae-novae* de la Pylaie – Reveal (1993); = *S. purpurea* ssp. *purpurea* – FNA, X]

Sarracenia purpurea Linnaeus *var.* ***venosa*** (Rafinesque) Fernald, Southern Purple Pitcherplant. Cp (NC, SC, VA), Pd? (NC?): wet savannas, sandhill seepage bogs; common (rare in VA). April-May; June-July. Var. *venosa* is restricted to the Atlantic Coastal Plain of the southeastern United States, ranging from se. VA south to se. SC; perhaps disjunct in e. LA. See MacRoberts & MacRoberts (2004) for a detailed discussion about old LA collections of *S. purpurea* or *S. rosea*. For those tolerant of quadrinomial taxonomy, plants in our area may be considered *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *venosa*. It is notable, though, that the findings of Godt and Hamrick (1999) and Ellison et al. (2004) do not support the greater relationship of the southern taxa to one another and their divergence from the northern taxon, and thus do not support the quadrinomial taxonomy. [= C, F, G, Z; < *S. purpurea* – RAB, GW, Q, S, U, W; = *S. purpurea* Linnaeus ssp. *purpurea* var. *purpurea* – K; = *S. purpurea* var. *purpurea* – Reveal (1993); = *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *venosa* – FNA, X, Y]

Sarracenia rosea Naczi, F.W. Case, & R.B. Case, Rose Pitcherplant. Cp (AL, FL, GA, LA?, MS): wet pine savannas and seepage bogs; rare. Sw. GA and Panhandle FL west to s. MS and (?) e. LA. Schnell (1993) distinguished the distinctive East Gulf Coastal Plain population (with short peduncles, white stigmas, and pale pink petals) as *S. purpurea* ssp. *venosa* var. *burkii* Schnell; Naczi et al. (1999) elevated this to species rank, as *S. rosea*. See Naczi et al. (1999) and Schnell (1993) for more detailed information and color photographs. Naczi et al.'s (1999) treatment of this taxon at specific rank is supported by the greater genetic distance found by Godt and Hamrick (1999) and morphologic and genetic analyses (Ellison et al. 2004). See MacRoberts & MacRoberts (2004) for a detailed discussion about old LA collections of *S. purpurea* or *S. rosea*. [= FNA, WH; < *S. purpurea* – GW, Q, S, U, Z; = *S. purpurea* Linnaeus ssp. *purpurea* var. *burkii* Schnell – K; < *S. purpurea* var. *purpurea* – Reveal (1993); = *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *burkii* Schnell – X, Y]

Sarracenia rubra Walter *ssp.* ***gulfensis*** Schnell, Gulf Pitcherplant. Cp (FL, GA): seepage bogs and savannas; rare. April-May. Sw. GA to Panhandle FL. Schnell (2002b) considers the populations of the "*rubra* complex" in Taylor County, GA (the western Coastal Plain of GA, near the AL line) to be best assigned to "*gulfensis*." [= FNA, K, WH, X; < *S. rubra* – GW, S, U, V, Z]

Sarracenia rubra Walter *ssp.* ***rubra***, Sweet Pitcherplant, Redflower Pitcherplant. Cp (GA, NC, SC): sandhill seepage bogs, pocosins, wet savannas; uncommon. April-May; June-July. Se. and sc. NC south to sc. GA. The *S. rubra* complex consists of five geographically isolated entities, variously treated as species, subspecies, or geographic races (see *S. jonesii* for some of the pertinent references). [= FNA, K, X; < *S. rubra* – RAB, GW, Q, S, U, V, Z]

Hybrids between the various species of pitcher-plants are relatively frequent; see Bell (1952) and Bell & Case (1956) for further discussion. They are usually rather easy to determine, since they show intermediacy in characters, and usually are found in close proximity to both parents.

SAURURACEAE E. Meyer 1827 (Lizard's-tail Family)

A family of 4 genera and 6 species, perennial herbs, of temperate e. and se. Asia (*Saururus, Gymnotheca, Houttuynia*), w. North America (*Anemopsis*), and e. North America (*Saururus*). One other member of the family occurs in North America: *Anemopsis californica* Hooker & Arnott, primarily of the sw. United States. References: Buddell & Thieret in FNA (1997); Wood (1971); Cheng-Yih & Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Meng et al. (2003).

Saururus Linnaeus 1753 (Lizard's-tail, Water-dragon)

A genus of 2 species, perennial herbs, our species in temperate e. North America, the other in e. Asia. References: Cheng-Yih & Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Saururus cernuus Linnaeus, Lizard's-tail, Water-dragon. Cp, Pd, Mt (GA, NC, SC, VA): swamps, overwash pools in stream floodplains, ditches, usually where water ponds seasonally or periodically; common (rare in Mountains). May-July; August-September. CT, s. Québec, s. Ontario, and MI south to s. FL and e. TX. In swamps of the Coastal Plain, *Saururus* often is dominant in large patches. The elongate inflorescence, drooping at the tip, is distinctive, attractive, and the (rather fanciful) inspiration for the genus name, the specific epithet, and the common names. Thien et al. (1994) studied the reproductive biology of *Saururus cernuus*, and found that pollination was both by wind and by insects. [= RAB, C, F, FNA, G, GW, K, S, W]

SAXIFRAGACEAE A.L. de Jussieu 1789 (Saxifrage Family)

If narrowly circumscribed (as here), a family of about 30-33 genera and 500-650 species, herbs (mianly perennial), nearly cosmopolitan, but especially diverse in warm temperate and cold temperate regions of North America and Eurasia. The circumscription of a much narrower Saxifragacaeae is clearly warranted, based on a wide variety of data, and recently strongly corroborated by molecular data (Morgan & Soltis 1993). References: Spongberg (1972); Morgan & Soltis (1993); Soltis in Kubitzki, Bayer, & Stevens (2007). [also see *GROSSULARIACEAE, HYDRANGEACEAE, ITEACEAE, PARNASSIACEAE,* and *PENTHORACEAE*]

1 Leaves compound ..... ***Astilbe***
1 Leaves simple (sometimes cleft or lobed).
  2 Stem creeping, the leaves all cauline, opposite; leaves short-petioled or sessile, < 2 cm long ..... ***Chrysosplenium***
  2 Stem erect, the leaves mostly or entirely basal, alternate (stem leaves opposite in *Mitella*); leaves long-petioled, > 4 cm long (except short-petioled or sessile and sometimes < 4 cm long in *Micranthes*).
    3 Basal leaves short-petioled or sessile, the petioles 0-1× as long as the blade; basal leaves cuneate or rounded at the base; leaf venation predominately pinnate ..... ***Micranthes***
    3 Basal leaves long-petioled, the petioles (1-) 2-5× as long as the blade; basal leaves cordate at the base; leaf venation predominantly palmate.
      4 Stem leaves opposite; petals fimbriate; inflorescence a raceme; flowers on pedicels 1.5-3 mm long ..... ***Mitella***
      4 Stem leaves absent or alternate; petals not fimbriate; inflorescence a panicle or raceme; flowers mostly on pedicels > 3 mm long.
        5 Inflorescence racemose; stamens 10 ..... ***Tiarella***
        5 Inflorescence paniculate; stamens 5.
          6 Seeds winged, 1.3-1.5 mm long; leaves cleft < ½ way to base; hypanthium fused to the pistils only at their bases; stems normally with several petiolate leaves much like the basal leaves (though typically somewhat smaller) ..... ***Sullivantia***
          6 Seeds papillose, echinate, smooth, or slightly ridged, 0.4-0.7 mm long; leaves cleft > ½ way to base (in *Boykinia*) or < ½ way (in *Heuchera*); hypanthium fused to the lower half or more of the pistils; stems with (in *Boykinia*) or without (in *Heuchera*) several petiolate leaves.
            7 Stems normally with several petiolate leaves much like the basal leaves (though typically somewhat smaller); ovary with 2 locules; leaves cleft > ½ way to base ..... ***Boykinia***
            7 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base ..... ***Heuchera***

Astilbe Buchenau-Hamilton ex D. Don 1825 (False Goat's-beard)

A genus of 14-25 species, perennial herbs, of e. Asia and e. North America. References: Mellichamp in FNA (in prep.); Soltis in Kubitzki, Bayer, & Stevens (2007).

Identification notes: Superficially, *Astilbe* is quite similar to *Aruncus* (Rosaceae). *Astilbe* may be distinguished by the following characteristics: pubescence of the stem and lower leaf surface glandular, plants monoecious, carpels 2 per flower, stamens 10 per flower (vs. *Aruncus*: pubescence nonglandular, plants dioecious, carpels 3-4 per flower, stamens 15-20 per flower).

1 Leaves serrate, the teeth sharp; fruit conic-lanceolate, tapering gradually, 4-5 mm long ..... ***A. biternata***
1 Leaves crenate, the teeth rounded (but with a prominent mucronate tip); fruit ovoid, abruptly contracted to the tip, 3 mm long ..... ***[A. crenatiloba]***

Astilbe biternata (Ventenat) Britton, Appalachian False Goat's-beard. Mt (GA, NC, SC, VA): cove forests, seepage slopes; common. May-June; July-August. VA, sw. WV, and KY south to n. GA. [= C, F, G, K, S, W; < *A. biternata* – RAB, FNA (also see *A. crenatiloba*)]

Astilbe crenatiloba (Britton) Small, Roan Mountain False Goat's-beard. Mt (TN): mountain forests; rare. July?; September. Known only from Roan Mountain, Carter County, TN and very rare or extinct. This species has apparently not been seen since the original collections (11 September 1885) by N.L. Britton and Mrs. Britton ("Tennessee. Base of Roan Mountain. Collected on the slope of Roan Mountain, East Tennessee, along the trail from 'Cloudland' to the Roan Mountain station of the E.T. & W.N.C.R.R.)"; the habitat, phenology, and other characteristics of this species are therefore poorly known. The morphologic characters are striking. [= K, S, W; < *A. biternata* – RAB, FNA]

Boykinia Nuttall 1834 (Boykinia)

A genus of 6-12 species, herbs, of e. Asia, e. North America, and w. North America, a classic relictual distribution. The other species are distributed primarily in the Pacific Northwest or Rocky Mountains, with several endemics in Japan and an endemic in the unglaciated portions of Alaska and e. Siberia. References: Soltis in Kubitzki, Bayer, & Stevens (2007)

Identification notes: Sometimes mistaken in vegetative condition for *Trautvetteria*, which is a coarser plant, often occupying similar habitats.

Boykinia aconitifolia Nuttall, Brook-saxifrage, Aconite-saxifrage, Eastern Boykinia. Mt (GA, NC, SC, VA): streambanks, riverbanks, in crevices in spray cliffs around waterfalls, seepages; uncommon (rare in SC). June-July. A Southern Appalachian endemic: sw. VA and s. WV, south through w. NC, e. TN, and nw. SC, to n. GA and ne. AL. [= RAB, C, F, G, GW, K, W; = *Therophon aconitifolium* (Nuttall) Millspaugh – S]

Chrysosplenium Linnaeus 1753 (Golden-saxifrage)

A genus of about 55-60 species, herbs, of Europe, ne. Asia, n. North America, n. Africa, and temperate South America. References: Packer in FNA (in prep.); Soltis in Kubitzki, Bayer, & Stevens (2007).

Chrysosplenium americanum Schweinitz ex Hooker, Golden-saxifrage, Water-mat, Water-carpet. Mt (GA, NC, SC, VA), Pd, Cp (VA): in shallow seepage in shade; uncommon (GA Special Concern). March-June. Québec west to Saskatchewan, south to e. VA, w. NC, n. GA, e. TN, and IN. [= RAB, C, F, FNA, G, GW, K, S, W]

Heuchera Linnaeus 1753 (Alumroot)

A genus of about 35-55 species, perennial herbs, of North America. Soltis (1985) found that speciation in *Heuchera* "apparently occurs with little divergence at genes coding for isozymes." Vegetatively, *Heuchera* resembles *Tiarella* and *Mitella*. References: Wells & Shipes in FNA (in prep.); Wells (1984)=Z; Rosendahl, Butters, & Lakela (1936)=Y; Wells (1979); Soltis in Kubitzki, Bayer, & Stevens (2007). The keys adapted from Wells (1984).

1 Calyx glandular-villous, white or pink, often with green-tipped lobes, 1.3-3.3 mm long, 1.1-2.9 mm in diameter; free hypanthium 0.1-0.4 mm long; petals linear or oblanceolate, 2-3× as long as the calyx lobes, glabrous; plants flowering (June-) July-October.
  2 Leaves with widely to narrowly triangular lobes and triangular teeth; petals linear, often coiled; seeds echinate; internodes of flora branches 0.3-2.9 mm long.
    3 Leaves deeply and sharply lobed, the terminal lobe wider than long; bracts of the inflorescence oblong to spatulate, at least the lower ones toothed; [of the Interior Low Plateau] ..... ***[H. villosa** var. **macrorhiza]***
    3 Leaves deeply and sharply lobed, the terminal lobe longer than wide; bracts of the inflorescence linear, rarely toothed; [primarily of Ridge and Valley, Blue Ridge, and upper Piedmont] ..... ***H. villosa** var. **villosa***
  2 Leaves with rounded lobes and rounded teeth; petals oblanceolate, reflexed; seeds smooth; internodes of floral branches 2.5-11.2 mm long.
    4 Petioles and peduncles more-or-less villous, the hairs 0.7-2.5 mm long; leaf blades slightly to fairly densely villous above and below, at least on the veins; [of ec. TN, KY, s. WV, sw. VA, w. NC, n. GA, n. AL, s. MO, s. IL, and s. IN] ..... ***H. parviflora***
    4 Petioles and peduncles densely glandular-puberulent, the hairs < 0.6 mm long; leaf blades densely puberulent above and below; [of c. KY westward] ..... ***[H. puberula]***
1 Calyx glandular-puberulent, greenish, 2.9-13.2 mm long, 2.4-7.5 mm in diameter; free hypanthium 0.6-7.0 mm long; petals rhombic-spatulate, slightly shorter to slightly longer than the calyx lobes, glandular-puberulent on the abaxial (lower) surface; plants flowering April-June.
  5 Free hypanthium < 2 mm long; calyx weakly zygomorphic; calyx urceolate, subglobose, or campanulate.
    6 At the onset of anthesis stamens exserted 0.2-1.5 mm beyond the calyx and styles included or exserted up to 1.1 mm beyond the calyx; calyx subglobose ..... ***H. caroliniana***
    6 At the onset of anthesis the stamens exserted 3 mm or more beyond the calyx and styles exserted 2.6 mm or more beyond the calyx; calyx urceolate or campanulate.
      7 Free hypanthium < 1.5 mm long; petals greenish, white, creamy, or pink, the margins entire or bearing short teeth ..... ***H. americana***
      7 Free hypanthium 1.5-1.9 mm long; petals purple, the margins fimbriate ..... ***H. hispida***
  5 Free hypanthium > 2 mm long; calyx weakly to strongly zygomorphic; calyx subglobose, campanulate, or tubular.
    8 Stigmas included within the calyx (the calyx lobes extending 1.3-5.3 mm beyond the stigma tips); calyx tubular; calyx lobes and petals inflexed, closing the mouth of the flower ..... ***H. longiflora***
    8 Stigmas barely included within the calyx (the calyx lobes extending up to 0.6 mm beyond the stigma tips) to moderately exserted beyond it; calyx subglobose or campanulate; calyx lobes and petals erect or spreading, not closing the mouth of the flower.
      9 Calyx 2.8-4.5 mm long, subglobose; [of the Piedmont of sc. VA southward to SC] ..... ***H. caroliniana***
      9 Calyx 5.5-13.2 mm long, narrowly campanulate; [primarily of the Mountains and upper Piedmont of VA and nc. NC].
        10 Flowers large, with white, exserted petals; [of high elevations (usually over 1000 m) on strongly acidic substrates, such as quartzitic sandstones, in w. VA and adjacent e. WV] ..... ***H. alba***
        10 Flowers smaller, with greenish or purplish-green petals; [of lower elevations on circumneutral or subacidic substrates] ..... ***H. pubescens***

Heuchera alba Rydberg. Mt (VA): quartzitic outcrops at high elevations; rare. Further study of *H. alba* Rydberg is needed; its recognition as distinct from *H. pubescens* is probably warranted (Bartgis, pers. comm.). It apparently differs from *H. pubescens* in its large flowers with white, exserted petals (vs. greenish or purplish-green petals), and occurs at higher elevations (usually over 1000 m) on acidic substrates, such as quartzitic sandstones (vs. at lower elevations on circumneutral or subacidic substrates). [= FNA, K; < *H. pubescens* – C, F, S, W, Z; < *H. pubescens* var. *brachyandra* Rosendahl, Butters, & Lakela – F, G, Y]

Heuchera americana Linnaeus, American Alumroot. Mt, Pd (GA, NC, SC, VA), Cp (GA, NC, VA): rocky forests, rock outcrops, particularly where soils are subacidic to circumneutral; common (uncommon in Coastal Plain). April-June. CT and NY west to s. Ontario, n. IN, s. IL, and sc. MO south to c. GA, c. AL, n. MS, and n. LA, and the most widespread in our area, *H. americana* is the only *Heuchera* in the Coastal Plain, though *H. caroliniana* reaches the lower Piedmont. Within the range of *H. caroliniana*, *H. americana* is absent. [= C; > *H. americana* var. *americana* – F, G; = *H. americana* var. *americana* – FNA, K, Z; < *H. americana* – RAB, W; > *H. americana* var. *heteradenia* Fernald – F; > *H. americana* var. *interior* Rosendahl, Butters, & Lakela – F, Y; > *H. americana* var. *subtruncata* Fernald – F; > *H. americana* var. *brevipetala* Rosendahl, Butters, & Lakela – G, Y; > *H. calycosa* Small – S; > *H. curtisii* – S; > *H. lancipetala* Rydberg – S; > *H. americana* var. *typica* – Y; > *H. americana* var. *calycosa* (Small) Rosendahl, Butters, & Lakela – Y]

Heuchera caroliniana (Rosendahl, Butters, & Lakela) E. Wells, Carolina Alumroot. Pd (NC, SC, VA): rocky forests, rock outcrops, particularly where soils are subacidic to circumneutral, replacing *H. americana* in much of the upper Piedmont; uncommon. April-June. Endemic to the Piedmont of sc. VA, NC, and nc. SC; first found in VA (Henry County) by T.F. Wieboldt in 2002 (Belden et al. 2004). [= FNA, K, Z; = *H. americana* Linnaeus var. *caroliniana* Rosendahl, Butters, & Lakela – Y; < *H. americana* – RAB, S]

Heuchera hispida Pursh, Purple Alumroot. Mt (VA), Pd (NC, VA): calcareous rocky forests, rock outcrops, particularly where soils are subacidic to circumneutral; rare. April-June. S. PA south through MD, WV, and VA to nw. NC. This species is intermediate between *H. americana* and *H. pubescens*; it is almost certainly of hybrid origin. The treatment of this hybrid derivative of *H. americana* and *H. pubescens* as *H. americana* var. *hispida* (a variety of one parent) seems undesirable. Since it partly replaces its parents within its range, occurs in populations away from one or both parent, and is not strictly intermediate, it seems best to accord it species status. [= F, G, S, Y; < *H. americana* – RAB, W; = *H.* ×*hispida* Pursh – C; = *H. americana* var. *hispida* (Pursh) E. Wells – FNA, K, Z]

Heuchera longiflora Rydberg, Long-flowered Alumroot. Mt (NC, VA): rich shaded forests and woodlands over calcareous rocks such as limestone, dolostone, or calcite-cemented shales, siltstones, or sandstones, in circumneutral soils; rare. May-June. This species is nearly limited to sedimentary rocks, occurring in e. and c. KY, s. OH, sw. WV, sw. VA, ne. TN, w. NC, and c. AL (?). In NC, it occurs primarily in the sedimentary window around Hot Springs, and is possibly limited to Madison, Buncombe, and Haywood counties. Wells (1984) calls it "most distinctive", "characterized by a unique combination of floral characters: long, tubular calyx, deeply included styles, inflexed calyx lobes and petals that close the mouth of the flower obliquely, and horizontal orientation of the flowers." [= C, F, FNA, G, K, W, Z ; = *H. pubescens* – RAB, misapplied; > *H. longiflora* Rydberg var. *aceroides* (Rydberg) Rosendahl, Butters, & Lakela – Y; > *H. longiflora* – S; > *H. aceroides* Rydberg – S; > *H. scabra* Rydberg – S; > *H. longiflora* var. *typica* – Y]

Heuchera parviflora Bartling, Cave Alumroot. Mt (GA, NC, SC, VA), Pd (NC): shaded cliff bases, usually under overhangs, on grotto floors, behind waterfalls where humidity is high but not in the spray zone, nearly always in deeply shaded situations where little or no direct sunlight falls; rare. July-September. An uncommon species throughout its range (ec. TN, KY, s. WV, sw. VA, w. NC, n. GA, n. AL, s. MO, s. IL, and s. IN), *H. parviflora* is probably most common in the gorge and waterfall country of sw. NC and in the Cumberland Plateau of TN and KY. In deeply shaded sites, it is often the only vascular plant present. The closely related species *H. puberula* Mackenzie & Bush [*H. parviflora* var. *puberula* (Mackenzie & Bush) E. Wells] occurs in s. MO and nc. AR, with scattered disjunct sites as far east as c. KY, c. TN, and s. IN. [= RAB, S, W; = *H. parviflora* var. *parviflora* – C, FNA, K, Z; > *H. parviflora* var. *parviflora* – F, G; > *H. parviflora* var. *rugelii* (Shuttleworth) Rosendahl, Butters, & Lakela – F, G, Y; > *H. parviflora* var. *typica* – Y]

Heuchera pubescens Pursh, Marbled Alumroot. Mt (SC?, VA), Pd (NC, VA): rocky forests, rock outcrops, particularly where soils are subacidic or circumneutral; uncommon. May-June. Primarily a species of the Ridge and Valley Province of PA, MD, WV, and VA, *H. pubescens* ranges south to only a few locations in the upper Piedmont of NC. See discussion under *H. alba*. The report in RAB of the occurrence of *H. pubescens* in Madison County is apparently erroneous; Wells (1984) shows *H. pubescens* reaching its southern limit just south of the VA border, and not occurring at all in KY, TN, or the mountains of NC. She found the bract characters used in the key in RAB to be unreliable. Reported by Hill & Horn (1997) for South Carolina {report needs verification}. [= FNA, K; < *H. pubescens* – C, S, W, Z (also see *H. alba*); >< *H. pubescens* var. *brachyandra* Rosendahl, Butters, & Lakela – F, G, Y; > *H. pubescens* var. *pubescens* – F; > *H. pubescens* var. *typica* – Y]

Heuchera villosa Michaux *var.* ***villosa***, Crag-jangle, Rock Alumroot. Mt, Pd (GA, NC, SC, VA): in crevices of rock outcrops, or in thin soil over boulders, a characteristic component of the flora of high elevation cliffs and summits (to at least 1920 m), not particular about the rock type, occurring on a wide range of rock types in our area, including felsic gneisses and schists, mafic gneisses, granites, quartzites, and others, probably the most acidophilic of our species of *Heuchera*; common (rare in upper Piedmont). Late June-October. W. VA and s. WV south through w. NC and e. TN to nw. SC, n. GA, ne. AL (primarily a Southern Blue Ridge endemic). In the Ozarks of AR it is replaced by the related *H. arkansana* Rydberg [*H. villosa* var. *arkansana* (Rydberg) E.B. Smith] with shorter and narrower inflorescence, shorter pedicels, and larger flowers. [= G; < *H. villosa* – RAB, W; < *H. villosa* var. *villosa* – C, FNA, K, Z; > *H. villosa* var. *villosa* – F; = *H. villosa* – S; > *H. villosa* var. *typica* – Y; >< *H. villosa* var. *intermedia* Rosendahl, Butters, & Lakela – F, Y]

Heuchera puberula Mackenzie & Bush, east to c. KY (Medley 1993) and c. TN (?). [= F, G, Y; = *H. parviflora* Bartling var. *puberula* (Mackenzie & Bush) E. Wells – FNA, K, Z]

* *Heuchera sanguinea* Engelmann var. *sanguinea*, Coral Bells. Cultivated as an ornamental "wildflower;" native of w. North America. [= K; < *H. sanguinea* – FNA, G; = *H. sanguinea* var. *typica* – Y] {not keyed}

Heuchera villosa Michaux var. *macrorhiza* (Small) Rosendahl, Butters, & Lakela, Giant Alumroot. S. WV, s. OH, and s. IN south through c. KY and c. TN to n. AL and ne. MS. This taxon has usually been disregarded in recent years, but is recognized by Chester et al. (1997). In its purest form, this plant seems to be very distinct from typical *H. villosa*, and actually may be more closely related to *H. arkansana*. The existence of intermediates and intergrades with *H. villosa* var. *villosa* muddies the taxonomic waters, however, and the overall best treatment seems to be at the varietal level. Some intermediates occur in the primary area, as in w. VA. [= G; < *H. villosa* var. *villosa* – FNA, K, Z; > *H. villosa* var. *macrorhiza* – F, Y; = *H. macrorhiza* Small – S; >< *H. villosa* var. *intermedia* Rosendahl, Butters, & Lakela – F, Y]

Micranthes Haworth 1812 (Saxifrage)

A genus of about 65-100 species, perennials, mostly of north temperate, boreal, and arctic regions of North America, South America, and Eurasia. As shown by molecular data, *Saxifraga*, as often broadly defined. is polyphyletic, and all of our species belong in *Micranthes* (Soltis 1995, Soltis et al. 1996, Mort & Soltis 1999). Soltis et al. (1996) demonstrate that *Micranthes* is closely allied with *Heuchera, Mitella,* and *Tiarella*, less closely related to *Astilbe, Boykinia, Sullivantia,* and *Chrysosplenium*, and least closely related to the bulk of *Saxifraga*. Four of our seven species are Southern Appalachian or Southern/Central

Appalachian endemics. References: Elvander & Brouillet in FNA (in prep.); Brouillet & Gornall (2007)=Z; Soltis in Kubitzki, Bayer, & Stevens (2007).

1 Larger leaf blades oblanceolate, 4-10× as long as wide.
  2 Leaf margin entire to crenate; petals greenish-white, lacking yellowish spots ..... ***M. pensylvanica***
  2 Leaf margin coarsely serrate; petals white, either 3 or 5 of them with yellowish spots.
    3 Leaves with mostly 12-40 teeth per side; pubescence of the leaves and scapes mostly nonglandular; corolla radially symmetrical; filaments strongly clavate; [mostly of shaded seepages and brook-banks] ..... ***M. micranthidifolia***
    3 Leaves mostly with 4-8 teeth per side; pubescence of the leaves and scapes mostly gland-tipped; corolla bilaterally symmetrical, the 3 upper petals distinctly clawed (the petal blade with a cordate or truncate base) and with 2 yellow spots, the 2 lower petals smaller, cuneate, and not spotted; filaments filiform; [mostly of rock outcrops and seepages, often exposed, but sometimes shaded] ..... ***M. petiolaris***
1 Larger leaf blades ovate or obovate, 1-3 (-4)× as long as wide.
  4 Leaf margins entire or with obscure teeth mostly < 1 mm long; leaves to 5 (-9) cm long and 2.5 cm wide; filaments 1-1.5 mm long; ovary partly inferior, the hypanthium partly adnate to the ovary; petals spatulate and cuneate, but not clawed; [widespread in our area].
    5 Inflorescence remaining compact with age; inflorescence axis sparsely short-hairy, the hairs not glandular (or with a very few glandular hairs interspersed; pedicels glabrous or nearly so; petals 2-3.5 mm long; [of granite outcrops in GA, otherwise in sc. US] ..... ***M. texana***
    5 Inflorescence branching with age, some branches often lower than the midpoint of the plant's height; inflorescence axis glandular-hairy; pedicels glandular-hairy; petals 3.5-6 mm long; [widespread in our area] ..... ***M. virginiensis***
  4 Leaf margins with coarse teeth mostly 2-10 mm long; leaves to 15 cm long and 8 cm wide; filaments 2.5-3.5 mm long; ovary superior, the hypanthium free from the ovary; petals (either 3 or 5 of them) moderately to strongly clawed; [of the Mountains and upper Piedmont].
    6 Leaves not petiolate, cuneate to the base, gradually increasing in width from the base to the widest point; corolla bilaterally symmetrical, the 3 upper petals distinctly clawed and with yellow spots, the 2 lower smaller, cuneate, and not spotted ..... ***M. petiolaris***
    6 Leaves petiolate, the blade rather abruptly contracted to the petiole; corolla radially symmetrical, all the petals alike.
      7 Sepals erect, later spreading; filaments filiform (use 10×); body of fruit (excluding the beak) 2.5-5 mm long; petals not spotted, or each with 2 obscure yellow spots ..... ***M. careyana***
      7 Sepals spreading, later reflexed; filaments slightly clavate (use 10×); body of fruit (excluding the beak) 4-5 mm long; petals each with 2 yellow spots ..... ***M. caroliniana***

Micranthes careyana (A. Gray) Small, Carey Saxifrage. Mt (GA, NC, VA): moist rock outcrops and cliffs, often under overhangs, often in moist soil at the base of a vertical or overhanging rock outcrop; rare (GA Special Concern, NC Watch List, SC Rare, VA Rare). May-June. A Southern Appalachian endemic: sw. VA south to e. TN, w. NC, and nw. SC. There remains a great deal of doubt regarding the taxonomic relationship between *S. careyana* and *S. caroliniana*. Many of the characters appear to be poorly correlated, and most specimens have been annotated at one time or another, by one investigator or another, as both species. The synonymization of *Micranthes tennesseensis* Small under *S. careyana* seems questionable, since the capsule size (seemingly one of the more stable characters in this complex) suggests *S. caroliniana*. I here retain the two taxa more to draw continued attention to them than out of conviction that the two are entirely satisfactory taxa (at least as currently defined). [= FNA, S, Z; = *Saxifraga careyana* A. Gray – RAB, C, F, G, GW, K, W]

Micranthes caroliniana (A. Gray) Small, Carolina Saxifrage. Mt (NC, VA): moist rock outcrops and cliffs, often under overhangs, often in moist soil at the base of a vertical or overhanging rock outcrop; rare (US Species of Concern, NC Rare, VA Rare). May-June. A Southern Appalachian endemic: WV south to w. NC and ne. TN. See *S. careyana* for discussion of the two taxa. [= FNA, S, Z; = *Saxifraga caroliniana* A. Gray – RAB, C, F, G, K, W; > *M. caroliniana* – S; > *M. tennesseensis* Small – S]

Micranthes micranthidifolia (Haworth) Small, Branch-lettuce. Mt (GA, NC, SC, VA), Pd (NC, VA): wet soils of seepages, in the beds of high elevation brooks, brookbanks; rocky seepages; common (rare in VA Piedmont). May-June. A Southern and Central Appalachian endemic: e. PA and WV, south to e. TN, w. NC, nw. SC, and ne. GA. This plant is gathered in considerable quantities as a spring green in the mountains of our area, and can sometimes be seen for sale in local grocery stores. The common name refers to the plant's habitat; "branches" are mountain streams. [= FNA, S, Z; = *Saxifraga micranthidifolia* (Haworth) Steudel – RAB, C, F, G, GW, K, W]

Micranthes pensylvanica (Linnaeus) Haworth, Swamp Saxifrage. Mt, Pd (NC, VA), Cp (VA): mountain bogs, mucky seeps; uncommon, rare in NC (NC Rare). April-June. ME west to MN, south to e. VA, c. and w. NC, and MO. [= FNA, Z; = *Saxifraga pensylvanica* Linnaeus – RAB, C, F, K, W; > *S. pensylvanica* ssp. *pensylvanica* – G]

Micranthes petiolaris (Rafinesque) Brouillet & Gornall, Cliff Saxifrage. Mt (GA, NC, SC, VA), Pd (NC, VA): in crevices in exposed rock outcrops at high elevations, other rock outcrops (moist to rather dry), periglacial boulderfields, rocky seeps; common (rare in VA Piedmont). June-August. A Southern Appalachian endemic: nw. VA, WV, and KY south to e. TN, w. NC, sw. SC, and ne. GA. The orange anthers are an attractive contrast to the white petals (the three upper with two yellow spots each). [= FNA, Z; = *Saxifraga michauxii* Britton – RAB, C, F, G, GW, K, W; = *Hydatica petiolaris* (Rafinesque) Small – S]

Micranthes texana (Buckley) Small, Texas Saxifrage. Pd (GA): granite outcrops; rare (GA Special Concern). Found in 1980 by Jim Allison on a small granite outcrop in McDuffie County, GA. It is uncertain whether its occurrence in GA represents a natural disjunction or a freak introduction (J. Allison, pers. comm.). [= FNA, S, Z; = *Saxifraga texana* Buckley – F, G, K]

Micranthes virginiensis (Michaux) Small, Early Saxifrage. Mt, Pd, Cp (GA, NC, SC, VA): rock outcrops, moist alluvial and slope forests, streambanks, riverbanks; common (rare in Coastal Plain). March-May. New Brunswick west to Manitoba, south to c. GA, LA, and AR. [= FNA, S, Z; = *Saxifraga virginiensis* Michaux – RAB, C, F, G, GW, W; > *S. virginiensis* var. *virginiensis* – K]

Mitella Linnaeus 1753 (Miterwort)

As traditionally circumscribed, a genus of about 20 species, herbs, of cold temperate e. North America, w. North America, and e. Asia. Soltis (2007) and Okuyama, Pellmyr, & Kato (2008) indicate that *Mitella* as currently circumscribed is polyphyletic and is likely to be divided; our species will remain in *Mitella*. References: Soltis & Freeman in FNA (in prep.); Soltis in Kubitzki, Bayer, & Stevens (2007).

Mitella diphylla Linnaeus, Two-leaved Miterwort. Mt (GA, NC, SC, VA), Pd, Cp (VA): moist rich forests, especially in the Mountains, and especially rocky; common (uncommon in Piedmont, rare in Coastal Plain, rare in SC). April-June. Québec west to MN, south to e. VA, w. NC, nw. SC, ne. GA, nw. GA, and MO. The fringed petals will reward a close look. [= RAB, C, F, FNA, G, GW, K, S, W]

Sullivantia Torrey & A. Gray 1842 (Sullivantia)

A genus of 3-4 species, perennial herbs, of c. North America. References: Soltis in FNA (in prep.); Soltis (1980)=Z; Soltis in Kubitzki, Bayer, & Stevens (2007).

Sullivantia sullivantii (Torrey & A. Gray) Britton, Sullivantia. Mt (VA): moist limestone cliffs; rare (VA Rare). June-August. *S. sullivantii* has a very scattered, relictual distribution, known from w. VA (Russell County), e. KY, ne. TN (Claiborne County), s. OH, IL, sw. WI, ne. IA, se. MN, and MO. [= C, F, FNA, G, K, Z]

Tiarella Linnaeus 1787 (Foamflower)

A genus of 3-6 species, perennial herbs, of temperate North America and e. Asia. References: Lakela (1937)=Y; Spongberg (1972)=Z; Wherry (1940, 1949)=X; Fernald (1943)=V; Soltis in Kubitzki, Bayer, & Stevens (2007).

1 Plant with stolons; capsules 8-12 mm long, subacuminate; lower fruiting pedicels 7-13 mm long; [of the Mountains] ..... ***T. cordifolia***
1 Plant without stolons; capsules 6-10 mm long, round-tipped; lower fruiting pedicels 6-10 mm long; [of the Mountains, Piedmont, and (less commonly) Coastal Plain] ..... ***T. wherryi***

Tiarella cordifolia Linnaeus. Mt (GA, NC, SC, VA): moist forests, cove forests, rock outcrops; common. April-June. Nova Scotia west to Ontario and WI, south to w. NC, nw. SC, n. GA, and MO. [= F, V, Z; = *T. cordifolia* var. *cordifolia* – RAB, C, G, K; < *T. cordifolia* – S, W (also see *T. wherryi*); ? *T. macrophylla* Small – S (type a combination of *Heuchera* and *Tiarella*); = *T. cordifolia* var. *typica* – Y]

Tiarella wherryi Lakela. Pd, Mt, Cp (GA, NC, SC, VA), Cp (VA): moist forests, cove forests, rock outcrops; common. April-June. VA and KY south to sw. GA, AL, and MS. Whether or not to recognize several taxa within what is here treated as *T. wherryi*, and at what level, has been controversial; see Lakela (1937), Wherry (1940, 1949), Fernald (1943), and Spongberg (1972) for discussion. [= F, V, Z; = *T. cordifolia* Linnaeus var. *collina* Wherry – RAB, C, G, K; < *T. cordifolia* – S, W; > *T. cordifolia* var. *collina* – X; > *T. wherryi* – X, Y; > *T. cordifolia* var. *austrina* – K, X, Y]

SCHISANDRACEAE Blume 1830 (Star-vine Family)

A family of 2 genera and about 40-50 species, woody vines, of e. Asia and e. North America (only our single species). References: Saunders (2001); Keng in Kubitzki, Rohwer, & Bittrich (1993).

Schisandra Michaux 1803 (Star-vine)

A genus of about 25 species, woody vines, of e. Asia (about 24 species) and e. North America (1 species). References: Vincent in FNA (1997); Godfrey (1988)=Z; Saunders (2001)=Y; Stone (1968); Keng in Kubitzki, Rohwer, & Bittrich (1993).

Schisandra glabra (Brickell) Rehder, Star-vine, Climbing-magnolia, Magnolia-vine. Cp (GA, NC, SC), Pd (GA, NC), Mt (GA, KY): rich slopes adjacent to bottomland forests, mesic "islands" surrounded by bottomlands; rare. May-June; July-August. Ne. NC (Martin County), sc. NC (Gaston County), n. GA, w. TN, e. and se. KY, and e. AR south south to the FL panhandle and LA; Mexico (Sierra Madre Oriental, Hidalgo). [= RAB, K, Y, Z; = *Schizandra coccinea* Michaux – S, orthographic variant; = *S. coccinea* Michaux – W]

SCROPHULARIACEAE A.L. de Jussieu 1789 (Snapdragon Family)

There is increasing evidence that the Scrophulariaceae as traditionally constituted includes two main and quite distinct groups (Olmstead & Reeves 1995; Young, Steiner, & dePamphilis 1999; Albach, Meudt, & Oxelman 2005). Based on molecular analysis, Young, Steiner, & dePamphilis (1999) suggest that Scrophulariaceae, Antirrhinanthaceae, and Orobanchaceae be restructured to include the current members of Orobanchaceae, Scrophulariaceae, and Callitrichaceae. Beardsley & Olmstead (2002) suggest that *Mimulus* and *Mazus* be included with *Phryma* in a redefined Phrymaceae. References: Pennell (1935)=P;

Olmstead & Reeves (1995); Young, Steiner, & dePamphilis (1999); Olmstead et al. (2001); Beardsley & Olmstead (2002). [also see *OROBANCHACEAE, PAULOWNIACEAE, PHRYMACEAE,* and *PLANTAGINACEAE*].

Disposition of the traditional Scrophulariaceae (including Antirrhinanthaceae), Orobanchaceae, Plantaginaceae, Buddlejaceae, Phrymaceae:

Linderniaceae: *Lindernia, Micranthemum*
Orobanchaceae: *Agalinis, Aureolaria, Buchnera, Castilleja, Conopholis, Dasistoma, Epifagus, Macranthera, Melampyrum, Orobanche, Pedicularis, Schwalbea, Seymeria, Striga.*
Plantaginaceae (Veronicaceae): *Amphianthus, Antirrhinum, Bacopa, Callitriche, Chaenorrhinum, Chelone, Collinsia, Cymbalaria, Digitalis, Gratiola, Kickxia, Leucospora, Limnophila, Limosella, Linaria, Mecardonia, Misopates, Nuttallanthus, Penstemon, Plantago, Scoparia, Veronica, Veronicastrum.*
Phrymaceae: *Glossostigma, Mazus, Mimulus, Phryma.*
Scrophulariaceae s.s.: *Buddleja, Scrophularia, Verbascum.*

Buddleja Linnaeus 1753 (Butterfly-bush)

A genus of about 90 species, trees and shrubs, of subtropical and tropical America, Asia, and Africa. The two species listed (and others) are grown for ornament and for their attractiveness as nectaring sites for butterflies. References: Rogers (1986)=Z; Oxelman, Kornhall, & Norman in Kadereit (2004).

1 Leaves serrate or crenate; corolla, calyx, pedicels, and inflorescence rachis pubescent (not granular-farinose) ..... ***B. davidii***
1 Leaves entire or remotely dentate; corolla, calyx, pedicels, and inflorescence rachis granular-farinose ..... ***B. lindleyana***

* ***Buddleja davidii*** Franchet, Summer-lilac, Orange-eye Butterfly-bush. Mt (GA, NC, VA), Pd (SC): planted, rarely escaped to disturbed places, such as thickets or streambanks (Wise Co., VA); rare, native of China. June-October. [= RAB, C, F, G, K, Z]
* ***Buddleja lindleyana*** Fortune ex Lindley. Pd (GA, NC, SC), Mt, Cp (NC, SC): rarely escaped to disturbed areas; rare, native of China. June-October. [= RAB, K, Z; = *Adenoplea lindleyana* (Fortune ex Lindley) Small – S]

EXCLUDED: *B. alternifolia* Maximowicz is reported as introduced in NC by Kartesz (1999), but the alleged documentation is not present. *B. officinalis* Maximowicz is reported as introduced in GA by Kartesz (1999), but the alleged documentation is not available.

Scrophularia Linnaeus (Figwort)

A genus of about 200 species, of temperate and tropical regions of the Old and New Worlds. Though our 2 species are only subtly distinct morphologically, they are clearly distinct. References: Pennell (1935)=P; Fischer in Kadereit (2004).

1 Sterile filament (hidden under the upper corolla lip) yellowish-green, often wider than long; leaf serrations coarse, often > 3 mm long; flowering May-early July; capsule 6-10 mm long ..... ***S. lanceolata***
1 Sterile filament dark purple or brownish, often longer than wide; leaf serrations fairly fine, < 3 mm long; flowering mid July-October; capsule 4-7 mm long ..... ***S. marilandica***

Scrophularia lanceolata Pursh, American Figwort. Mt, Pd, Cp (VA): woodlands and forests; common (rare in Piedmont and Coastal Plain). May-early July. Québec and Nova Scotia west to British Columbia, south to VA, MO, NM, and n. CA. [= C, F, G, K, P, W]

Scrophularia marilandica Linnaeus, Eastern Figwort. Mt, Pd, Cp (GA, NC, SC, VA): moist to dry, nutrient-rich woodlands and forests, especially over mafic or calcareous rocks; common (rare in Piedmont and Coastal Plain south of VA). July-October. Québec west to MN, south to SC, ne. GA, sw. GA, and LA. [= RAB, C, F, G, K, P, S, W]

Verbascum Linnaeus (Mullein)

A genus of about 360 species, herbs (annual, biennial, and perennial) and shrubs, of Eurasia and ne. Africa. References: Pennell (1935)=P; Fischer in Kadereit (2004).

1 Leaves green and glabrous on both sides, or sparsely pubescent with glandular hairs; hairs of the calyx and upper stem simple and glandular.
  2 Flowers 1 per node throughout the inflorescence; pedicels longer than the calyx; glandular hairs usually restricted to the upper part of the plant ..... ***V. blattaria***
  2 Flowers usually > 1 per node in the lower parts of the inflorecence; pedicels shorter than the calyx; glandular hairs extending down the stem to the base ..... ***V. virgatum***
1 Leaves densely tomentose at least on the lower surface, and often the upper as well; hairs of the calyx and upper stem branched, not glandular (except in *V. sinuatum*).
  3 Inflorescence generally simple (sometimes with 1-several small branches), dense and spike-like (at least initially); leaves moderately to densely tomentose above; upper 3 filaments bearing white hairs.

4 Leaves sessile to auriculate-clasping, slightly or not at all decurrent on the stem; stigma patulate, decurrent on the style; corolla white or yellow ..... ***V. phlomoides***
4 Leaves sessile, decurrent down the stem to the next leaf; stigma capitate; corolla yellow ..... ***V. thapsus***
3 Inflorescence freely branched, paniculate; leaves green and nearly glabrous above; all 5 filaments bearing either white or violet hairs.
5 Basal leaves not lobed; inflorescence lacking glandular hairs; filaments bearing white hairs ..... ***V. lychnitis***
5 Basal leaves lobed; inflorecence with glandular hairs; filaments bearing violet hairs ..... ***[V. sinuatum]***

* ***Verbascum blattaria*** Linnaeus, Moth Mullein. Cp, Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common, native of Eurasia. May-June; June-July. [= RAB, C, F, G, K, P, S, W]
* ***Verbascum lychnitis*** Linnaeus, White Mullein. Cp, Pd (VA): disturbed areas, fields; rare, native of Eurasia. [= RAB, C, F, G, K, P, S]
* ***Verbascum phlomoides*** Linnaeus, Clasping Mullein, Orange Mullein. Mt, Pd, Cp (NC, VA): disturbed areas, roadsides; rare, native of Europe. May-June; July. [= RAB, C, F, G, K, P, W]
* ***Verbascum thapsus*** Linnaeus, Woolly Mullein, Common Mullein, Flannel-plant, Velvet-plant. Mt, Pd, Cp (GA, NC, SC, VA): fields, roadsides, disturbed areas; common, native of Europe. June-September; July-October. [= RAB, C, F, G, K, P, S, W]
* ***Verbascum virgatum*** Stokes, Twiggy Mullein. Cp (NC, SC): sandhills, sandy disturbed areas, roadsides; rare, native of Europe. April-May; June. [= RAB, C, F, G, K, P, S]

* *Verbascum sinuatum* Linnaeus, Wavyleaf Mullein, is introduced at scattered locations in MD, PA, NJ, and NY, on ballast and in disturbed areas. July-August. [= G, K]

SIMAROUBACEAE A.P. de Candolle 1811 (Quassia Family)

A family of about 13 genera and 111 species, trees and shrubs of primarily tropical areas of the New World and Old World. The Leitneriaceae has been traditionally considered to be a monotypic family, endemic to se. North America; a variety of recent studies have suggested its inclusion in the Simaroubaceae (Angiosperm Phylogeny Group 1998, 2003; Bogle in FNA (1997). References: Angiosperm Phylogeny Group (1998, 2003). [including *LEITNERIACEAE*]

1 Leaves compound; [species alien, aggressively naturalizing in upland sites]..... ***Ailanthus***
1 Leaves simple; [species native, in wetland sites]..... ***Leitneria***

Ailanthus Desfais 1788 (Tree-of-Heaven)

A genus of 5 species, trees, native to Asia and Australia. References: Hu (1979).

* ***Ailanthus altissima*** (P. Miller) Swingle, Tree-of-Heaven, Copal Tree, Stink-tree. Pd, Mt, Cp (GA, NC, SC, VA): roadsides, forests, disturbed areas, including cities, especially in moist, fertile soils; common, native of e. Asia. Late May-early June; July-October. In our area, this tree is now an aggressive and noxious weed, colonizing even undisturbed forests and outcompeting the native vegetation. As serious a weed as it is here, it is (at the time of this writing, at least), much worse to the north, now the dominant tree in fencerows, woodlots, and forests in the urbanized, suburbanized, and even rural Northeast. It can be recognized vegetatively by its large pinnately compound leaves, very stout twigs (over 1 cm thick), and the characteristic and unpleasant odor of the crushed foliage. [= RAB, C, F, G, K, S, W]

Leitneria Chapman 1860 (Corkwood)

A monotypic genus, endemic to se. North America. References: Bogle in FNA (1997); Channell & Wood (1962).

Leitneria floridana Chapman, Corkwood. Cp (FL, GA): swamps and cabbage palm / sawgrass marshes; rare. February-March. Sw. GA and Panhandle FL west to e. TX, and north in the Mississippi Embayment to AR and MO, very scattered in occurrence. [= FNA, GW, K, S, WH]

SOLANACEAE A.L. Jussieu 1789 (Nightshade Family)

A family of about 94 genera and nearly 3000 species, shrubs, trees, vines, and herbs, nearly cosmopolitan but especillay diverse in South America. References: Hunziker (2001).

Subfamily Cestroideae, Tribe Cestreae: *Cestrum*
Subfamily Cestroideae, Tribe Nicotianeae: *Calibrachoa, Nicotiana, Nierembergia, Petunia*
Subfamily Solanoideae, Tribe Solaneae: *Capsicum, Physalis, Salpichroa, Solanum*
Subfamily Solanoideae, tribe Datureae: *Datura*
Subfamily Solanoideae, tribe Lycieae: *Lycium*
Subfamily Solanoideae, tribe Nicandreae: *Nicandra*

Bouchetia Dunal (Bouchetia)

A genus of about 3-4 species, tropical American.

Bouchetia erecta A.P. de Candolle. MS and TX. [= K] {synonymy incomplete}

Calibrachoa Llave & Lexarza (Seaside Petunia)

References: Hunziker (2001)=Z.

* ***Calibrachoa parviflora*** (Antoine Laurent de Jussieu) D'Arcy, Wild Petunia, Seaside Petunia. Cp (NC, VA): upper edges of salt marshes, waste areas, garbage dumps; rare, naturalized from tropical America. Tatnall (1946) documents its occurrence in Virginia: "upper edge of salt marsh, Wachapreague," Accomack Co. (Fernald & Long 4169, 26 July 1934). [= K; = *Petunia parviflora* Antoine Laurent de Jussieu – RAB, C, F, G, S, Z]

Capsicum Linnaeus (Red Pepper, Chile)

A genus of about 10 species, herbs and shrubs, of tropical America. References: D'Arcy & Eshbaugh (1974)=Z; Heiser & Pickersgill (1975). Key based on Z.

1 Flowers usually only one per node after the first flowering node, rarely more; corolla pure white (rarely bluish or violet) ..... ***C. annuum***
1 Flowers 2 or more per node above the first flowering node; corolla greenish-white ..... ***C. frutescens***

* ***Capsicum annuum*** Linnaeus, Red Pepper, Chile. Pd, Cp (GA?, NC, SC, VA): naturalized or persistent from gardens; commonly cultivated, rare as a naturalized species. June-frost. A very influential food crop introduced from the New World to the Old World, now important in various (especially tropical or subtropical) cuisines, including Hunan, Szechuan, Indian, various African, Mexican, and others. [= RAB, S, Z; = *C. annuum* var. *annuum* – K]
* ***Capsicum frutescens*** Linnaeus, Tabasco Pepper. Cp (GA): persistent from gardens; rarely cultivated, rare as a waif. Reported in e. GA (Duncan 1985; Jones & Coile 1988). [= *C. annuum* Linnaeus var. *frutescens* (Linnaeus) Kuntze; = *Capsicum annuum* Linnaeus var. *glabriusculum* (Dunal) Heiser & Pickersgill – K]

Cestrum Linnaeus (Night-flowering Jessamine)

A genus of 150-200 shrubs (rarely trees or vines), of Tropical America. References: Hunziker (2001)=Z.

* ***Cestrum nocturnum*** Linnaeus, Night-flowering Jessamine. Cp (GA): cultivated, weakly (if at all) established; rare, native of West Indies. See Small (1933). [= K, Z; ? *C. parqui* – S, misapplied]

Datura Linnaeus (Jimsonweed)

{needs thorough rework, based on herbarium material and clarification of nomenclature}

A genus of about 10 species, of s. North America (probably originally native to sw. United States and Mexico). Several species of *Datura* are known to have been in our area at the time of first settlement by Europeans. They may have been weeds in Indian fields, or grown for their hallucinogenic properties. The common name "Jimsonweed" is a corruption of "Jamestown Weed." References:

1 Calyx 3-5 cm long, the tube strongly angled, the angles even narrowly winged; corolla 7-10 cm long; capsule erect, dehiscent by 4 valves ..... ***D. stramonium***
1 Calyx 5-15 cm long, the tube terete or slightly angled; corolla 12-20 cm long; capsule inclined or nodding, irregularly dehiscent.
  2 Corolla with 10 teeth, lavender; spines of capsule few, very stout-based ..... ***D. metel***
  2 Corolla with 5 or 10 teeth, white or pale lavender; spines of capsule many, hispid (the base only slightly thickened).
    3 Corolla with 10 teeth; leaves soft-pubescent ..... ***D. inoxia***
    3 Corolla with 5 teeth; leaves glaucescent ..... ***D. wrightii***

* ***Datura inoxia*** J.S. Miller. Cp, Pd (NC, SC, VA?): disturbed areas, rare, native of Mexico; September-October. This species may not be distinct from *D. wrightii*. [It is currently not known which records in our area apply to which taxon] [= K; = *D. innoxia* – F, S, orthographic variant; *D. meteloides* – G, misapplied]
* ***Datura metel*** Linnaeus (NC): location and habitat in our area not known; rare, presumably introduced, allegedly native of tropical Africa and Asia. July-August. [= RAB, C, K, S]

* ***Datura stramonium*** Linnaeus, Jimsonweed. Cp, Pd, Mt (GA, NC, SC, VA): fields, pastures, disturbed areas, especially common in severely over-grazed pastures; common, presumably introduced from further south and west. July-September; August-October. The plant is dangerously poisonous. [= RAB, C, K, S, W; > *D. stramonium* var. *stramonium* – F; > *D. stramonium* var. *tatula* (Linnaeus) Torrey – F; > *D. tatula* Linnaeus]

* ***Datura wrightii*** Regel, Indian-apple. Pd (NC, SC, VA?), Cp (VA): disturbed areas; rare, native of Mexico. July-September; September-October. [= K; ? *D. meteloides* Dunal – RAB, S, misapplied; ? *D. metel* – G, misapplied]

* ***Datura quercifolia*** Kunth is reported for sw. GA by Jones & Coile (1988). [= K] {not yet keyed}

Lycium Linnaeus (Matrimony-vine)

A genus of about 100 species, shrubs, of warm temperate and tropical areas of the Old World and New Word (especially America).

1 Leaves succulent, oblanceolate, 1-5 mm wide; [native, in maritime situations] ..... ***L. carolinianum***
1 Leaves herbaceous, elliptic, ovate, or broadly oblanceolate, 8-30 mm wide; [introduced, persistent or naturalized, usually around old home sites].
  2 Corolla lobes shorter than the corolla tube; leaves gray-green, 2-5 cm long ..... ***L. barbarum***
  2 Corolla lobes longer than the corolla tube; leaves bright green, 3-8 cm long ..... ***L. chinense***

* ***Lycium barbarum*** Linnaeus, Common Matrimony-vine. Cp (NC, SC, VA), Pd, Mt (GA, NC, VA): old home sites, disturbed areas, along railroad tracks; native of s. Europe. May-November; August-December. [= K; ? *L. halimifolium* P. Miller – RAB, F, G, S, W; < *L. barbarum* – C (also see *L. chinense*)]

Lycium carolinianum Walter, Christmas-berry, Carolina Matrimony-vine. Cp (FL, GA, SC): shell middens, shell mounds, shelly sand dunes, brackish marshes, maritime sand spits; uncommon (rare in GA and SC). September-October. Se. SC and e. GA south to FL, west to e. TX; also in the West Indies. Apparently not recently seen in SC; its occurrence in that state is based on Walter's flora. [= RAB, GW, S, WH; > *L. carolinianum* var. *carolinianum* – K]

* ***Lycium chinense*** P. Miller, Chinese Matrimony-vine. Mt (NC, VA), Pd, Cp (VA): old home sites; rare, native of China. May-November; August-December. [= RAB, F, G, K; < *L. barbarum* – C]

Nicandra Adanson (Apple-of-Peru)

A monotypic genus, an annual herb native of Peru.

* ***Nicandra physalodes*** (Linnaeus) Gaertner, Apple-of-Peru. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): disturbed places, such as cultivated fields; uncommon, native of Peru. July-September; August-October. [= RAB, C, F, G, K, W; = *Physalodes physalodes* (Linnaeus) Britton – S]

Nicotiana Linnaeus (Tobacco)

A genus of about 67 species, of America, Australia, and s. Pacific areas. Fernald (1950) describes the genus as "rank, acrid-narcotic American herbs." References: Goodspeed (1954)=Z; Knapp, Chase, & Clarkson (2004).

1 Plant a shrub or small tree, 3-10 m tall; stems glabrous and glaucous; [section *Paniculatae*] ..... ***N. glauca***
1 Plant an herb, 0.5-3 m tall; stems densely viscid-puberulent (or sparsely so to merely tuberculate in *N. longiflora*).
  2 Corolla tube 1.2-1.7 cm long, greenish yellow, with limb 3-6 mm wide; leaves distinctly petiolate; [section *Rusticae*] ..... ***N. rustica***
  2 Corolla tube 3.0-12.0 cm long, cream, white, yellow, or pink, with limb 10-25 mm wide; leaves auriculate clasping.
    3 Larger leaves on a plant 3.5-8 dm long; corolla tube 3.0-5.5 cm long, 4-7× as long as the average diameter, the limb 10-15 mm wide, pink or reddish (rarely white); [section *Nicotiana*] ..... ***N. tabacum***
    3 Larger leaves on a plant 1-3 dm long; corolla tube 4.0-12.0 cm long, 10-20× as long as the average diameter, the limb 15-25 mm wide, white or lavender; [section *Alatae*].
      4 Rosette of a few leaves, not persisting; cauline leaves clasping and decurrent on the stem ..... ***N. alata***
      4 Rosette persisting; cauline leaves clasping but not decurrent on the stem ..... ***[N. longiflora]***

* ***Nicotiana alata*** Link & Otto, Jasmine Tobacco. Cp (GA): cultivated in gardens; rarely persistent, native of South America. See Jones & Coile (1988). [= K, Z]

* ***Nicotiana glauca*** Graham, Tree Tobacco. Cp (GA): cultivated in gardens, rarely persistent or spreading; rare, native of South America. Apparently present at Fort Pulaski National Monument, Chatham County, GA (Jones & Coile 1988; W. Duncan pers.comm. 2004). [= K, S, Z]

* ***Nicotiana rustica*** Linnaeus, Indian Tobacco, Wild Tobacco. Cp, Pd, Mt (GA?, NC, SC, VA): formerly commonly cultivated by native Americans in all parts of our area, persistent following cultivation, now apparently extinct in our area; rare, originally native of Peru. This was the tobacco cultivated by American Indians at the time of contact by Europeans, and was the first tobacco taken to Europe and cultivated there. [= RAB, C, F, K, S; > *N. rustica* var. *rustica* – Z]

* ***Nicotiana tabacum*** Linnaeus, Cultivated Tobacco. Pd, Cp, Mt (GA, NC, SC, VA): persistent after cultivation; commonly cultivated, rarely naturalized, native of tropical America. June-frost; September-October. This is the tobacco currently cultivated in our area for the manufacture of cigarettes, cigars, and other smoking and chewing tobacco products. Two different strains are cultivated. Burley tobacco, with acute to acuminate leaves, grown mostly in the Mountains and upper Piedmont, is air-cured in open barns, and used mostly for cigar and pipe tobacco. Flue-cured tobacco, with obtuse or broadly acute leaves, is grown mostly in the Coastal Plain and lower Piedmont, cured in closed, cubical barns with forced heat, and used mostly for cigarettes. [= RAB, C, F, K, S]

* *Nicotiana longiflora* Cavanilles, Long-flower Tobacco. Also cultivated and may be found as a waif or persistent. Native of South America. [= K, S, Z]

Nierembergia Ruiz & Pavón (Cupflower)

A genus of about 23 species, of Mexico, Central America, and South America.

* ***Nierembergia frutescens*** Durieu, Tall Cupflower, is reported from sw. GA (Jones & Coile 1988). [= K]

Petunia Antoine Laurent de Jussieu (Petunia)

[also see *Calibrachoa*]

* ***Petunia ×hybrida*** Vilmorin [*P. axillaris* × *integrifolia*], Petunia. Cp, Pd (GA, NC, SC, VA): disturbed areas, garden edges; common in cultivation, uncommonly spread from cultivation, native of Argentina. May-November. Individual plants may closely resemble either parent, but this taxon in our area is best considered as a variable hybrid taxon. [= *P. ×atkinsiana* D. Don ex Loudon – RAB; > *P. axillaris* (Lamarck) Britton, Sterns, & Poggenburg – C, F, G, K, S; > *P. violacea* Antoine Laurent de Jussieu – F, S, misapplied; > *P. integrifolia* (Hooker) Schinz. & Thellung – C, G, K; > *P. ×atkinsiana* D. Don ex Loudon – K]

Physalis Linnaeus 1753 (Ground-cherry)
(contributed by Milo Pyne)

A genus of about 80 species, nearly cosmopolitan, but especially diverse in America. Many of the species of *Physalis* in our area occur primarily in disturbed habitats. The pre-Columbian ranges of these species are unclear; they may have been introduced to e. North America by native Americans. Of the species treated here, only a few are definitely introduced.

1 Plants obviously covered with dense, stellate hairs, especially the young growth, flowering calyces, and pedicels ..... ***Ph. walteri***
1 Plants glabrous to variously pubescent, the pubescence not stellate.
  2 Leaves glabrous or essentially so.
    3 Perennials from rhizomes, frequently with remnant of last year's stem attached to crown; corolla with 5 dark maculations in the throat.
      4 Hairs on the pedicels and young stems retrorse or retrorse-spreading; fruiting calyx 5-angled, indented at base ..... ***Ph. virginiana*** *var.* ***virginiana***
      4 Hairs on the pedicels and young stems antrorse; fruiting calyx subterete, with 10 ribs, not indented at base ..... ***Ph. longifolia*** *var.* ***subglabrata***
    3 Annuals from taproots; corolla with or without 5 dark maculations in the throat.
      5 Upper part of the stem glabrous or glabrate (when young, sometimes with minute, deflexed hairs in lines); corolla with or without 5 dark maculations in the throat.
        6 Corolla 4-10 mm long entirely yellow, without 5 dark maculations in the throat; anthers 1-2.3 mm long; berry 8-11 mm in diameter ..... ***Ph. angulata*** *var.* ***angulata***
        6 Corolla 7-15 mm long, yellow and with 5 dark maculations in the throat; anthers 2.5-4 mm long; berry to 40 mm in diameter ..... ***Ph. philadelphica***
      5 Upper part of the stem with long, spreading hairs; corolla with 5 dark maculations in the throat.
        7 Leaf margins strongly dentate with 7-10 (or more) teeth per side; fruiting pedicels 12 mm or more long; mature fruiting calyx 2.5-4 cm (or more) long, the lobes long-acuminate to attenuate; corolla pubescent internally ..... ***Ph. cordata***
        7 Leaf margins entire, or dentate with 1-8 teeth per side; fruiting pedicels < 10 mm long; mature fruiting calyx 2.5 cm or less long, the lobes triangular-acuminate; corolla glabrous internally.
          8 Leaves mostly toothed nearly to the base with 5-8 teeth per side; leaf blade thick in texture, not translucent; fruiting calyces 2-3.5 cm long, 1.2-3 cm wide, the lobes triangular to narrowly lanceolate, the apex narrowly acute to acuminate, (3.5-) 4.5-6.5 mm long ..... ***Ph. pubescens*** *var.* ***pubescens***
          8 Leaves entire or with few teeth, usually 1-4 teeth per side; leaf blade thin in texture, flaccid and translucent; fruiting calyces 1.2-2.5 cm long, 1-1.5 cm wide, the lobes ovate to deltoid, the apex acute, 3-3.5 mm long ..... ***Ph. pubescens*** *var.* ***integrifolia***
  2 Leaves variously pubescent, the hairs copious and villous to sparse and appressed.
    9 Flowering calyces 6 mm or less long; annuals from taproots.
      10 Stems, young growth, and major veins of the leaves covered with villous pubescence intermixed with sessile glands; leaves gray-green, prominently and coarsely dentate to the base, with well-defined reticulate venation, especially visible on the lower surface, frequently drying orange or with orange spots; anthers yellow, perhaps with a bluish tinge; body of mature calyx about as long as broad, abruptly acuminate at apex; berry tawny orange when mature ..... ***Ph. grisea***

10 Stems, young growth, and major veins of leaves with fine, non-villous pubescence; leaves green, obscurely dentate, often in the upper half only, or entire, without well-defined reticulate venation, drying green or brownish; anthers blue or violet; body of mature calyx longer than broad, long-acuminate at the apex; berry green when mature.
  11 Leaves mostly toothed nearly to the base with 5-8 teeth per side; leaf blade thick in texture, not translucent; fruiting calyces 2-3.5 cm long, 1.2-3 cm wide, the lobes triangular to narrowly lanceolate, the apex narrowly acute to acuminate, (3.5-) 4.5-6.5 mm long ..... ***Ph. pubescens** var. **pubescens***
  11 Leaves entire or with few teeth, usually 1-4 teeth per side; leaf blade thin in texture, flaccid and translucent; fruiting calyces 1.2-2.5 cm long, 1-1.5 cm wide, the lobes ovate to deltoid, the apex acute, 3-3.5 mm long ..... ***Ph. pubescens** var. **integrifolia***
9 Flowering calyces 6 mm or more long; perennials from rhizomes.
  12 Pubescence viscid, generally composed of glandular trichomes mixed with fine, short hairs and long, multicellular hairs; leaf blades broadly ovate to suborbicular, the base rounded, truncate, or cordate (occasionally widely cuneate) ..... ***Ph. heterophylla***
  12 Pubescence seldom if at all glandular-viscid, composed of trichomes of varying lengths, from dense, spreading, and long-villous to sparse, strigose, and appressed; leaf blades narrowly ovate to broadly lanceolate, the base cuneate (rarely truncate).
    13 Pedicels and flowering calyces pubescent with minute, appressed, antrorse hairs; hairs on the calyx primarily confined to 10 narrow longitudinal strips consisting of simple, appressed hairs 0.5 mm or less long ..... ***Ph. longifolia** var. **subglabrata***
    13 Pedicels and flowering calyces densely pubescent with divergent and appressed hairs mixed (or only with appressed retrorse hairs); hairs on the calyx scattered more or less evenly over the surface, not confined to 10 longitudinal strips.
      14 Pedicels with both divergent and antrorse hairs; principle leaf blades 5-8 cm long; filaments 0.5 as wide as the anthers; spots at the base of the corolla inconspicuous or absent; berry > 14 mm in diameter when mature ..... ***Ph. lanceolata***
      14 Pedicels with short, appressed, retrorse hairs, or with short retrorse and longer divergent hairs intermixed; principle leaf blades 3-6 cm long; filaments as wide or wider than the anthers; spots at base of the corolla prominent; berry < 12 mm in diameter when mature ..... ***Ph. virginiana** var. **virginiana***

Physalis angulata Linnaeus var. ***angulata***, Smooth Ground-cherry. Cp, Pd (GA, NC, SC, VA), Mt (GA): disturbed areas, open woodlands, agricultural fields; common (VA Watch List). August-October. Var. *angulata* is widely distributed in Tropical America, north to se. VA and MO, and scattered as an adventive further north. Var. *pendula* (Rydberg) Waterfall is (in North America) more western, east to nw. TN and, allegedly, to SC. It can be distinguished from var. *angulata* by the following characters: principle cauline leaf blades generally > 2.75× as long as wide (vs. < 2.5× as long as wide), flowering pedicels 1.5-2.5 cm long, elongating to 3.0-4.0 cm long in fruit (vs. flowering and fruiting pedicels 0.5-1.0 cm long), pedicels and calyx covered at anthesis with fine, even, antrorse hairs, especially at the base of the calyx (vs. pedicels and calyx essentially glabrous at anthesis except for hairs on the margins of the calyx lobes). [< *Ph. angulata* – RAB, C, K, S; = *Ph. angulata* – F, G]

Physalis cordata P. Miller, Toothleaf Ground-cherry. Cp (NC), {GA, SC}: disturbed areas; rare. July-October. This species is scattered in the Southeastern United States, and is more widespread in Mexico, Central America, and West Indies. [= K; = *Ph. pubescens* var. *glabra* (Michaux) Waterfall – RAB; = *Ph. barbadensis* var. *glabra* (Michaux) Fernald – F]

Physalis grisea (Waterfall) M. Martínez, Gray Ground-cherry, Strawberry-tomato, Dwarf Cape-gooseberry. Mt, Pd (GA, NC, VA), Cp? (GA?), {SC}: wooded slopes, disturbed areas; uncommon. July-September; August-October. The species is mainly distributed in ne. United States, south (mainly) to NC, TN, and MO, and scattered further south. The fruits are edible, sweet, and tasty. Martínez (1993) discusses the nomenclature of this species, showing that the *P. pruinosa* Linnaeus is properly applied to a Mexican and Central American species. [= K; = *Ph. pubescens* var. *grisea* Waterfall – RAB, C; < *P. pruinosa* Linnaeus – F, G, S, W, misapplied]

Physalis heterophylla Nees, Clammy Ground-cherry. Pd, Mt, Cp (GA, NC, SC, VA): disturbed areas, dry rocky woodlands; common (uncommon in Mountains, rare in Coastal Plain). May-July; July-September. Widespread in e. and c. United States and adjacent Canada. [= RAB, C, S, W; > *Ph. heterophylla* var. *heterophylla* – F, G; > *Ph. heterophylla* var. *ambigua* (A. Gray) Rydberg – F, G; > *Ph. heterophylla* var. *clavipes* Fernald – F; > *Ph. heterophylla* var. *nyctaginea* (Dunal) Rydberg – F; > *P. heterophylla* var. *heterophylla* – K; > *Ph. heterophylla* – S; > *Ph. ambigua* (A. Gray) Britton – S; > *Ph. nyctaginea* Dunal – S]

Physalis lanceolata Michaux, Sandhills Ground-cherry. Cp (GA, NC, SC): sandhills; rare (NC Rare). June-July; July-September. Endemic to sandhill habitats of (primarily) sc. and (rarely) se. NC (northern limit in Lee, Wayne, and New Hanover counties), south through SC to just over the Savannah River in Richmond County, GA. Many earlier floras included midwestern material in the concept of this species; it is, however, limited to the Carolinas and Georgia. See Hinton (1970) for discussion of its taxonomic status. [= RAB; < *Ph. lanceolata* – F, G, S (also see *Ph. hispida* (Waterfall) Cronquist)]

Physalis longifolia Nuttall *var.* ***subglabrata*** (Mackenzie & Bush) Cronquist, Longleaf Ground-cherry. Mt, Pd (NC, VA), {GA, SC}: open woodlands, gardens and disturbed areas; uncommon. June-August; August-October. The species is widespread in e. and c. United States; var. *subglabrata* is more eastern, var. *longifolia* more western. [= C, G, K, W; = *Ph. virginiana* P. Miller var. *subglabrata* (Mackenzie & Bush) Waterfall – RAB; = *Ph. subglabrata* Mackenzie & Bush – F, S]

* ***Physalis philadelphica*** Lamarck, Tomatillo. Pd (NC): naturalized after cultivation; rare, native of Mexico and Central America. June-August; July-October. See Kartesz & Gandhi (1994) for a discussion of this group. It is the large-flowered plant (and therefore *Ph. philadelphica* in the narrow sense) that is weakly naturalized after cultivation in c. NC. [= C; < *Ph. ixocarpa* Brotero ex Hornemann – F, G, misapplied; > *Ph. philadelphica* var. *immaculata* Waterfall – K]

Physalis pubescens Linnaeus *var.* ***integrifolia*** (Dunal) Waterfall, Thinleaf Downy Ground-cherry. The distribution, abundance, and habitats of the two varieties are poorly known. July-September; August-October. Widespread in the American tropics, north to PA and IA. [= C, K; < *Ph. pubescens* var. *pubescens* – RAB; = *Ph. pubescens* – F; > *Ph. pubescens* – G, S; > *Ph. turbinata* Medikus – G, S; < *Ph. pubescens* – W; *Ph. pruinosa* Linnaeus, misapplied]

Physalis pubescens Linnaeus *var.* ***pubescens***, Thickleaf Downy Ground-cherry. The distribution, abundance, and habitats of the two varieties are poorly known. July-September; August-October. Widespread in the American tropics, north to VA. [= C, K; < *Ph. pubescens* var. *pubescens* – RAB; > *Ph. barbadensis* Jacquin var. *barbadensis* – F; > *Ph. barbadensis* Jacquin – G, S; > *Ph. pubescens* – S; > *Ph. barbadensis* Jacquin – S; < *Ph. pubescens* – W]

Physalis virginiana P. Miller *var.* ***virginiana***, Virginia Ground-cherry. Pd, Mt, Cp (GA, NC, SC, VA): woodlands and disturbed areas; common. April-May; June-July. This complex species is widespread in e. and c. North America. Var. *virginiana* is the most eastern of a number of varieties, some of the others being var. *campaniforma* Waterfall, var. *polyphylla* (Greene) Waterfall, and var. *texana* (Rydberg) Waterfall. The validity and true affinities of some of these varieties is, at present, uncertain; var. *texana* may be actually affiliated with *Ph. longifolia*. [= RAB, K; < *Ph. virginiana* – C, F, G, W; > *Ph. virginiana* – S; > *Ph. intermedia* Rydberg – S; > *Ph. monticola* C. Mohr – S]

Physalis walteri Nuttall, Dune Ground-cherry. Cp (GA, NC, SC, VA): dunes of sea-beaches, openings in maritime forests; uncommon (VA Rare List). May-September. This species ranges from se. VA south to s. FL and west to s. MS. See Sullivan (1985) for further information on this species and its relatives. It is largely replaced on the Gulf Coast by the related *Ph. angustifolia*, with which it locally intergrades in peninsular FL. *Ph. viscosa* Linnaeus is South American. [= C, K; < *Ph. viscosa* Linnaeus ssp. *maritima* (M.A. Curtis) Waterfall – RAB; < *Ph. maritima* M.A. Curtis – F; < *Ph. viscosa* – G, S]

* *Physalis acutifolia* (Miers emend Sandwith) Sandwith, native to AZ and vicinity, was collected once in NC (in 1936), from a nursery in Mecklenburg County, NC. It is probably not established. It is most similar to *Ph. angulata*, but differs in its white to cream-colored corollas, with yellow basal spots, and the presence of 5 hairy pads, alternating with the stamens near the base of the corolla limb. [= K]

* *Physalis alkekengi* Linnaeus, Chinese-lantern Plant, native of Japan, Korea, and n. China, is commonly cultivated as an ornamental and occasionally naturalized in e. North America, as at scattered locations in TN (Chester, Wofford, & Kral 1997). It is perennial, readily recognized by its mature calyces red-orange and up to 5 cm long. [= K]

Physalis arenicola Kearney, Sandhill Ground-cherry, reported from nc. GA by Jones & Coile (1988) and for "cypress-heads and scrub thickets" by GANHP (GA Special Concern). [= K; > *Ph. arenicola* var. *ciliosa* (Rydberg) Waterfall] {not yet keyed; synonymy incomplete}

* *Physalis cinerascens* (Dunal) A.S. Hitchcock var. *cinerascens*, native to OK, TX, and Mexico, occurs locally in the Southeastern United States in weedy situations; it has been found once in our area, in a disturbed habitat in SC. It is probably not established. It resembles *Ph. walteri* in having stellate pubescence, but differs in having leaves ovate to suborbicular, with margins sinuate, dentate, or entire (vs. leaves obovate, with margins entire), anthers at least 1.5× as long as the filaments (vs. anthers equal to or shorter than the filaments), and fruiting pedicels mostly at least 1.5× as long as the calyces (vs. fruiting pedicels equal to or shorter than the fruiting calyces). [= K] {not yet keyed; full treatment}

Physalis longifolia Nuttall *var.* ***longifolia*** occurs east to PA, WV, KY, TN, and GA (Kartesz 1999). [= K]

Physalis missouriensis Mackenzie & Bush, reported from nc. GA in Jones & Coile (1988); record not repeated in Kartesz (1999). [= K; *Ph. pubescens* Linnaeus var. *missouriensis* (Mackenzie & Bush) Waterfall] {investigate; not yet keyed; synonymy incomplete}

* *Physalis peruviana* Linnaeus, Cape Gooseberry or Po'ha, is also cultivated. Native to South America, it is now cultivated for its edible fruit in various tropical and temperate areas, and is known to rarely persist in e. North America. [= K]

Physalis viscosa Linnaeus. AL, MS. [= K]

Salpichroa Miers

A genus of about 17 species, herbs and shrubs, native of South America. References: Hunziker (2001)=Z.

* ***Salpichroa origanifolia*** (Lamarck) Baillon. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): gardens, roadsides, disturbed areas; rare, native of n. South America. May-November. [= RAB, K, Z; = *Perizoma rhomboidea* (Gillies & Hooker) Small – S; = *Salpichroa rhomboidea* (Gillies & Hooker) Miers]

Solanum Linnaeus 1753 (Nightshade, Tomato, Potato, Horse-nettle)
(contributed by Milo Pyne and Alan S. Weakley)

A genus of about 1700 species, trees, shrubs, vines, and herbs, of tropical and temperate regions of the Old and New World. References: Schilling (1981)=Z; Bohs & Olmstead (1997); Olmstead & Palmer (1997).

1 Anthers opening by longitudinal slits, connivent into a slender cone with sterile tip; berry fleshy, seeds pubescent; plant glandular "clammy"-pubescent; [cultivated plant, also appearing as a waif, escape, or discard, e.g. on sewage sludge] ..... ***S. lycopersicum***
1 Anthers opening by terminal pores, separate or connivent; berry dry to juicy, not fleshy, seeds glabrous; plant not clammy-pubescent; [plants native, exotic, or cultivated escapes, some are weeds of cultivation].
  2 Stems and leaves not prickly or spiny.
    3 Leaves irregularly pinnatifid or auriculate-lobed.
      4 Woody climbing or twining vine; leaves auriculate-lobed ..... ***S. dulcamara***
      4 Herb, not twining; leaves irregularly pinnatifid.
        5 Fetid annual, plant more or less prostrate; leaves sessile or short-petiolate, lateral leaflets lanceolate, not alternating with smaller ones ..... ***[S. triflorum]***
        5 Tuberiferous perennial, plant more or less erect; leaves distinctly petiolate, lateral leaflets ovate, alternating with smaller ones ..... ***S. tuberosum***
    3 Leaves not appearing compound or auriculate-lobed.
      6 Foliage densely pubescent to puberulent with spreading hairs, especially on undersurface.
        7 Trichomes stellate; ripe berry yellow; corolla lavender ..... ***S. elaeagnifolium***
        7 Trichomes simple; ripe berry black or green to yellow; corolla white.
          8 Berry black when ripe; leaves lance-elliptic, 1-2.5 cm wide, style usually protruding beyond anthers by > 1 mm; plants strictly coastal, on dunes and similar habitats ..... ***S. pseudogracile***
          8 Berry green to yellow when ripe; leaves ovate, 2.5-6 cm wide, style not protruding; plants widespread, weedy ... ***S. sarrachoides***
      6 Foliage glabrous, glabrescent or very sparsely pubescent (with appressed hairs).
        9 Berry dull red, ca. 1 cm wide at maturity, uncommon horticultural escape ..... ***S. pseudocapsicum***
        9 Berry black (rarely green, never red), up to 0.5 cm wide at maturity, ruderal weeds.

10 Inflorescence subracemose, corymbose or umbellate, pedicels and peduncles becoming stout; anthers 1.8-2.6 [2.2-2.9] mm long; berry dull; seed 1.7-2.2 mm long [1.8 mm wide or wider]; sclerotic granules (concretions of stone cells) typically absent .. ***S. nigrum***

10 Inflorescence umbellate, pedicels and peduncles remaining slender; anthers 1.4-2 mm long; berry glossy; seed 1.2-1.8 mm long; sclerotic granules typically present but occasionally absent

11 Calyx lobes strongly reflexed in mature fruit; sclerotic granules in fruit five or less if present, occasionally absent; flowers 2-14 per inflorescence, usually > 7 in largest inflorescences; fruiting pedicels erect (may be deflexed with age or in winter), to 8 mm long; fruit shiny, black ..... ***S. americanum***

11 Calyx lobes adherent or spreading in mature fruit, occasionally somewhat reflexed; sclerotic granules usually 7-12 per fruit, often visible through skin of dried berry; flowers usually < 6 per inflorescence, fruiting pedicels deflexed, to 13 mm long; fruit dull or shiny black, or rarely green ..... ***S. ptychanthum***

2 Stems, and often leaves, prickly and/or spiny.

12 Berry enveloped at least until near maturity by prickly calyx; leaves regularly and strongly pinnately parted or very deeply divided (sinus depth greater than 1/2 distance from leaf margin to midvein).

13 Corolla yellow, anthers dissimilar, the lowest larger and longer; calyx tightly enveloping the fruit, seeds coarsely undulate-rugose ..... ***S. rostratum***

13 Corolla violet to (rarely) white, anthers all similar; calyx loosely enveloping the fruit, seeds minutely reticulate-pitted ..... ***S. sisymbriifolium***

12 Berry not enveloped by prickly calyx; the leaves not pinnately parted or divided (except in *S. sisymbriifolium*), or only weakly so (sinus depth < ½ the distance from leaf margin to midvein).

14 Berry 2 cm or more in diameter; lower leaf surface not stellate-pubescent.

15 Ripe berry orange-red to reddish, leaves deeply lobed (sinus depth up to 1/2 distance from leaf margin to midvein) ..... ***S. capsicoides***

15 Ripe berry yellow, immature berry green with white mottles, leaves shallowly lobed (sinus depth typically < 1/3 distance from leaf margin to midvein) ..... ***S. viarum***

14 Berry < 2 cm in diameter; lower leaf-surface stellate-pubescent.

16 Leaves linear-lanceolate, 1-3 cm wide, trichome clusters 0.5 mm broad, with 12 or more rays ..... ***S. elaeagnifolium***

16 Leaves ovate to elliptic, 2-8 cm wide, often lobed or cleft, trichome clusters 1 mm broad, with 5-10 rays.

17 Stellate trichomes of lower leaf surface stipitate, the 6-8 rays essentially equal; corolla 3-4 cm wide, calyx 8-12 mm long ..... ***S. dimidiatum***

17 Stellate trichomes of lower leaf surface sessile, 2-5 rays, the central one elongate; corolla 2-3 cm wide, calyx 5-7 mm long.

18 Leaves entire, margins at most sinuate; plants up to 2 dm in stature; prickles few, absent, and/or confined to midveins; corollas white; [rare plants of Bibb and Chilton counties, AL] ..... ***[S. pumilum]***

18 Leaves not entire, lobed, cleft, pinnately parted, or divided; plants 3-10 dm in stature; prickles more abundant and generally distributed; corollas purple, rarely white; [plants more widely distributed, weedy or ruderal].

19 Leaves pinnately parted or divided, the segments often pinnately lobed; calyx enveloping fruit when ripe, berry red; plant annual ..... ***S. sisymbriifolium***

19 Leaves irregularly lobed or cleft, the lobes or segments entire; calyx not enveloping fruit when ripe; berry yellowish orange, never red; plant perennial.

20 Leaves lobed to near the middle ..... ***S. carolinense*** *var.* ***floridanum***

20 Leaves lobed < ½ way to the middle ..... ***S. carolinense*** *var.* ***carolinense***

Solanum americanum P. Miller, north to e. GA (SC). [= K; < *S. americanum* – RAB, F; < *S. nigrum* – C, G, S]

* ***Solanum capsicoides*** Allioni. Cp (SC), Pd (NC): disturbed areas; rare, introduced. [= K; *S. aculeatissimum* – RAB, S, misapplied]

Solanum carolinense Linnaeus *var.* ***carolinense***, Horse-nettle, Ball-nettle. Cp, Pd, Mt (GA, NC, SC, VA): [= K; < *S. carolinense* – RAB, C, F, G, W; = *S. carolinense* – S]

Solanum carolinense Linnaeus *var.* ***floridanum*** (Shuttleworth ex Dunal) Chapman. Cp (GA): sandhills; rare. GA and FL (Kartesz 1999). [= K; < *S. carolinense* – RAB; = *S. floridanum* Shuttleworth ex Dunal – S]

* ***Solanum dimidiatum*** Rafinesque. Cp (SC), {GA}: disturbed areas; rare, native of w. North America. April-June. [= C, K; = *S. torreyi* A. Gray – RAB, F, G; = *S. perplexum* Small – S]

* ***Solanum dulcamara*** Linnaeus, Bittersweet, Nightshade. Mt (NC, VA), Pd, Cp (VA), {GA}: native of Europe. [= RAB, C, W; > *S. dulcamara* var. *dulcamara* – F, K]

* ***Solanum elaeagnifolium*** Cavanilles, Silverleaf Nightshade, White Horse-nettle. Cp (GA, NC, SC), Pd (NC). Mt (GA): disturbed areas; rare, native of sc. North America. June-September. [= C, F, G, K; = *S. eleagnifolium* – RAB, S, orthographic error]

* ***Solanum lycopersicum*** Linnaeus, Tomato. Cp, Pd, Mt (GA, NC, SC, VA): persistent and weakly naturalized around gardens, especially where compost or sewage sludge is spread; commonly cultivated, rare as a naturalized species. June-frost. The species is native to the Andes Mountains of nw. South America. *S. lycopersicum* is one of the most important and influential of edible species native of the New World introduced to the Old World, along with two other Solanaceae, the potato (*Solanum tuberosum*) and the chili (*Capsicum annuum*). There appears to be little reason to separate *Lycopersicon* from *Solanum*. [= *Lycopersicon esculentum* – RAB, C, F, G; > *Solanum lycopersicum* Linnaeus var. *cerasiforme* (Dunal) Spooner, J. An derson, & R.K. Jansen – K; > *Solanum lycopersicum* var. *lycopersicum* – K; = *Lycopersicon lycopersicon* (Linnaeus) Karsten – S; > *Lycopersicon esculentum* var. *cerasiforme* (Dunal) Alefani]

* ***Solanum pseudocapsicum*** Linnaeus, Jerusalem-cherry. Cp, Mt (GA), Pd (NC), {SC}: rarely cultivated, perhaps not established, native of Mediterranean Europe. [= K; = *S. pseudo-capsicum* – F, orthographic variant]

Solanum pseudogracile Heiser, Dune Nightshade. Cp (GA, NC, SC): ocean dunes, usually with *Uniola paniculata*, maritime forests; uncommon. May-October. E. NC south to FL, west to LA. [= K, Z; = *S. gracile* – RAB, S, misapplied]

Solanum ptychanthum Dunal, American Black Nightshade. Mt, Pd, Cp (GA, NC, SC, VA): disturbed areas; common. June-December. [= K, W, Z; < *S. americanum* P. Miller – RAB, F, misapplied; < *S. nigrum* – C, G, S; = *S. ptycanthum*, orthographic variant]

Solanum pumilum Dunal. {GA} . Known from dolomitic Ketona glades in Bibb County, c. AL (Allison & Stevens 2001) and historically in GA (GAHP). [= *Solanum carolinense* Linnaeus var. *hirsutum* (Nuttall) A. Gray – K]

* ***Solanum rostratum*** Dunal, Buffalo-bur, Kansas-thistle. Cp (GA, NC, SC, VA), Mt, Pd, (GA, NC, VA): disturbed areas; uncommon, native of w. North America. [= RAB, C, F, G, K, W; = *Androcera rostrata* (Dunal) Rydberg – S; ? *S. cornutum* Lamarck, misapplied]

* ***Solanum sarrachoides*** Sendtner, Hairy Nightshade. Cp, Pd (NC, VA): disturbed areas; native of South America. Works by Edmonds and associates have established that *S. sarrachoides* and *S. physalifolium* Rusby are two distinct species, but both are presently known from North America. Mistaken interpretations of Cronquist's 1991 treatment of *Solanum* (e.g. by Kartesz 1999) have given rise to the incorrect belief that only *S. physalifolium* is found in North America. True *S. physalifolium* is present in the western United States, *S. sarrachoides* in the Southeast. [= RAB, C, Z; < *S. physalifolium* Rusby – K; = *S. sarachoides* – F, orthographic error]

* ***Solanum sisymbriifolium*** Lamarck, Sticky Nightshade. Cp (GA, NC, SC), {VA}: disturbed areas; uncommon, native of South America. July-September; September-October. [= RAB, C, F, G, K, S]

* ***Solanum tuberosum*** Linnaeus, Potato, Irish Potato, White Potato. Cp, Pd, Mt (GA, NC, SC, VA): commonly cultivated, rarely escaped or spontaneous from thrown-out tubers, native of Andean South America. June-August. [= RAB, C, F, G, K]

* ***Solanum viarum*** Dunal, Tropical Soda Apple. Cp (GA, NC, SC): pastures; rare, native of South America (s. Brazil, Paraguay, and n. Argentina). This species has only recently appeared in our area, but has been publicized as a severe, extremely aggressive, and rapidly spreading weed further south (Wunderlin et al. 1993, Mullahey et al. 1993, Mullahey 1996). [= K]

* *Solanum capsicastrum* Link ex Schauer. Reported for NC and SC (Kartesz 1999), but apparently erroneously. [= K]

* *Solanum citrullifolium* A. Braun var. *citrullifolium*. Introduced in scattered states, including DE and FL (Kartesz 1999). [= K; < *S. citrullifolium* – C, F, G]

* *Solanum melongena* Linnaeus, Eggplant, is planted in gardens but does not persist. [= F, G, K, S]

* *Solanum nigrescens* Mart. & Gal. Reported from NC, SC, GA, etc. (Kartesz 1999), but actual status unclear. [= K] {not keyed}

* *Solanum nigrum* Linnaeus ssp. *nigrum*, European Black Nightshade. Disturbed areas; rare, native of Eurasia. May-November. [= K, Z; = *S. nigrum* – RAB; < *S. nigrum* – C, F, G, S]

* *Solanum torvum* Swartz. In AL.

* *Solanum triflorum* Nuttall. Introduced in c. TN. [= C, F, G, K]

SPHENOCLEACEAE von Martius ex A.P. de Candolle 1839 (Chickenspike Family)

A family of one genus and 2 species, annual herbs, of tropical regions, native of the Old World. References: Rosatti (1986)=Z.

Sphenoclea Gaertner (Chickenspike)

A genus of 2 species, annual herbs, native of the Old World.

* ***Sphenoclea zeylanica*** Gaertner, Chickenspike. Cp (FL, SC), Pd (GA, NC): rice plantations, reservoirs, other disturbed wetlands; rare, native of Old World tropics. August-October. [= K, S, WH, Z; = *S. zeylandica* – RAB, GW, orthographic error (presumably from a mistaken notion that the epithet refers to New Zealand rather than Ceylon)]

STAPHYLEACEAE Martynov 1820 (Bladdernut Family)

A family of 2-5 genera and about 45-50 species, trees and shrubs, of mainly temperate Northern Hemisphere, especially e. Asia. References: Spongberg (1971)=Z; Simmons in Kubitzki, Bayer, & Stevens (2007).

Staphylea Linnaeus 1753 (Bladdernut)

A genus of 23 species, trees and shrubs, mainly of temperate Eurasia and e. North America, but extending into Central and South America. References: Simmons in Kubitzki, Bayer, & Stevens (2007).

Identification notes: The opposite, trifoliolate leaves with serrulate margins are diagnostic.

Staphylea trifolia Linnaeus, Bladdernut. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): nutrient-rich bottomland forests, extending upslope over calcareous or mafic rocks; common (rare in FL). April; September-October. Québec west to MN, south to sw. GA, Panhandle FL, n. AL, n. MS, and OK. [= RAB, C, F, G, GW, K, S, W, WH, Z]

STYRACACEAE Dumortier 1829 (Storax Family)

STYRACACEAE

A family of about 11 genera and 160 species, trees and shrubs, of warm temperate and tropical regions of America, Mediterranean, se. Asia, Malesia. References: Fritsch in Kubitzki (2004).

1 Corolla lobes 4; fruit elongate, winged, 2.5-5 cm long; petioles 15-25 mm long..... ***Halesia***
1 Corolla lobes 5; fruit globose, not winged, 0.5-0.9 cm in diameter; petioles 2-10 mm long..... ***Styrax***

Halesia Ellis ex Linnaeus (Silverbell, Snowdrop Tree)

A genus of about 5 species, trees and shrubs, of e. North America and e. Asia. The genus was named to honor Stephen Hales; it therefore seems more appropriate to pronounce the genus with three syllables (the accent on the first) than the commonly heard four, which thoroughly distorts the honoree's name. The number of taxa in our area and their appropriate taxonomic level are in dispute; recent analyses vary from from 2-5, with specific or varietal status. References: Fritsch & Lucas (2000)=X; Reveal & Seldin (1976)=Y; Sargent (1921); Godfrey (1988)=Z.

1 Petals united only basally, the lobes longer than the tube; fruits broadly 2-winged; leaves broadly obovate to suborbicular, 1-2× as long as wide.
  2 Corolla 10-15 mm long..... ***H. diptera** var. **diptera***
  2 Corolla 20-30 mm long..... ***H. diptera** var. **magniflora***
1 Petals united for most of their length, the tube longer than the lobes; fruits narrowly or broadly 4-winged; leaves elliptic-oblong, ca. 2× as long as wide.
  3 Corolla 7-10 (-12) mm long, the style strongly exserted (1/3 to 1/2 the length of the corolla tube beyond its mouth), the anthers at the mouth of the corolla tube or slightly exserted; fruit obovate in outline, broadest toward the tip, strongly narrowed to the base, narrowly winged..... ***H. carolina***
  3 Corolla (12-) 15-30 mm long, the style included or slightly exserted, the anthers within the mouth of the corolla tube; fruit ellipsoid to slightly obovate in outline, broadest near the middle, broadly winged.
    4 Corolla (18-) 20-30 mm long, the style included, the anthers well inside the mouth of the corolla tube; large tree, to 40 m tall..... ***H. tetraptera** var. **monticola***
    4 Corolla (12-) 15-20 mm long, the style slightly exserted, the anthers just within the mouth of the corolla tube; shrub to small tree, rarely exceeding 10 m in height..... ***H. tetraptera** var. **tetraptera***

Halesia carolina Linnaeus, Little Silverbell. Pd (GA, SC): sandy alluvial forests; common (rare in GA and SC). March-April; September-October. S. SC south to panhandle FL, west to s. MS. [= K, Y, Z; = *H. parviflora* Michaux – RAB, GW, S; < *H. carolina* – X]

Halesia diptera Ellis *var.* ***diptera***, Common Two-wing Silverbell. Cp (FL, GA, SC): bottomland forests, forested edges of brackish marshes; common (uncommon in GA, rare in SC). April-May; August-September. Var. *diptera* ranges from s. SC south to panhandle FL, west to n. AL, sw. AR, and e. TX. [= Y, Z; < *H. diptera* – RAB, GW, K, S, WH]

Halesia diptera Ellis *var.* ***magniflora*** Godfrey. Cp (FL, GA): dry to moist hammocks; rare. Endemic to sw. GA and panhandle FL. [= Y, Z; < *H. diptera* – GW, K, S, WH]

Halesia tetraptera Ellis *var.* ***monticola*** (Rehder) Reveal & Seldin, Mountain Silverbell. Mt (NC, VA?): cove forests, moist ridges, mostly above 1000m in elevation; common (VA Watch List). April-May; August-September. Apparently limited to the higher mountains of the Southern Appalachians of NC, TN, and VA (?), but the range obscure, perhaps limited to the area south of Linville Gorge, notably the Great Smoky Mountains. [= K, Y; < *H. carolina* – RAB, F, G, W; < *H. tetraptera* – C; = *H. monticola* (Rehder) Sargent – S; < *H. carolina* – X]

Halesia tetraptera Ellis *var.* ***tetraptera***, Common Silverbell. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC): moist slopes, coves, creek-banks, bottomlands; common (uncommon in lower Piedmont and Coastal Plain, rare in FL). March-May; August-September. W. VA, WV, s OH and s IL, south to FL and e. TX (and cultivated elsewhere). [= K, Y; < *H. carolina* – RAB, F, G, W; < *H. tetraptera* – C; = *H. carolina* Linnaeus – S; < *H. carolina* – X]

Styrax Linnaeus (Snowbell, Storax)

A genus of about 120-130 species, trees and shrubs, of s. Europe, Malesia, se. Asia, se. North America, and tropical America. References: Gonsoulin (1974)=Z. Nicolson & Steyskal (1976) discuss at length the grammatical gender of the genus, and conclude that it should be treated as masculine.

1 Leaves generally broadly obovate, sometimes broadly ovate, 5-14 cm long, 4-10 cm wide, the apices acute to short-acuminate, densely and finely pubescent beneath, giving the underside of the leaf a pale color; inflorescence usually of 5-20 flowers..... ***S. grandifolius***
1 Leaves narrowly elliptic to ovate or obovate, usually 2-8 cm long, 1-4 cm wide, the apices short- to long-acuminate, glabrous or sparsely pubescent beneath (to densely pubescent and then giving the underside of the leaf a rusty color in var. *pulverulentus*); inflorescence usually of 1-7 flowers.
  2 Leaves oblong-elliptic, glabrous or sparsely pubescent on the undersurfaces and petioles, the margins usually distantly toothed toward the apices); pedicels 10-14 mm long; calyces essentially glabrous; new growth glabrous to sparsely pubescent..... ***S. americanus** var. **americanus***
  2 Leaves elliptic to ovate to oblanceolate or obovate, sparsely to densely scurfy-hairy on the undersurfaces and petioles, margins entire to serrate; pedicels 4-6 mm long; calyces and pedicels densely scurfy-hairy; new growth densely matted pubescent..... ***S. americanus** var. **pulverulentus***

Styrax americanus Lamarck *var.* ***americanus***, American Snowbell, American Storax. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, VA): swamp forests, pocosin edges, other moist to wet habitats; uncommon (rare in Piedmont, rare in VA) (VA Watch List). April-June; July-September. Var. *americanus* ranges from ne. WV, OH, s. IN, s. IL, s. MO, south to s. FL and e. TX. See discussion below on var. *pulverulentus* and the presence in our area of transitional plants. [= C; < *S. americana* – RAB, G, GW, W; < *S. americanus* – K; = *S. americana* var. *americana* – F, Z; = *S. americana* – S]

Styrax americanus Lamarck *var.* ***pulverulentus*** (Michaux) Perkins ex Rehder, Downy American Snowbell. Cp (GA, SC): wet pine flatwoods; rare. April-May; July-September. "Good" var. *pulverulentus* ranges from SC south to s. FL and west to e. TX and se. MO; some plants in NC and SC are transitional between the two varieties and will not be easily assigned. [= C, Z; < *S. americana* – RAB, G, GW, W; < *S. americanus* – K; = *S. pulverulenta* Michaux – S; = *S. americana* var. *americana* - Z]

Styrax grandifolius Aiton, Bigleaf Snowbell, Bigleaf Storax. Pd, Cp, Mt (GA, NC, SC, VA): upland forests, bluffs; uncommon (rare in Mountains) (VA Watch List). April-May; August-September. Se. VA south to s. FL, west to e. TX, north to se. MO. [= C, K; = *S. grandifolia* – RAB, F, G, S, W, Z]

SYMPLOCACEAE Desfontaines 1820 (Sweetleaf Family)

A family of 1 genus and about 250-300 species, trees and shrubs, of tropical and warm temperate America and Asia. References: Nooteboom in Kubitzki (2004).

Symplocos Jacquin 1760 (Sweetleaf)

A genus of about 300 species, trees and shrubs, of tropical and warm temperate America and Asia. Wang et al. (2004) found that the affinities of *S. tinctoria* are with South American species of subgenus *Epigenia*, rather than with east Asian species of subgenus *Hopea*, section *Palaeosymplocos*. References: Wang et al. (2004); Nooteboom in Kubitzki (2004).

Identification notes: The foliage of *S. tinctoria* has a sweet taste, and an odor and taste similar to green apples. Sometimes the leaves are glossy and appear subcoriaceous, somewhat resembling *Kalmia latifolia*.

1 Leaf margins sharply and finely glandular-dentate; inflorescence a terminal panicle; drupes blue (white); [alien, rarely cultivated and escaped]; [subgenus *Hopea*, section *Palura*] ..... ***[S. paniculata]***
1 Leaf margins entire to coarselt serrate-crenate; inflorescence an axillary fascicle; drupes green; [native, common in parts of our area]; [subgenus *Epigenia*] ..... ***S. tinctoria***

Symplocos tinctoria (Linnaeus) L'Heritier, Sweetleaf, Horsesugar. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC): moist bottomland forests, pocosin edges, mesic forests, ridgetop forests; common (rare in Piedmont). March-May; August-September. DE south to n. FL and west to e. TX and se. OK. The range in our area is discontinuous and interesting, the species rather abundant in the Coastal Plain throughout our area, and in the Mountains of NC and SC (absent from the VA mountains!), but present in the Piedmont only near its borders with the other provinces and in scattered sites in the central Piedmont. The leaves have a subcoriaceous and rather evergreen appearance, but are (in our area) only semi-evergreen. As the name implies, the leaves are somewhat sweet, but the sweetness seems variable from plant to plant, season to season, and taster to taster. Whether sweet or not, the taste is distinctive and is helpful (once learned) in distinguishing this rather nondescript shrub or small tree. Where protected from fire, *S. tinctoria* can reach considerable size, up to 20 cm in diameter and 10 m tall, with longitudinally striped bark. [= RAB, C, GW, K, S, W, WH; > *S. tinctoria* var. *tinctoria* – F, G; > *S. tinctoria* var. *pygmaea* Fernald – F, G (probably based on fire sprouts)]

* *Symplocos paniculata* (Thunberg) Miq., Sapphire-berry, Asiatic Sweetleaf, native of e. Asia, has been reported as spreading from plantings in the District of Columbia (Whittemore 2003).

TAMARICACEAE Link 1821 (Tamarisk Family)

A family of about 4 genera and 78 species, shrubs and trees, of Eurasia and Africa (especially from the Mediterranean to c. Asia). References: Crins (1989b); Gaskin in Kubitzki & Bayer (2003); Gaskin et al. (2004).

Tamarix Linnaeus (Tamarisk, Salt-cedar)

A genus of about 54 species, trees and shrubs, native of Eurasia and Africa. References: Baum (1978)=Z; Crins (1989b)=Y.

Identification notes: An important character is the staminal disk; three terms are used. In **hololophic** disks, the lobe between each stamen is obvious and separate from the stamens on either side, and each is usually 2-lobed. In **paralophic** disks, each lobe is deeply bipartite, and each half-lobe is fused to the base of the adjacent stamen, but is still somewhat distinct from it. In **synlophic** disks, the lobes are also deeply bipartite, but each half-lobe is fused confluently with the stamen base, giving the appearance that the filament has swollen base.

1 Flowers 4-merous; [section *Oligadenia*].

2 Petals 1.5-2.5 mm long; bracts subtending the pedicels diaphanous; young growth completely glabrous; [section *Oligadenia*; series *Arbusculae*] ..... ***T. parviflora***
2 Petals 3.5-5 mm long; bracts subtending the pedicels herbaceous; young growth (especially the bracts and the raceme axis) papillose; [section *Oligadenia*; series *Anisandrae*] ..... ***T. tetragyna***
1 Flowers 5-merous.
3 Racemes 5-10 mm wide; [section *Oligadenia*].
4 Bracts of the raceme linear to linear oblong, about equalling the pedicel; disk hololophic; young growth glabrous; [section *Oligadenia*; series *Laxae*] ..... ***T. chinensis***
4 Bracts of the raceme lanceloate to ovate, exceeding the pedicel; disk synlophic, paralophic, or hololophic; young growth glabrous or papillose; [section *Oligadenia*; series *Anisandrae*].
5 Young growth glabrous (except sometimes papillose on the raceme axis); disk synlophic; flowers with 5 antesepalous stamens and 0 antepetalous stamens ..... ***T. africana***
5 Young growth papillose; disk hololophic to paralophic; flowers with 4-5 antesepalous stamens and 0-4 antepetalous stamens ..... ***T. tetragyna***
3 Racemes 3-5 mm wide; [section *Tamarix*].
6 Young growth papillose; disk synlophic; [section *Tamarix*; series *Canariensis*] ..... ***T. canariensis***
6 Young growth glabrous; disk synlophic or hololophic; [section *Tamarix*; section *Gallicae*].
7 Petals caducous; disk synlophic ..... ***T. gallica***
7 Petals persistent; disk hololophic ..... ***T. ramosissima***

* ***Tamarix africana*** Poiret, African Tamarisk. Cp (SC): brackish marshes, coastal sands; rare, native of sw. Mediterranean Europe, ne. Africa, and the Canary Islands. [= K, Y; > *T. africana* var. *africana* – Z]
* ***Tamarix canariensis*** Willdenow, Canary Island Tamarisk. Cp (GA, NC, SC): brackish marshes, coastal hammocks, coastal sands; uncommon, native of sw. Europe, ne. Africa, and the Canary Islands. [= K, Y, Z; < *T. gallica* Linnaeus – RAB, S]
* ***Tamarix chinensis*** Loureiro, Chinese Tamarisk. Cp (NC): coastal sands; rare, native of China, Korea, and Japan. [= C, K, Y, Z; = *T. pentandra* Pallas – G, an illegitimate name]
* ***Tamarix gallica*** Linnaeus, French Tamarisk. Cp (GA, NC): brackish marshes; rare, native of the w. Mediterranean region of Europe. April-July. Most reports of this taxon from the Southeast represent misidentifications or a very broad interpretation of the species. [= F, G, K, Y, Z; < *T. gallica* – RAB, S]
* ***Tamarix parviflora*** A.P. de Candolle, Small-flower Tamarisk. Cp (NC, VA): coastal sands; rare, native of ne. Europe (Italy, Greece, Cyprus, Turkey). [= C, G, K, Y, Z; < *T. gallica* Linnaeus – RAB, S]
* ***Tamarix ramosissima*** Ledebour, Salt-cedar. Cp (GA, NC, SC, VA): brackish marshes, coastal hammocks, dunes and coastal sands; common, native of w. to e. Asia. [= K, Y, Z; < *T. gallica* Linnaeus – RAB, S]
* ***Tamarix tetragyna*** C. Ehrenberg. Cp (GA): coastal sands; rare, native of the Middle East. Established on Cumberland Island, Camden County, GA (Crins 1989b). [= K, Y, Z]

* *Tamarix aralensis* Bunge, Russian Tamarisk. Reported for NC (Kartesz 1999), but the specimen on which the report is based is of a plant in cultivation as an ornamental. Not keyed. [= K, Y, Z]

TETRACHONDRACEAE Wettstein 1924 (Tetrachondra Family)

A family of 2 genera, *Polypremum* and *Tetrachondra* (Oxelman et al. 1999), and 3 species, perennial herbs, of s. North America south to South America, and New Zealand. References: Oxelman et al. (1999); Wagstaff in Kadereit (2004).

Polypremum Linnaeus 1753 (Polypremum)

The genus is monotypic; its assignment to family controversial, problematic, and unresolved. A recent molecular analysis strongly suggests that its closest relationship is with *Tetrachondra* (Oxelman et al. 1999). References: Rogers (1986)=Z; Wagstaff in Kadereit (2004).

Polypremum procumbens Linnaeus, Polypremum, Rustweed, Juniperleaf. Cp, Pd, Mt (GA, NC, SC, VA): fields, disturbed areas; common, rare in Mountains. Late May-September; August-October. Se. NY, NJ, and MO south to FL and TX, and south into tropical America. [= RAB, C, F, G, GW, K, S, W, Z]

THEACEAE D. Don 1825 (Tea Family)

With a more circumscribed definition (excluding Ternstroemiaceae), a family of about 8 genera and 195-460 species, trees and shrubs, of primarily tropical and subtropical regions of the Old and New Worlds. References: Prince & Parks (2001); Stevens, Dressler, & Weitzman in Kubitzki (2004).

1 Leaves deciduous, medium green above, herbaceous in texture.
2 Leaves broader toward the tip, 2-2.5× as long as wide; [tribe *Gordonieae*] ..... ***Franklinia***
2 Leaves broadest near or below the middle, 1-1.8× as long as wide); [tribe *Stewartieae*] ..... ***Stewartia***
1 Leaves evergreen, dark green above, coriaceous in texture.
3 Leaves ovate to elliptic (broadest at or below the middle), 1-3× as long as wide, slightly to strongly acuminate, 5-10 (-15) cm long; [introduced shrub, planted in upland soils]; [tribe *Theeae*] ..... ***Camellia***

3 Leaves oblanceolate to narrowly elliptic (broadest at or above the middle), 2.5-4× as long as wide, acute to obtuse (rarely slightly acuminate), 8-30 cm long; [small to large tree, native in acidic Coastal Plain wetlands]; [tribe *Gordonieae*] ..... ***Gordonia***

Camellia Linnaeus 1753 (Camellia, Tea)

A genus of about 100-300 species, shrubs and trees, of se. Asia. References: Stevens, Dressler, & Weitzman in Kubitzki (2004).

1 Sepals deciduous; flowers sessile; leaves mostly ovate, acuminate, > 4 cm wide ..... ***C. japonica***
1 Sepals persistent; flowers on pedicels; leaves mostly elliptic, only slightly acuminate, < 4 cm wide ..... ***C. sinensis***

* ***Camellia japonica*** Linnaeus, Camellia. Cp (GA, NC, SC): frequently cultivated, sometimes persistent around old home sites; rare, native of China and Japan. [= K]
* ***Camellia sinensis*** (Linnaeus) Kuntze, Tea. Cp (SC): cultivated in plantations and as a horticultural novelty, rarely escaped; rare, native to China. [= K; = *Thea sinensis* Linnaeus]

* *Camellia sasanqua* Thunberg, Sasanqua Camellia, is reported as introduced in NC, SC, GA, and FL (Kartesz 1999). [= K] {not yet keyed}

Franklinia Bartram ex Marshall 1785 (Franklinia)

A monotypic genus, apparently endemic to e. GA (now presumably extinct in the wild). *Franklinia* is actually most closely related to the Asian genus *Schima* (Prince & Parks 2001); its closest relative in North America is *Gordonia*, from which it differs in its deciduous leaves (vs. evergreen) and globose fruits (vs. pointed). References: Bozeman & Rogers (1986); Stevens, Dressler, & Weitzman in Kubitzki (2004).

Franklinia alatamaha Bartram ex Marshall, Franklinia. Cp (GA): habitat speculative, probably dry sandy ridges, near the mouth of the Altamaha River; rare (believed to be extinct in the wild). It was native to the Coastal Plain of GA, where it was found by William Bartram near the mouth of the Altamaha River. It has not been seen in the wild since 1790 and is now considered to be extinct in the wild. It is sometimes cultivated in our area. Bozeman & Rogers (1986) discuss the history of this tree. [= K, S; = *Gordonia alatamaha* (Bartram ex Marshall) Sargent]

Gordonia Ellis 1771 (Loblolly Bay, Gordonia)

As recircumscribed, a genus of 2 species, trees, of se. North America and Central America (*Gordonia brandegeei* H. Keng). The other 20-70 species, trees and shrubs, of se. Asia, previously assigned to *Gordonia* are actually in a different tribe and should be reassigned to *Polyspora* (Yang et al. 2004). References: Yang et al. (2004); Stevens, Dressler, & Weitzman in Kubitzki (2004).

Identification notes: *Gordonia* is one of the "bay trees" so typical of acid Coastal Plain wetlands of our area – the other two being Sweet Bay (*Magnolia virginiana* of the Magnoliaceae) and Swamp Red Bay (*Persea palustris* of the Lauraceae). *Gordonia* can be distinguished from the other two species by its smooth leaves, serrate toward the tip, odorless when crushed (vs. pubescent leaves, entire-margined, aromatic when crushed). *Gordonia* is also distinctive in its narrow, conical crown, resembling *Liriodendron* or *Chamaecyparis*, and its medium-gray, deeply furrowed bark. Most individuals of *Gordonia* have at least a few orange-red leaves visible, at any season.

Gordonia lasianthus (Linnaeus) Ellis, Loblolly Bay, Gordonia. Cp (FL, GA, NC, SC): pocosins, bayheads, acidic, organic-rich swamp forests, wet pine savannas, bay forests; common. July-September; September-October. Ne. NC south to s. peninsular FL, west to s. MS (Sorrie & Leonard 1999), a Southeastern Coastal Plain endemic. Peat-filled Carolina bays and large peat dome pocosins typically have *Gordonia* as an important tree, surpassed in abundance and importance only by *Pinus serotina*. On deep peats, *Gordonia* individuals are stunted and rarely reach sizes larger than pocosin shrubs. [= RAB, GW, K, S, WH]

Stewartia Linnaeus 1753 (Stewartia, Wild Camellia)

A genus of about 10 species, trees and shrubs, of temperate e. Asia and e. North America. Both our species of *Stewartia* are very attractive shrubs. The other species of the genus are Asian. Li et al. (2002) demonstrate that our 2 species form a clade together, separate from and basal to the Asian species; Prince (2002) shows a different tree topology. References: Spongberg (1974)=Z; Li et al. (2002); Prince (2002); Stevens, Dressler, & Weitzman in Kubitzki (2004).

Identification notes: The leaves are borne in horizontal planes, reminiscent of *Cornus florida* and *Cornus alternifolia*. The leaves of both species are obscurely serrate or crenate, and also conspicuously and copiously ciliate-margined.

1 Style 1, with a 5-lobed stigma; seeds 5-7 mm long, shiny, plump, angled; fruits lobed, the lobes rounded; leaves mostly 4-10 cm long; petioles narrowly winged, not enclosing and concealing the terminal and lateral buds; calyx subtended by 2 persistent bracts, each 2-4 mm long ..... ***S. malacodendron***
1 Styles 5, separate; seeds 8-10 mm long, dull, flat, thin (to slightly winged); fruits lobed, the lobes angled; leaves mostly 7-15 cm long; petioles widely winged, enclosing and concealing the terminal and lateral buds; calyx subtended by 1 persistent bract, 11-14 mm long .....

Stewartia malacodendron Linnaeus, Silky Camellia, Virginia Stewartia. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC): mesic forests, especially on beech-dominated bluffs or "islands" in Coastal Plain swamps; uncommon, (rare in Piedmont and Mountains, rare in GA, rare in VA). May-June; September-October. Primarily Coastal Plain, se. VA south to FL, west to se. TX, but extending inland to the Piedmont of GA, NC, and SC and the Mountains of NC. [= RAB, K, W, WH, Z; = *Stewartia malachodendron* – C, F, G (orthographic variant); = *Stuartia malachodendron* – S (orthographic variant)]

Stewartia ovata (Cavanilles) Weatherby, Mountain Camellia, Mountain Stewartia. Mt (GA, NC, SC, VA), Pd (GA, NC, VA), Cp (VA): mesic forests, especially acidic bluffs, often in openings in rhododendron thickets ("hells"), in the Coastal Plain of VA restricted to ravines; rare. Late June-July; August-September. Primarily Appalachian: e. KY, sc. VA, e. VA south to c. NC, w. SC, e. and c. TN to n. GA and n. AL, avoiding, however, the higher mountains, and extending into the Coastal Plain in e. VA. The species is most abundant in the Cumberland Plateau of KY and TN. [= RAB, C, F, G, K, W, Z; = *Malachodendron pentagynum* (L'Héritier) Small – S]

THYMELAEACEAE A.L de Jussieu 1789 (Mezereum Family)

A family of about 45-53 genera and 500-800 species, mostly trees and shrubs, of cosmopolitan distribution, but especially diverse in Africa (Van der Bank, Fay, & Chase 2002). References: Van der Bank, Fay, & Chase (2002); Herber in Kubitzki & Bayer (2003).

Dirca Linnaeus 1753 (Leatherwood, Leatherbark)

A genus of 3 species, shrubs, of North America (including Mexico). Our species is most closely related to *D. mexicana* Nesom & Mayfield, of the Sierra Madre Oriental, Tamaulipas, Mexico; the other species is *D. occidentalis* A. Gray of California (Schrader & Graves 2004). *Dirca* is in subfamily Thymelaeoideae (Van der Bank, Fay, & Chase 2002). References: Nevling (1962)=Z.

Dirca palustris Linnaeus, Leatherwood, Leatherbark, Wicopee, Rope-bark. Pd (GA, NC, SC, VA), Mt (GA, NC, VA), Cp (FL, GA, VA): very rich forests, on slopes or bottomlands, limited to calcareous or mafic rocks such as limestone, calcareous siltstone, calcareous shale, gabbro, or amphibolite, in marl ravine bottoms in the Coastal Plain of VA; uncommon, rare south of VA and in VA Coastal Plain. March-April; June-July. Widespread in e. North America, from Nova Scotia and s. Québec, south to FL, AL, and OK. The curiously flexible twigs and swollen nodes are distinctive. The tan-brown bark is extraordinarily tough and was used by the native Americans for cordage; the common names refer to this property. [= RAB, C, F, G, K, S, W, WH, Z]

Edgeworthia Meisner 1841 (Paperbush)

A genus of 3 species, shrubs, of e. Asia.

* *Edgeworthia papyrifera* Siebold & Zuccarini, Paperbush. Reported for Rabun County, GA by Jones & Coile (1988). [= K] {not yet keyed}

TROPAEOLACEAE A.L de Jussieu ex A.P. de Candolle 1824 (Nasturtium Family)

A family of 1-3 genera and about 90 species, herbs, of Central and South America. References: Sparre & Andersson (1991)=Z; Bayer & Appel in Kubitzki & Bayer (2003).

Tropaeolum Linnaeus 1753 (Nasturtium)

A genus of about 85-90 species, herbs, of tropical Central America and South America (s. Mexico to Peru). References: Sparre & Andersson (1991)=Z.

* *Tropaeolum majus* Linnaeus, Nasturtium, is cultivated and rarely persistent or present around refuse areas, as in se. PA (Rhoads & Klein 1993). *T. majus* is considered by Sparre & Andersson (1991) to be a taxon of hybrid origin, not known from wild populations. It is probably not truly established in our area. [= K, Z]

TURNERACEAE Kunth ex A.P. de Candolle 1828 (Turnera Family)

A family of about 10 genera and 200 species, shrubs, herbs, and trees, of tropical and subtropical Africa and America. References: Arbo in Kubitzki, Bayer, & Stevens (2007).

Piriqueta Aublet 1775

A genus of about 20-50 species, herbs and shrubs, of tropical and subtropical America, with a single species in s. Africa. References: Arbo (1990, 1995)=Z; Maskas & Cruzan (2000).

Piriqueta caroliniana (Walter) Urban *var. caroliniana*. Cp (GA, SC): longleaf pine sandhills, sandy soils of roadsides, woodland edges, and disturbed areas; uncommon. May-September. SC south to n. FL; Cuba and Hispaniola; and in Central and n. South America. Arbo (1990; 1995) treats *P. caroliniana* as a subspecies of *P. cistoides*, but the morphological distinctions seem strong and the two taxa have widely overlapping distributions in the Neotropics. Maskas & Cruzan (2000) discuss variation and evolutionary taxa in this complex in the southeastern United States and the Bahamas. [= *P. caroliniana* -- RAB; < *P. cistoides* (Linnaeus) Grisebach ssp. *caroliniana* (Walter) M.M. Arbo – K, Z; = *P. caroliniana* – S]

Piriqueta cistoides (Linnaeus) Grisebach is reported for GA (Kartesz 1999), but the documentation is untraceable. {not keyed; rejected pending better documentation} [= *P. cistoides* ssp. *cistoides* – K, Z]

ULMACEAE de Mirbel 1815 (Elm Family)

As here circumscribed (excluding *Celtis* and relatives), a family of 6-7 genera and about 35 species, of temperate, subtropical, and boreal Northern Hemisphere, rarely extending into the Southern Hemisphere). Zavada & Kim (1996) discuss compelling reasons to recognize the *Celtis* from the Ulmaceae. The distinctiveness of the Celtidaceae from the Cannabaceae and Moraceae is more questionable. References: Sherman-Broyles, Barker, & Schulz in FNA (1997); Zavada & Kim (1996); Todzia in Kubitzki, Rohwer, & Bittrich (1993). [also see *CANNABACEAE*]

1 Leaves strongly 3-veined from the base, the venation otherwise pinnate; fruit a drupe with thin flesh.....*[**Celtis** – see CANNABACEAE]*
1 Leaf venation pinnate throughout, the venation strictly pinnate; fruit dry, a samara (flat and winged) or nutlike (with numerous fleshy protuberances).
  2 Fruit nutlike (with numerous fleshy protuberances); primary lateral veins mostly forking before reaching the margin; [small trees of swamp forests of the Coastal Plain from se. NC and SC southward].....***Planera***
  2 Fruit a samara (flat and winged); primary lateral veins mostly parallel and unforked to the leaf margin; [small to large trees, widespread in our area].....***Ulmus***

Planera J.F. Gmelin 1791 (Planer-tree, Water-elm)

A monotypic genus, a tree, of temperate se. North America. References: Barker in FNA (1997); Todzia in Kubitzki, Rohwer, & Bittrich (1993).

Planera aquatica (Walter) J.F. Gmelin, Planer-tree, Water-elm. Cp (FL, GA, NC, SC): river swamps where flooded (often to depths of 1-2 m) in the winter; common (uncommon in NC). Se. NC (limited to the Waccamaw and Lumber rivers) south to n. FL, west to e. TX, and north in the Mississippi Embayment to w. TN, w. KY, s. IL, and se. MO. [= RAB, C, F, FNA, G, GW, K, S]

Ulmus Linnaeus 1753 (Elm)

A genus of about 25-30 species, trees (rarely shrubs), of temperate and boreal regions of the Northern Hemisphere (most diverse in c. and n. Asia). References: Sherman-Broyles in FNA (1997); Wiegrefe, Sytsma, & Guries (1994); Kurz & Godfrey (1962)=Z; Todzia in Kubitzki, Rohwer, & Bittrich (1993). Key adapted in part from FNA.

1 Leaf blades mostly < 7 cm long, the base symmetrical to somewhat oblique.
  2 Samaras ciliate-margined; twigs often cork-winged; upper surfaces of leaves glabrous to scabrous; [native trees, sometimes weedy].
    3 Leaf apex acute; flowers appearing in the late winter to late spring; calyx lobes 5; upper surfaces of leaves glabrous to somewhat scabrous; [widespread in our area; [subgenus *Oreoptelea*, section *Chaetoptelea*].....***U. alata***
    3 Leaf apex obtuse; flowers appearing in the late summer to fall; calyx lobes 6-9; upper surfaces of leaves harshly scabrous; [of w. TN, w. MS westward; also disjunct in FL]; [subgenus *Oreoptelea*, section *Trichoptelea*].....***U. crassifolia***
  2 Samaras with glabrous margins; twigs never cork-winged; upper surfaces of leaves glabrous; [introduced trees, planted and sometimes naturalized or persistent]; [subgenus *Ulmus*, section *Microptelea*].
    4 Flowers appearing in the late summer to fall; leaf base generally oblique; leaves 1.5-2.5 cm wide, 5 or more of the lateral veins forked per side.....***U. parvifolia***
    4 Flowers appearing in the late winter to late spring; leaf base generally symmetrical; leaves 2-3.5 cm wide, 3 or fewer of the lateral veins forked per side.....***U. pumila***
1 Leaf blades mostly > 7 cm long, the base moderately to strongly oblique (rarely nearly symmetrical).
  5 Leaf uppersurface slightly to very strongly scabrous; leaf undersurface tomentose or villous, with tufts of hairs in the vein axils; flowers and fruits sessile or subsessile (on pedicels 0-2 mm long), not pendulous, in dense fascicles; [subgenus *Ulmus*, section *Ulmus*].
    6 Leaves with ciliate margins; samara pubescent on the body with reddish hairs; bud scales red, the margins red-tomentose; [native tree]..

..... ***U. rubra***

6 Leaves without ciliate margins; samara glabrous except along the margin of the notched apex **or** on the central vein of the wing; bud scales brown, margins pale-cilate; [introduced tree, planted and sometimes naturalized or persistent]

7 Leaf base strongly oblique, the lower side overlapping the petiole; branchlets not corky; samara glabrous except on the central vein of the wing ..... ***[U. glabra]***

7 Leaf base oblique but not overlapping the petiole; branchlets with corky wings; samara glabrous except along the margin of the notched apex ..... ***U. procera***

5 Leaf uppersurface glabrous (or slightly to moderately scabrous on stump sprouts or seedlings); leaf undersurface glabrous to tomentose, with or without tufts of hairs in the vein axils; flowers and fruits pedicellate (on pedicels 5-20 mm long), pendulous, in fascicles or racemes.

8 Leaf undersurfaces glabrous or slightly pubescent, but always with tufts of hairs in the vein axils; branches never with corky wings; inflorescence a fascicle; [trees widespread in our area]; [subgenus *Oreoptelea*, section *Blepharocarpus*].

9 Leaf bases strongly oblique; larger leaves 10-15 cm long; primary leaf teeth acuminate, often curved inward; [tree widespread in our area] ..... ***U. americana** var. **americana***

9 Leaf bases moderately oblique (rarely nearly symmetrical); larger leaves 7-10 cm long; primary leaf teeth acute, not curved; [tree restricted to moist calcareous sites in the Coastal Plain of se. NC southward] ..... ***U. americana** var. **floridana***

8 Leaf undersurfaces moderately white or yellowish soft-pubescent, lacking prominant tufts of hairs in the vein axils (differing from the general pubescence of the surface); branches often developing corky wings; inflorescence a raceme or racemose cyme; [trees of calcareous areas immediately west of our area]; [subgenus *Oreoptelea*, section *Trichoptelea*].

10 Leaves 7-8 (-14) cm long, lanceolate to ovate, the undersurface with yellowish-gold pubescence; buds and young twigs glabrous; calyx lobes 5-6; seeds thickened ..... ***U. serotina***

10 Leaves 9-11 (-16) cm long, obovate, the undersurface with whitish pubescence; buds and young twigs pubescent; calyx lobes 7-8; seeds inflated ..... ***[U. thomasii]***

Ulmus alata Michaux, Winged Elm. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): rock outcrops, dry and mesic forests and woodlands, bottomlands, old fields, disturbed areas, common (rare in the Mountains). February-March; March-April. N. VA west to MO, south to c. peninsular FL and c. TX. [= RAB, C, F, FNA, G, GW, K, S, W, WH, Z]

Ulmus americana Linnaeus *var.* ***americana***, American Elm, White Elm. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): swamps, bottomland forests, moist slopes, especially on relatively or strongly nutrient-rich substrates; common (rare in Mountains of NC and SC). February-March; March-April. Nova Scotia, New Brunswick, and Québec west to se. Saskatchewan, south to n. FL and c. TX. An ascomycetous fungus, *Ceratocystis ulmi*, is the cause of the Dutch Elm disease. In our area, the effects of the disease appear to have been mild or nonexistent, especially in natural areas. [= Z; < *U. americana* – RAB, C, F, FNA, G, GW, K, W; = *U. americana* – S]

Ulmus americana Linnaeus *var.* ***floridana***, Florida Elm. Cp (FL, GA, NC, SC): shell middens, other calcareous forests; uncommon. January-March; February-April. Se. NC (north at least to Carteret County) south to c. peninsular FL, west to panhandle FL. [= Z; < *U. americana* – RAB, C, F, FNA, G, GW, K, W; = *U. floridana* Chapman – S]

Ulmus crassifolia Nuttall, Cedar Elm. Cp (FL, LA, MS, TN): bottomlands, mesic forests; rare. W. TN, s. MO, and OK south to MS, LA, and TX; disjunct in e. Panhandle FL. [= FNA, K, S, Z]

* ***Ulmus parvifolia*** Jacquin, Chinese Elm, Lacebark Elm. Cp (FL, VA), Mt (VA), Pd (NC, VA): disturbed areas; rare, native of China and Japan. August-October; September-November. [= FNA, K]

* ***Ulmus procera*** Salisbury, English Elm, English Cork Elm. Cp (NC, VA), Pd, Mt (VA): disturbed areas; rare, native of Europe. [= C, FNA, K; *U. minor* P. Miller, misapplied]

* ***Ulmus pumila*** Linnaeus, Siberian Elm, Dwarf Elm. Cp (NC, VA), Pd, Mt (VA): disturbed areas; rare, native of Asia. [= C, F, FNA, K]

Ulmus rubra Muhlenberg, Slippery Elm, Red Elm. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist to fairly dry calcareous forests, rich bottomlands, rich cove forests in the low Mountains; common (rare in Coastal Plain of FL, GA, NC, and SC). February-March; March-April. ME, Québec, and Ontario west to MN and ND, south to panhandle FL and c. TX. [= RAB, C, FNA, G, K, W, Z; = *U. fulva* Michaux – S]

Ulmus serotina Sargent, September Elm. Mt (GA): mesic limestone forests; rare (GA Rare). KY, s. IL, and e. OK south to e. TN, nw. GA, AL, and MS. It was collected on the French Broad River by Rugel in 1842, and has been attributed to NC by Mohr. [= C, FNA, F, G, K, S]

* *Ulmus glabra* Hudson, Wych Elm, Scotch Elm. Ne. United States; reported from VA and DC (Sherman-Broyles in FNA 1997), but may only be cultivated. Native of Europe. [= FNA, C, F, K]

Ulmus thomasii Sargent, Cork Elm, Rock Elm. Rocky or rich slopes, especially over limestone. Québec to MN and NE, south to NJ, MD, PA, WV, KY, TN, AR, and KS. [= C, FNA, K; = *U. thomasi* – F, G, orthographic variant]

URTICACEAE A.L. de Jussieu 1789 (Nettle Family)

A family of about 45 genera and 1000 species, herbs, shrubs, vines, and trees, of cosmopolitan distribution in tropical, subtropical, and temperate regions. References: Boufford in FNA (1997); Friis in Kubitzki, Rohwer, & Bittrich (1993); Miller (1971a).

1 Leaves alternate.

2 Flowers in axillary spikes; woody herb to 4 m tall; [tribe *Boehmerieae*] ..... ***Boehmeria nivea***

2 Flowers in terminal panicles, axillary panicles, or axillary fascicles; herb to 1.5 m tall.

3 Leaves 4-13 cm wide, with stinging trichomes; [tribe *Urticeae*] ..... ***Laportea***

3 Leaves 0.8-2 cm wide, lacking stinging trichomes; [tribe *Parietarieae*] ..... ***Parietaria***

1 Leaves opposite.
  4 Plant with stinging trichomes, these having a distinct bulbous or cylindrical base, and a stiff, translucent apex; [tribe *Urticeae*]..... ***Urtica***
  4 Plant without stinging trichomes (or these minute and not apparent), the non-stinging hairs (if present) soft and flexible, lacking a bulbous or cylindrical base.
    5 Flowers in axillary spikes; foliage dull, yellow-green; [tribe *Boehmerieae*]..... ***Boehmeria cylindrica***
    5 Flowers in axillary panicles or fascicles; foliage shiny, bright green; [tribe *Lecantheae*]..... ***Pilea***

Boehmeria Jacquin 1760 (False-nettle)

A genus of about 80 species, trees, shrubs, and perennial herbs, of warm temperate, subtropical, and tropical regions of the Old World and New World. References: Friis in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves opposite; monoecious herb to 1.5 m tall; [subgenus *Duretia*]..... ***B. cylindrica***
1 Leaves alternate; dioecious herb to 4 m tall; [subgenus *Tilocnide*]..... ***B. nivea***

Boehmeria cylindrica (Linnaeus) Swartz, False-nettle. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): swamp forests, bottomlands, bogs, marshes, other wetlands; common. July-August; September-October. Québec and MN south to FL and NM. [= RAB, C, FNA, G, GW, K, W, WH; > *B. cylindrica* var. *cylindrica* – F; > *B. cylindrica* var. *drummondiana* (Weddell) Weddell – F; > *B. cylindrica* – S; > *B. drummondiana* Weddell – S]

* ***Boehmeria nivea*** (Linnaeus) Gaudichaud-Beaupré, Ramie. Cp (GA, SC), {VA}: waste ground; rare, native of Asia. This plant is cultivated for the fiber of its stems, which is extracted and used for fabric in a manner reminiscent of linen (which is made from *Linum usitatissimum*). [= RAB, FNA, K; = *Ramium niveum* (Linnaeus) Small – S]

Laportea Gaudichaud-Beaupré 1830 (Wood-nettle)

A genus of about 21 species, shrubs, perennial herbs, and annual herbs, of tropical and warm temperate e. Asia and temperate e. North America. References: Friis in Kubitzki, Rohwer, & Bittrich (1993).

Laportea canadensis (Linnaeus) Weddell, Wood-nettle. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist, nutrient-rich forests, especially abundant in cove forests in the Mountains and bottomlands in the Piedmont; common (rare in Coastal Plain). Late June-August; late July-October. Nova Scotia and se. Manitoba south to panhandle FL and OK. By mid-summer, *Laportea* often becomes the aspect dominant in rich, moist cove forests of the mountains (especially those with extensive seepage), visually replacing the diverse spring flora. The stinging hairs can penetrate pants made of light-weight or loosely woven fabrics. [= RAB, C, F, FNA, G, GW, K, W; ? *Urticastrum divaricatum* (Linnaeus) Kuntze – S]

Parietaria Linnaeus 1753 (Pellitory)

A genus of about 20 species, annual and perennial herbs, of nearly cosmpolitan distribution. References: Hinton (1968)=Z; Friis in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves softly pubescent; [alien weed]; [subgenus *Parietaria*]..... ***P. judaica***
1 Leaves glabrescent; [native, sometimes weedy in calcareous or coastal areas]; [subgenus *Freirea*].
  2 Main lateral veins diverging from the midvein above the usually narrowly cuneate leaf base; larger leaves 2-5× as long as wide ..... ***P. pensylvanica*** *var.* ***pensylvanica***
  2 Main lateral veins diverging from the midvein at the usually truncate, rounded, or broadly cuneate leaf base; larger leaves 1-2× as long as wide.
    3 Achene with a flanged stipe, the minute apiculate tip located symmetrically at the pole of the achene, the achene 0.8-1.0 mm long..... ***P. floridana***
    3 Achene without a flanged stipe, the minute apiculate tip located asymmetrically, the achene usually 1.2 (-1.4) mm long..... ***P. praetermissa***

*? ***Parietaria floridana*** Nuttall, Florida Pellitory. Cp (FL, GA, NC, SC): coastal shores, sometimes weedy in calcareous situations; common (rare north of FL), perhaps only introduced in our area. March-frost; April-frost. DE south to FL and west to TX, on the outer Coastal Plain. This species has smaller leaves than *P. praetermissa*. [= FNA, GW, K, WH, Z; *P. nummularia* Small – C, F, S]

* ***Parietaria judaica*** Linnaeus, Pellitory-of-the-wall. Cp (FL, VA): disturbed urban areas; rare, native of Europe. [= FNA, K, WH; ? *P. diffusa* Mertens & Koch]

Parietaria pensylvanica Muhlenberg ex Willdenow *var.* ***pensylvanica***, Pennsylvania Pellitory, Rock Pellitory. Mt (GA, NC, VA), Pd (NC, VA), Cp (FL, NC, VA): in circumneutral soils, such as in thin soils at the bases of calcareous or subcalcareous cliffs or on calcareous shale barrens; uncommon (rare in FL, GA, NC, rare in VA Coastal Plain). April-October; May-October. ME west to British Columbia, south to e. NC, w. NC, AL, Panhandle FL, TX, NV, and Mexico (though scattered and irregular in much of that area). Var. *pensylvanica* is eastern and northern; var. *obtusa* (Rydberg ex Small) Shinners is southwestern. [< *P. pensylvanica* – C, FNA, G, GW, K, RAB, S, W, WH; = *P. pensylvanica* – F (sensu stricto)]

Parietaria praetermissa Hinton, Coastal Pellitory. Cp (FL, GA, NC, SC): shell middens, coastal hammocks; rare. March-frost; April-frost. E. NC south to FL and west to LA. [= FNA, GW, K, WH, Z; *P. floridana* Nuttall – RAB, C, F, S, misapplied]

Pilea Lindley 1821 (Clearweed)

A genus of about 250 species, annual and perennial herbs, nearly cosmpolitan in tropical and warm temperate regions of the Old World and the New World. References: Friis in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves 0.5-1.0 (-1.8) cm long ..... ***P. microphylla***
1 Leaves 4-10 cm long.
  2 Achene 1-1.5× as long as broad, tuberculate, dark brown or black, the margins slightly paler ..... ***P. fontana***
  2 Achene 1.5-2× as long as broad, smooth, green or light brown, with slightly raised dark to black lines and mottlings ..... ***P. pumila***

Pilea fontana (Lunell) Rydberg, Blackfruit Clearweed, Lesser Clearweed. Cp (FL, NC, SC, VA), Mt, Pd (NC, SC, VA): swamp forests, freshwater marshes, calcareous wetlands; uncommon (rare in FL and SC). August-September; September-November. E. Canada west to MN and ND, south to FL, IN, and NE. Only reliably distinguishable from *P. pumila* using fruits, *P. fontana* is, however, somewhat less shiny and transparent-translucent. [= RAB, C, F, FNA, G, GW, K, W, WH; < *Adicea pumila* (Linnaeus) Rafinesque – S]

* ***Pilea microphylla*** (Linnaeus) Liebmann, Rockweed, Artillery Weed. Cp (FL, GA, SC): old rock and brick walls, urban areas; uncommon (rare north of FL). January-December. Although listed by RAB for the Carolinas as "a weed in and around greenhouses, not established as part of our flora," this species is well-established and weedy in Charleston, SC and Savannah, GA. It is presumably adventive from further south. [= RAB, FNA, K, S, WH]

Pilea pumila (Linnaeus) A. Gray, Greenfruit Clearweed, Coolwort, Richweed. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): swamp forests, bottomlands, freshwater marshes; common (rare in FL). August-September; September-November. Québec west to MN, south to FL, LA, and OK. [= RAB, C, FNA, G, GW, W, WH; > *P. pumila* var. *pumila* – F, K; > *P. pumila* var. *deamii* (Lunell) Fernald – F, K; < *Adicea pumila* (Linnaeus) Rafinesque – S (including in concept *P. fontana*)]

Urtica Linnaeus 1753 (Stinging Nettle)

A genus of about 80 species, annual and perennial herbs, nearly cosmpolitan, but primarily in temperate regions of the Northern Hemisphere. References: Woodland (1982)=Z; Woodland, Bassett, Crompton, & Forget (1982); Friis in Kubitzki, Rohwer, & Bittrich (1993).

1 Tap-rooted annual; stipules 1-3 mm long, spreading or deflexed; inflorescences usually shorter than the subtending leaf petiole, each panicle consisting of a mixture of pistillate and staminate flowers.
  2 Flower clusters subglobose; mature achenes ovate, 1-1.5 mm long, < 1 mm wide; leaf teeth generally blunt, the sides of the tooth convex... ..... ***U. chamaedryoides***
  2 Flower clusters elongate; mature achenes triangular, 1.5-2.5 mm long, 1-1.5 mm wide; leaf teeth generally sharp, the sides of the tooth straight ..... ***U. urens***
1 Rhizomatous perennial; stipules 5-15 mm long, erect; inflorescences usually surpassing the subtending leaf petiole, each panicle of either pistillate or staminate flowers.
  3 Plants dioecious (male and female flowers always on separate plants); stems usually weak, sprawling, branching; stems strongly hispid with stinging hairs; leaf blades strongly hispid with stinging hairs on both surfaces; leaf teeth commonly 5-6 mm long ..... ***U. dioica***
  3 Plants mostly monoecious (with male and female flowers in separate inflorescences on the same plant), rarely an entire plant male or female; stems upright, erect, less branched; stems glabrous to puberulent or strigose, lacking (or nearly so) stinging hairs; leaf blades glabrous or glabrescent above (lacking stinging hairs), glabrous to puberulent below (with some stinging hairs); leaf teeth commonly 2-3.5 mm long ..... ***U. gracilis***

Urtica chamaedryoides Pursh, Dwarf Stinging Nettle. Cp (FL, GA, NC, SC), Pd (NC, SC): rich moist soil, usually on floodplains; uncommon (rare north of FL). November-May; May-July. WV, KY, se. MO and OK south to FL, TX, and Mexico; very rare east of the Blue Ridge. Notable locations in our area include Stevens Creek (Richmond County, SC), and various sites on very rich levees of the Roanoke River (NC). Gaddy & Rayner (1980) report the common winter flowering of this species in our area. [= RAB, C, F, FNA, G, K, S, WH, Z]

* ***Urtica dioica*** Linnaeus, European Stinging Nettle, Great Nettle. Mt (GA, NC, VA), Cp (FL, GA, NC, VA), Pd (NC, VA): disturbed areas, primarily in calcareous soils; uncommon, native of Europe. May-July; July-September. See *U. gracilis* for discussion of the two taxa. [= F, S; < *U. dioica* – RAB, W (also see *U. gracilis*); = *U. dioica* var. *dioica* – C, G; = *U. dioica* ssp. *dioica* – FNA, K, Z]

Urtica gracilis Aiton, American Stinging Nettle. Mt (NC?, VA), Pd (VA): bottomland forests and edges, particularly over limestone; rare (NC Watch List). May-July; July-September. Labrador and Nova Scotia west to AK, south to sw. VA, w. NC (?), s. OH, s. IL, s. MO, n. TX, s. NM, and se. AZ. The native stinging nettle of e. and c. North America is best treated as specifically distinct from *U. dioica* of Europe. Woodland (1982) and Woodland, Bassett, Crompton, & Forget (1982) showed that *U. gracilis* differs from *U. dioica* in a variety of morphologic characters (see key), chromosome number (2n = 26 for *U. gracilis*, 2n = 52 for *U. dioica*), breeding system (monoecy vs. dioecy), and distribution (North American vs. Eurasian); furthermore, the two taxa could not be crossed. Woodland (1982) chose subspecific status, apparently to emphasize the close relationship of the two (and a third taxa in w. North America). The combination of morphological distinctiveness, allopatry, major differences in species biology, and incompatability seem adequate to warrant separation as species, however. Until herbaria can be checked, it is uncertain whether *U. gracilis* occurs in NC. F (as *U. procera*), G (as *U. dioica* var. *procera* and S include NC in the range; Woodland (1982), however, showed the range as extending only south to VA. [= S; < *U. dioica* – RAB,

W; = *U. dioica* Linnaeus var. *procera* (Muhlenberg ex Willdenow) Weddell – C, G; > *U. gracilis* Aiton – F; > *U. procera* Muhlenberg – F; = *U. dioica* Linnaeus ssp. *gracilis* (Aiton) Selander – FNA, K, Z]

* ***Urtica urens*** Linnaeus, Burning Nettle, Dog-nettle, Small Nettle. Cp (FL, SC), Mt (VA), {GA}: disturbed areas; rare, native of Eurasia. April-May; May-July. [= RAB, C, F, FNA, G, K, S, WH, Z]

VALERIANACEAE Batsch 1802 (Valerian Family)

A family of about 10 genera and 300-350 species, herbs (rarely shrubs), nearly cosmopolitan in distribution. References: Bell (2004); Ferguson (1965).

1 Stem leaves divided into 3-21 segments ..... ***Valeriana***
1 Stem leaves simple ..... ***Valerianella***

Valeriana Linnaeus (Valerian)

A genus of about 200 species, herbs and shrubs, of temperate North America and Eurasia, s. Africa, and Andean South America.

1 Corolla tube 12-16 mm long; stem leaves pinnately divided into 3-7 segments; [native, of VA and TN northward] ..... ***V. pauciflora***
1 Corolla tube 1.5-4 mm long; stem leaves divided **either** into 3 segments **or** into 11-21 segments.
  2 Upright perennial herb; stem leaves divided into 11-21 segments; corolla tube 3-4 mm long; [alien, grown as an ornamental and casually escaped] ..... ***[V. officinalis]***
  2 Scandent vine; stem leaves divided into 3 segments; corolla tube 1.5-2 mm long; [native, of FL] ..... ***V. scandens***

Valeriana pauciflora Michaux, Pink Valerian, Long-tube Valerian. Pd (VA): very nutrient-rich alluvium in floodplain forests; rare. May; June. MD, se. PA, and sw. PA, west to s. IL, south to n. VA, sc. TN, KY, and MO. [= C, F, G, K, W]

Valeriana scandens Linnaeus, Florida Valerian. Cp (FL): floodplain forests, hammocks; rare. Ne. FL south to c. peninsular FL. [= K, S, WH]

* *Valeriana officinalis* Linnaeus, Garden-heliotrope, is a European species sometimes cultivated in our area; it may escape or persist. May-August. [= C, F, G, K]

Valerianella P. Miller (Corn-salad)

A genus of about 50 species, herbs, of temperate North America, Eurasia, and n. Africa. References: Ware (1983)=Z.

Identification notes: *Valerianella* species exhibit an interesting set of fruit polymorphisms; the fruit forms in a single species are often strikingly different, and these forms were traditionally regarded as separate taxa. Ware (1983) demonstrated that they were under simple genetic control, and that different fruit forms were found in the same population. Thus, some taxa previously considered distinct are best considered mere fruit types. The fruit consists of three locules, one of which is fertile and dorsal to or more-or-less flanked by the two sterile locules. The sterile locules may be elongate, forming (between them) a groove, or they may be expanded laterally well beyond the width of the fertile locule into flattened or bulbous wings. In *V. locusta*, there is additionally a corky mass on the side of the fertile locule opposite the two sterile locules.

1 Fruit greatly thickened by a corky mass on the back of the fertile locule; corolla pale blue (or white) ..... ***V. locusta***
1 Fruit lacking a corky mass on the back of the fertile locule; corolla white.
  2 Corolla 1.5-2 mm long, the corolla lobes 0.4-0.8 mm long ..... ***V. radiata***
  2 Corolla 3-5 mm long, the corolla lobes 1-2 mm long ..... ***V. umbilicata***

* ***Valerianella locusta*** (Linnaeus) Lat., European Corn-salad. Pd (GA, NC, SC, VA), Cp (NC, VA), Mt (GA, NC, VA): roadsides, moist forests, bottomlands, disturbed areas; common, native of Europe. April-May. [= RAB, C, K, S, Z; = *V. olitoria* (Linnaeus) Pollich – F, G]

Valerianella radiata (Linnaeus) Dufresne. Cp, Pd, Mt (GA, NC, SC, VA): moist forests, bottomlands, disturbed areas; common. April-May. VA, s. IL, and KS, south to FL and TX. [= RAB, C, K, S, Z; > *V. radiata* var. *fernaldii* Dyal – F, G; > *V. radiata* var. *radiata* – F, G]

Valerianella umbilicata (Sullivant) Wood. Pd, Mt (NC, VA), Cp (VA), {SC?}: moist forests, bottomlands, disturbed areas; rare. S. NY west to IL, south to NC and sc. TN (Chester, Wofford, & Kral 1997). Ware (1983) raises the question of whether *V. woodsiana* is a distinct taxon; further study is needed. [= RAB, C; > *V. umbilicata* – F, G, K, S, Z; > *V. patellaria* (Sullivant ex A. Gray) Wood – F, S; *V. intermedia* Dyal – F; = *V. radiata* var. *intermedia* (Dyal) Gleason – G; > *V. woodsiana* (Torrey & A. Gray) Walpers – K, S, Z]

Valerianella chenopodiifolia (Pursh) A.P. de Candolle ranges south to s. PA, MD, and WV (Kartesz 1999) and might be expected in the northern part of our area. [= K; = *V. chenopodifolia* – C, F, G, orthographic variant] {not yet keyed; synonymy incomplete}

* ***Valerianella dentata*** (Linnaeus) Pollich is reported as naturalized in central TN by Kral (1981) and Chester et al. (1997), in nc. GA (Jones & Coile 1988), and in AL (Kartesz 1999). [= K] {not yet keyed; synonymy incomplete}

VERBENACEAE J. St.-Hilaire 1805 (Verbena Family)

As recently reworked, a family of about 34-41 genera and 950-1200 species, trees, shrubs, vines, and herbs, widespread in tropical, subtropical, and warm temperate regions of the Old World and New World. References: Atkins in Kadereit (2004). [also see *LAMIACEAE* and *PHRYMACEAE*]

tribe Verbeneae: *Glandularia, Stylodon, Verbena.*
tribe Lantaneae: *Aloysia, Lantana, Phyla.*

Aloysia Palau 1784 (Bee-brush)

A genus of about 30 species, shrubs, of tropical and subtropical America. References: Atkins in Kadereit (2004).

* *Aloysia triphylla* (L'Héritier) Britton, Lemon Bee-brush, is allegedly introduced in Iredell County, in the Piedmont of NC (Moldenke 1980); the documentation is unknown. [= K]

Glandularia J.F. Gmelin 1796 (Vervain)

A genus of about 100 species, herbs, of s. North America, Central America, and South America. References: Umber (1979)=Z; Atkins in Kadereit (2004).

1 Leaves finely dissected, the divisions 1 mm or less wide, the margins strongly revolute.
  2 Bracts as long as or longer than the calyx; leaf segments 1-4 mm wide ..... ***G. bipinnatifida** var. **bipinnatifida***
  2 Bracts much shorter than the calyx; leaf segments 0.5-1.5 mm wide ..... ***G. pulchella***
1 Leaves coarsely dissected or lobed, the divisions > 1 mm wide, the margins slightly or not at all revolute.
  3 Calyx lobes > 3 mm long ..... ***G. canadensis***
  3 Calyx lobes < 3 mm long ..... ***G. ×hybrida***

Glandularia bipinnatifida (Nuttall) Nuttall *var.* ***bipinnatifida***, Dakota Vervain. Cp, Mt (GA): dry prairies on clay soils; rare (GA Special Concern). KY, MO, SD, and CO south to c. GA, AL, AZ and s. Mexico; elsewhere in e. North America as waifs. [= K; = *Verbena bipinnatifida* Nuttall – C] {not yet keyed; synonymy incomplete}

Glandularia canadensis (Linnaeus) Nuttall, Rose Vervain, Rose Verbena, Creeping Vervain. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): roadsides, sandhills, other dry (especially sandy) soils; uncommon. March-May. PA, IL, and CO, south to FL and TX, and introduced elsewhere. [= K, S, Z; = *Verbena canadensis* Linnaeus – RAB, C, F, G]

* ***Glandularia ×hybrida*** (Grönland & Rümpler) Nesom & Pruski, Garden Vervain. Cp (SC): cultivated in gardens; uncommonly cultivated, rarely escaped or persistent. March-July. Nesom & Pruski (1992) have provided the transfer to *Glandularia* of this common garden plant. [= *Verbena ×hybrida* Grönland & Rümpler – RAB, G, K; = *Verbena hybrida* – C]

* ***Glandularia pulchella*** (Sweet) Troncoso, Moss Vervain, South American Vervain. Cp (GA, NC, SC), Pd (GA, SC): pastures, roadsides, other disturbed areas; common, native of South America. March-November. [= K, Z; *Verbena tenuisecta* Briquet – RAB, C; *G. tenuisecta* (Briquet) Small – S]

Lantana Linnaeus 1753 (Lantana)

A genus of about 150 species, shrubs and subshrubs, of tropical and subtropical America and Africa. References: Sanders (1987)=Z; Sanders (2006)=Y; Atkins in Kadereit (2004).

1 Heads with an involucre; flowers pink or purple ..... ***L. montevidensis***
1 Heads with bracts, but not an involucre; flowers orange, yellow, or multicolored.
  2 Stems lacking prickles ..... ***L. depressa** var. **floridana***
  2 Stems with scattered retrorse prickles.
    3 Calyx lobes acute, as long as or longer than the calyx tube ..... ***L. camara***
    3 Calyx lobes obtuse, shorter than the calyx tube ..... ***L. urticoides***

* ***Lantana camara*** Linnaeus, Common Lantana, Hedgeflower. Cp (FL, GA, NC, SC): disturbed areas, especially near the coast; rare, native of the West Indies. [= RAB, K, S, Z]

Lantana depressa Small *var.* ***floridana*** (Moldenke) R. Sanders, Florida Lantana. Cp (FL, SC*?): edges of brackish marshes, dunes; rare, the SC occurrence apparently introduced from FL. Native from ne. FL south to se. FL. [= K, Z; < *L. ovatifolia* Britton – RAB, S, misapplied; < *L. depressa* Small – S]

* ***Lantana montevidensis*** (Sprengel) Briquet, Trailing Shrub-verbena, Polecat-geranium. Cp (FL, GA): disturbed areas; rare, native of South America. Scattered locations in s. and e. GA (Jones & Coile 1988). [= K; = *L. sellowiana* Link & Otto – S]

* ***Lantana urticoides*** Hayek, West Indian Lantana. Cp (NC, SC): disturbed and brackish areas; rare, native of West Indies. May-December. [= K; < *L. horrida* Kunth – RAB, misapplied]

Phyla Loureiro 1790 (Frogfruit, "Fogfruit")

A genus of about 11-15 species, herbs, of tropical, subtropical, and warm temperate regions of the Old and New Worlds. References: Atkins in Kadereit (2004).

1 Leaves 2-6 cm long, lanceolate, widest at or below the middle, acute at the tip; leaf teeth (5-) 7-11 per leaf side ..... ***Ph. lanceolata***
1 Leaves 1-4 cm long, obovate, widest above the middle, obtuse to rounded at the tip; leaf teeth (3-) 5 (-7) per leaf side ..... ***Ph. nodiflora***

Phyla lanceolata (Michaux) Greene, Marsh Frogfruit, Northern Frogfruit. Cp (GA, NC, SC, VA), Pd, Mt (VA): brackish marshes, other marshes, ditches; common (GA Special Concern). June-November. Ontario west to SD, south to ne. FL, AL, MS, LA, CA, and n. Mexico; primarily in the outer Coastal Plain in the Carolinas, but extending inland in VA. [= C, G, GW, K, S, W; = *Lippia lanceolata* Michaux – RAB; > *L. lanceolata* var. *lanceolata* – F; > *Lippia lanceolata* var. *recognita* Fernald & Griscom – F]

Phyla nodiflora (Linnaeus) Greene, Creeping Frogfruit, Capeweed, Turkey-tangle, Matgrass. Cp (GA, NC, SC, VA): sandy soils of roadsides, lawns, ditches, disturbed areas; common (VA Rare List). May-November. Pantropical, in North America from se. VA south to s. FL and west to CA, north in the interior to AR, se. MO, and southward into the tropics. This species is very weedy, and is a familiar component of road margins and lawns in the southeastern Coastal Plain. [= C, G, GW, K, S; = *Lippia nodiflora* (Linnaeus) Michaux – RAB, F]

Stylodon Rafinesque 1825 (Carolina-vervain)

A monotypic genus, an herb, of se. North America. References: Atkins in Kadereit (2004).

Stylodon carneus (Medikus) Moldenke, Carolina-vervain. Cp (GA, NC, SC, VA?): sandy woodlands, sandhills; uncommon. April-July. E. NC (se. VA?) south to c. peninsular FL, west to e. TX. [= K; = *Verbena carnea* Medikus – RAB, F; = *Stylodon carolinensis* (Walter) Small – S]

Verbena Linnaeus 1753 (Verbena, Vervain)

A genus of about 200-250 species, herbs, of tropical, subtropical, and warm temperate regions of the New World and (rarely) Old World. References: Barber (1982)=Z; O'Leary, Múlgara, & Morrone (2007)=Y; Atkins in Kadereit (2004). [also see *Glandularia* and *Stylodon*]

* ***Verbena bonariensis*** Linnaeus. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC): roadsides, disturbed areas, old fields; common, native of South America. May-October. [= RAB, C, G, GW, S; > *V. bonariensis* var. *bonariensis* – K, Y; > *V. bonariensis* var. *conglomerata* Briquet – K, Y]

*? ***Verbena bracteata*** Lagasca & Rodriguez, Prostrate Vervain. Cp (GA, NC, SC, VA), Pd (GA, NC), Mt (NC): disturbed areas, waste areas near wool-combing mills; rare. June-October. The original distribution uncertain, now distributed from ME west to British Columbia, south to FL and Mexico. [= RAB, C, F, G, K, Z; =? *V. bracteosa* Michaux – S]

* ***Verbena brasiliensis*** Vellozo, Brazilian Vervain. Cp, Pd (GA, NC, SC, VA), Mt (GA, NC): roadsides, disturbed areas, old fields; common, native of South America. May-October. [= RAB, C, F, G, GW, K, S]

* ***Verbena halei*** Small, Texas Vervain. Cp (GA, NC, SC): roadsides, pastures; rare, presumably introduced from farther west. April-June. NC, MO, and AZ south to FL, TX, and Mexico. [= RAB, K, S; = *V. officinalis* ssp. *halei* (Small) Barber – Z]

Verbena hastata Linnaeus, Common Vervain, Blue Vervain, Simpler's-joy. Cp, Pd, Mt (NC, VA), {GA, SC}: marshes, bogs, low fields; common (rare south of VA). June-October. The hybrid with *V. urticifolia*, *Verbena* ×*engelmannii* Moldenke, is known from our area. [= RAB, C, F, G, GW, S, W, Z; > *V. hastata* var. *hastata* – K; > *V. hastata* var. *scabra* Moldenke – K]

* ***Verbena officinalis*** Linnaeus, European Vervain, Juno's Tears, Herb-of-the-cross. Cp (GA, NC, SC, VA), Mt (NC, VA), Pd (VA): disturbed areas; rare, native of Europe. June-October. [= RAB, C, F, G, S; > *V. officinalis* var. *officinalis* – K; > *V. officinalis* var. *prostrata* Gren. & Godr. – K; = *V. officinalis* ssp. *officinalis* – Z]

* ***Verbena rigida*** Sprengel. Cp (GA, NC, SC, VA), Pd (GA): roadsides, disturbed areas; common (uncommon north of SC), native of South America. Late March-July. [= K, S, Y]

*? ***Verbena riparia*** Rafinesque ex Small & Heller, Riverbank Vervain. Mt (NC, VA), Pd (NC): riverbanks; rare. June-July. This species is enigmatic; there are only a few collections, and the taxonomic status of the taxon is unclear. It may represent unusual forms of *V. officinalis*. [= RAB, C, F, G, K, S, W]

Verbena scabra Vahl, Rough Vervain, Harsh Vervain. Cp (GA, NC, SC, VA), Pd (GA, VA), Mt (VA): brackish marshes, shell deposits, other wet habitats; common. May-October. VA and WV south to FL, west to TX and CA, south into tropical America; mainly coastal in our area but with scattered inland records. [= RAB, C, F, G, GW, K, S]

Verbena simplex Lehmann, Narrowleaf Vervain. Pd (GA, NC, SC, VA), Mt (GA, VA), Cp (VA): glades, woodlands, forests, and roadsides, over mafic or calcareous rocks; common. May-September. NH west to MN and NE, south to Panhandle FL (Jackson County) and TX. [= RAB, C, F, G, K, W, Z; ? *V. angustifolia* Michaux – S]

* ***Verbena stricta*** Ventenat, Hoary Vervain. Cp* (NC*, VA*), Pd (GA): pastures and roadsides; rare, native of c. United States. June-September. Perhaps native as far east as prairie-like sites in TN, AL, and (?) GA. [= RAB, C, F, G, K, S, W, Z]

Verbena urticifolia Linnaeus *var.* ***leiocarpa*** Perry & Fernald, Velvetleaf Vervain. {Cp, Pd, Mt (NC, SC, VA): } May-November. CT, MI, and ND, south to SC, TN, AR, and TX. [= C, F, G, K; < *V. urticifolia* – RAB, GW, W, Z; < *V. urticaefolia* – S, orthographic variant]

Verbena urticifolia Linnaeus *var.* ***urticifolia***, White Vervain. {GA, NC, SC, VA}: mesic to dry-mesic forests, marshes, disturbed areas; common. May-November. New Brunswick west to Saskatchewan, south to FL and TX. The hybrid with *V. hastata*, *Verbena ×engelmannii* Moldenke, is known from our area. [= C, F, G, K; < *V. urticifolia* – RAB, GW, W, Z; < *V. urticaefolia* – S, orthographic variant]

Verbena canescens Kunth. AL. [= K]
Verbena carolina Linnaeus. AL and MS. [= K]
* ***Verbena litoralis*** Kunth *var.* ***brevibracteata*** (Kuntze) N. O'Leary. Cp (GA, SC): scattered sites in e. and s. GA (Jones & Coile 1988). [= Y; < *V. litoralis* – K; < *V. littoralis* – S, orthographic variant] {synonymy incomplete}
Verbena xutha Lehmann, Gulf Vervain. AL west to TX. [= K, S]

VIOLACEAE Batsch 1802 (Violet Family)

A family of about 20 genera and 900 species, herbs, shrubs, and vines, cosmopolitan in distribution. References: McKinney & Russell (2002)=X.

1 Plants caulescent, 4-10 dm tall, the leaves narrowly cuneate to a petiole 0-20 mm long, also long acuminate; petals green; fruit 15-20 mm long ..... ***Hybanthus***
1 Plants acaulescent or caulescent, 0-5 dm tall, if caulescent, the leaves not at the same time cuneate, short-petiolate, and acuminate; petals white, yellow, violet, or blue, the lowermost spurred; fruit < 13 mm long ..... ***Viola***

Hybanthus Jacquin (Green-violet)

A genus of about 70-150 species, shrubs and herbs, of tropical and warm temperate regions of the Old and New Worlds. Likely to be split in the near future, our native plant accorded generic status as the monotypic *Cubelium* (H.E. Ballard, pers comm.; J. de Paula Souza, pers. comm.). References: McKinney & Russell (2002)=X; Wofford et al. (2004).

1 Leaves 9-17 cm long, entire (or with a few obscure teeth); capsule 15-20 mm long; seeds ca. 4 mm long; [native, of nutrient-rich forests] ..... ***H. concolor***
1 Leaves 0.6-3 cm long, finely crenate; capsule 3-4 mm long; seeds ca. 1.5 mm long; [alien, of weedy areas] ..... ***H. parviflorus***

Hybanthus concolor (T.F. Forster) Sprengel, Green-violet. Pd, Mt (GA, NC, SC, VA), Cp (GA, VA): very nutrient-rich and mesic forests; uncommon. Cleistogamous flowers: April-early May; late May-June. Chasmogamous flowers: Late May-June; August-October. VT and s. Ontario west to MI and KS, south to SC, GA, and AR. [= RAB, C, F, G, K, W, X; = ***Cubelium concolor*** (T.F. Forster) Rafinesque – S]
* ***Hybanthus parviflorus*** (Mutis ex Linnaeus f.) Baillon. Cp (GA): disturbed area; rare, native of South America. April. First collected in North America in New Jersey in the 19th century; and again in 1998 by Tom Govus at Fort Pulaski National Monument (Chatham County, GA). It is unclear whether this is a recent introduction or an old weed introduced via ship's ballast (Wofford et al. 2004).

Viola Linnaeus 1753 (Violet, Johnny-jump-up, Pansy)
(contributed by B.A. Sorrie and A.S. Weakley)

A genus of about 525-600 species, herbs (rarely subshrubs), of temperate regions of the Old and New Worlds. References: Ballard (1992)=Z; Gil-ad (1998)=Y; McKinney & Russell (2002)=X; Haines (2001)=V; McKinney (1992); Ballard & Wujek (1994); Russell (1955); Ballard, Sytsma, & Kowal (1999). Key adapted, in part, from Ballard (1992) and Ballard & Wujek (1994).

1 Plant caulescent (producing aerial stems bearing leaves and flowers).
  2 Corolla yellow, or white with a yellow center (sometimes drying lavender); stipules entire or erose ..... **Key A**
  2 Corolla wholly cream-colored, or cream with a yellow center, or blue-violet, or multicolored (blue or violet with orange or yellow) .. **Key B**
1 Plant acaulescent (with leaf petioles and flower stalks arising separately from the base of the plant).
  3 Corolla yellow; leaves borne more-or-less flat on the ground ..... **Key C**
  3 Corolla white, blue-violet, or blue-and-white variegated.
    4 Plant producing stolons; corolla white (or blue in *V. appalachiensis*, *V. walteri*, and *V. odorata*) ..... **Key D**
    4 Plant not producing stolons; corolla blue-violet ..... **Key E**

Key A – Caulescent Violets with yellow or white flowers

1 Corolla white with a yellow center (sometimes drying lavender); stipules long-triangular, attenuate ..... ***V. canadensis*** *var.* ***canadensis***
1 Corolla solid yellow; stipules ovate to narrowly ovate.

2 Leaves 3-lobed ..... ***V. tripartita** var. **tripartita***
2 Leaves cordate or hastate.
3 Leaves at least as broad as long.
4 Stems 2-several; basal leaves 4 or more; foliage glabrous to glabrate ..... ***V. pubescens** var. **scabriuscula***
4 Stems 1; basal leaves 0-2; foliage densely pubescent ..... ***V. pubescens** var. **pubescens***
3 Leaves distinctly longer than broad.
5 Leaf blade hastate; base of leaf strongly cordate ..... ***V. hastata***
5 Leaf blade narrowly ovate; base of leaf blade rounded to broadly cuneate ..... ***V. tripartita** var. **glaberrima***

Key B – Caulescent Violets with blue, cream, or multicolored flowers

1 Stipules foliaceous, deeply lobed; leaves cuneate at base; [of weedy habitats].
2 Corolla pale blue with a cream center; petals 2× as long as the sepals ..... ***V. bicolor***
2 Corolla either cream with a yellow center or multicolored; petals < 2× as long as the sepals.
3 Corolla cream with a yellow center; petals shorter than the sepals or longer by up to 2 mm ..... ***V. arvensis***
3 Corolla multicolored (cream to orange with a yellow center, the upper petals at least partly dark blue); petals longer than the sepals by 2 mm or more ..... ***V. tricolor***
1 Stipules herbaceous, fringed along the margin; leaves truncate or cordate at the base; [section *Viola*].
4 Above-ground stems absent (surficial stolons present; style terminating in a slender hook ca. 1 mm long; capsules hirtellous; [introduced, cultivated, rarely persistent or spreading] ..... ***V. odorata***
4 Above-ground stems present, ascending or prostrate (and stolon-loke rhizomes present in *V. appalachiensis* and *V. walteri*); style straight or terminating in a bent or recurved hook 0-0.5 mm long; capsules glabrous; [native].
5 Stems immediately becoming prostrate at time of flowering; stems persistent through winter, rooting at the nodes, and generating the following year's plants at their tips (plants thus mat-forming).
6 Leaf blades with scattered hairs near the margin only; petioles, peduncles and stems glabrous; stipules shallowly lacerate, with marginal processes < 1/4 as long as the stipule ..... ***V. appalachiensis***
6 Leaf blades moderately to densely puberulent over the entire surface; petioles, peduncles and stems moderately to densely puberulent; stipules deeply laciniate with marginal processes > 1/2 as long as the stipule ..... ***V. walteri***
5 Stems ascending to erect at time of flowering and fruiting; stems deciduous at end of growing season, not rooting at nodes (plants thus solitary).
7 Lateral sepals glabrous within; corolla lavender, with a purple-black eyespot surrounding the throat; spur 7-20 mm long ..... ***V. rostrata***
7 Lateral sepals bearded within; corolla uniformly creamy-white or blue (rarely white), lacking a contrasting eyespot around the throat; spur 3-6 mm long.
8 Sepal margins eciliate; flowers lavender to violet (rarely white in albino forms); spur mostly > 5 mm long ..... ***V. labradorica***
8 Sepal margins distinctly ciliate; flowers creamy-white; spur mostly < 5 mm long ..... ***V. striata***

Key C – Acaulescent Violets with yellow flowers

One species in our area ..... ***V. rotundifolia***

Key D – Acaulescent Violets with stolons and white or blue flowers

1 Flowers generally blue (white or blue-and-white variegated in *V. odorata*, which has the style terminating in a conic hook).
2 Above-ground stems absent (surficial stolons present); style terminating in a slender hook ca. 1 mm long; capsules hirtellous; [introduced, cultivated, rarely persistent or spreading] ..... ***V. odorata***
2 Above-ground stems generally present, ascending or prostrate (and stolon-like rhizomes present); style straight or terminating in a bent or recurved hook 0-0.5 mm long; capsules glabrous; [native].
3 Leaf blades with scattered hairs near the margin only; petioles, peduncles and stems glabrous; stipules shallowly lacerate with marginal processes < 1/4 as long as the stipule ..... ***V. appalachiensis***
3 Leaf blades moderately to densely puberulent over the entire surface; petioles, peduncles and stems moderately to densely puberulent; stipules deeply laciniate with marginal processes > 1/2 as long as the stipule ..... ***V. walteri***
1 Flowers white (and the style broad at the tip, in most species resembling a scoop).
4 Leaf blades > 1.5× as long as broad.
5 Leaf blades lance-ovate, broadly cuneate to subcordate at the base ..... ***V. primulifolia***
5 Leaf blades linear to lanceolate, narrowly cuneate at the base.
6 Leaf blades lanceolate, < 8× as long as wide; plant glabrous ..... ***V. lanceolata** var. **lanceolata***
6 Leaf blades linear or narrowly lanceolate, > 10× as long as wide; plant glabrous to pubescent ..... ***V. lanceolata** var. **vittata***
4 Leaf blades < 1.5× as long as broad.
7 Leaf blades completely glabrous (petioles may be villous); [of wet, acidic seepage or streamsides] ..... ***V. macloskeyi** var. **pallens***
7 Leaf blades pubescent, at least on the upper surface of the basal lobes.
8 Lateral petals glabrous within; petioles and peduncles usually reddish-tinged; leaf apex acute; basal lobes of the leaf often overlapping; pubescence of the upper leaf surface often restricted to the basal lobes; [of mesic, often nutrient-rich forests] ..... ***V. blanda***
8 Lateral petals bearded within; petioles and reduncles green; leaf apex obtuse to rounded; basal lobes of the leaf not overlapping; pubescence of the upper leaf surface usually widespread; [of mesic to wet situations] ..... ***V. incognita***

Key E – Acaulescent Violets without stolons, with blue-violet flowers

1 Leaf blades deeply divided throughout, or lobed basally, or deeply toothed basally (the earliest 1-2 leaves may be simply cordate); [some species keyed both here and below].
  2 Leaf blades deeply divided throughout into linear or lanceolate segments (or with several narrow lateral segments and a broadly lanceolate central segment), the leaf blade (in outline) about as broad as long.
    3 Lateral petals glabrous within; stamens orange, conspicuously exserted; [of dry habitats] ..... ***V. pedata***
    3 Lateral sepals bearded; stamens not orange and conspicuously exserted; [of moist to wet habitats, or dryish, basic sites].
      4 Petioles and leaf blades (the lower leaf surface at least) moderately to densely pubescent; [of mesic to fairly dry, woodlands, over circumneutral to basic soils] ..... ***V. palmata var. subsinuata***
      4 Petioles and leaves glabrous or glabrate with marginal ciliate hairs; [of moist to wet habitats].
        5 Leaf segments 9-11, with a narrow central lobe 1-2× as wide as the lateral lobes; peduncle equal to or shorter than the leaves; sepal auricles much longer than wide; [of ecotones at upper edges of alluvial or levee forests] ..... ***V. brittoniana var. brittoniana***
        5 Leaf segments 5-7, with a broadly lanceolate central lobe 3-5× as wide as the lateral lobes; peduncle normally much longer than the leaves; sepal auricles wider than long or equal; [of mesic pine savannas and pocosin ecotones] ..... ***V. septemloba***
  2 Leaf blades lobed or deeply toothed only toward the base.
    6 Leaf blade outline oblong-lanceolate to ovate-triangular, much longer than wide.
      7 Petioles distinctly shorter than the leaf blades; leaf blades densely pubescent, the apex blunt, the basal teeth undeveloped or with a few coarse teeth on mature leaves; [of dry sandy clearings and banks] ..... ***V. fimbriatula***
      7 Petioles equal to or longer than the leaf blades; leaf blades glabrate, the apex acute, the basal teeth well-developed, very coarse to lobe-like; [of mesic sandy soil of fields, meadows, and pine savannas] ..... ***V. sagittata***
    6 Leaf blade outline ovate to subrotund, about as wide as long.
      8 Plant moderately to densely pubescent, at least on petioles and undersurfaces of leaves; mature leaves trilobed; [of mesic to dryish woodlands, in circumneutral or basic soils] ..... ***V. palmata var. palmata***
      8 Plant glabrous or glabrate (hairs on leaf margins or on upper surface of the lobes); mature leaves either trilobed or 5-7-lobed; [of moist to wet habitats].
        9 Mature leaves trilobed, with 1 (-2) reniform or obovate lobes on each side; spurred petal glabrous; [of streamsides, floodplains, levee forests] ..... ***V. esculenta***
        9 Mature leaves deeply lobed with 2-3 lanceolate lobes on ech side; spurred petal bearded; [of moist to wet pine savannas and pocosin ecotones] ..... ***V. septemloba***
1 Leaf blades merely serrate along the margin, ovate to subrotund in outline, cordate to truncate at the base.
  10 Leaf blades mostly longer than broad, narrowly ovate to long-triangular, tapering to an acute or even short-acuminate apex.
    11 Foliage moderately to densely pubescent; leaves distinctly longer than wide; [of dry to mesic clearings and banks] ..... ***V. fimbriatula***
    11 Foliage glabrous or glabrate; [plants of various habitats].
      12 Lateral petals bearded with clavate hairs; spurred petal glabrous within; [of swamps and sphagnous streamsides] ..... ***V. cucullata***
      12 Lateral petals with hairs of essentially uniform width; spurred petal bearded within; [of various habitats].
        13 Basal teeth no larger than the others; leaf bases cordate; [of mesic forests, streamsides, and seeps] ..... ***V. affinis***
        13 Basal teeth longer than the others; leaf bases truncate to subcordate (ignore earliest 1-2 leaves).
          14 Leaf outline broadly triangular, not much longer than wide; teeth on lower half of leaf numerous, pectinate ..... ***V. brittoniana var. pectinata***
          14 Leaf outline narrowly triangular-ovate, much longer than wide; basal teeth few, very coarse ..... ***V. sagittata***
  10 Leaf blades about as wide as long or wider, ovate to suborbicular, the apex obtuse to acute.
    15 Lateral petals bearded with clavate hairs; foliage glabrous or glabrate.
      16 Petals light blue or light violet-blue, with a dark eye and dark veins; sepals 8-12 mm long; all plants in population with unlobed leaves; [primarily of the Mountains] ..... ***V. cucullata***
      16 Petals violet-blue, with a white eye and dark veins; sepals 6-7 (-8) mm long; at least some plants in population with trilobed leaves; [primarily of the Coastal Plain] ..... ***V. esculenta***
    15 Lateral petals bearded with hairs of uniform width; foliage distinctly pubescent, glabrate, or glabrous.
      17 Leaf blades glabrous or glabrate, or with hairs confined to just the basal lobes; petioles glabrous or glabrate.
        18 Leaf blades with obvious area of hairs confined to upper surface of the basal lobes; spurred petal bearded; all plants in population with unlobed leaves ..... ***V. affinis***
        18 Leaf blades glabrous or glabrate, not as above; spurred petal glabrous or glabrate; all plants in population with unlobed leaves, or some leaves trilobed.
          19 Blades green beneath; spurred petal glabrous; at least some plants in population with trilobed leaves ..... ***V. esculenta***
          19 Blades red-dotted or red-tinged beneath; spurred petal glabrous or glabrate; all plants in population with unlobed leaves ..... ***V. sororia***
      17 Leaf blades moderately to densely pubescent on one or both surfaces, or on the petioles.
        20 Leaf blades equally pubescent on both surfaces, or glabrate on both surfaces.
          21 Leaf blades large, the apex acute, held high above the ground on long, ascending petioles, deciduous; peduncles shorter than to equalling the petioles ..... ***V. sororia***
          21 Leaf blades small, blunt or rounded, essentially flat on the ground, evergreen or tardily deciduous; peduncles much longer than the petioles ..... ***V. villosa***
        20 Leaf blades much more pubescent on one surface than the other.
          22 Leaf blades densely pubescent above, sparsely so below and on the petiole; leaf apex blunt to rounded; leaf blade often purple-tinged below ..... ***V. hirsutula***
          22 Leaf blades much more pubescent beneath and on petiole, glabrate above; leaf apex acute; leaf blade green beneath ..... ***V. septentrionalis***

Viola affinis Le Conte, Thinleaf Violet, LeConte's Violet. Pd, Cp, Mt (GA, NC, SC, VA): swamp forests, wet bottomlands; common. March-May. VT and MA west to WI, south to c. peninsular FL and e. TX. [= RAB, F, G, GW, K, S, V, W, Y; < *V. sororia* – C]

Viola appalachiensis L.K. Henry, Appalachian Violet. Mt (NC): serpentine barrens, rich cove forests (especially old road beds through coves); rare (NC Rare). April-May. PA and WV south to sw. NC. See Grund & Isaac (2007) and Ballard & Wujek (1994) for discussion of the taxonomy of this species. [= K, Z; = *V. walteri* House var. *appalachiensis* (L.K. Henry) L.E. McKinney – X]

* ***Viola arvensis*** Murray, European Field-pansy. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): roadsides, fields; common, native of Europe. March-July. [= RAB, C, F, G, K, S, W, X]

Viola bicolor Pursh, Wild Pansy. Mt, Pd, Cp (GA, NC, SC, VA): pastures, roadsides, lawns, other disturbed habitats; common. March-May. MA and NY west to SD and CO, south to FL, TX, and AZ. [= K, X; = *V. rafinesquii* Greene – RAB, C, G, S, W; = *V. kitaibeliana* J.A. Schultes var. *rafinesquii* Fernald – F; = *V. rafinesquei*, orthographic variant]

Viola blanda Willdenow, Sweet White Violet. (GA, NC, SC, VA} [= F, G, S; < *V. blanda* – RAB, C, W, X (also see *V. incognita*); = *V. blanda* var. *blanda* – K, V]

Viola brittoniana Pollard *var.* ***brittoniana***. Cp (NC, SC, VA): low ground, including brackish areas; uncommon (NC Watch List, VA Watch List). April-May. ME to SC, along the coast. [= RAB, G, K; < *V. palmata* var. *palmata* – C; = *V. brittoniana* – F; < *V. pedatifida* G. Don ssp. *brittoniana* (Pollard) McKinney – X; < *V. brittoniana* – V, Y]

Viola brittoniana Pollard *var.* ***pectinata*** (Bicknell) Alexander. Cp (NC, VA): low ground; rare. April-May. MA to NC, along the coast. [= RAB, G, K; < *V. palmata* var. *palmata* – C; = *V. pectinata* Bicknell – F; < *V. pedatifida* G. Don ssp. *brittoniana* (Pollard) McKinney – X; < *V. brittoniana* – V, Y]

Viola canadensis Linnaeus *var.* ***canadensis***, Tall White Violet. Mt (GA, NC, SC, VA), Pd (NC, VA): rich cove forests, other rich mesic situations, such as floodplains; common. April-July. Newfoundland to Ontario, south to GA, AL, TN, and AR. Other varieties are more western. [= RAB, C, K, V; >< *V. canadensis* var. *rugulosa* (Greene) C.L. Hitchcock – RAB, C, misapplied as to plants in our area; = *V. canadensis* – F, G, S; >< *V. rugulosa* Greene – G, misapplied as to our plants; < *V. canadensis* – W, X]

Viola cucullata Aiton, Blue Marsh Violet, Bog Violet. Mt (GA, NC, SC, VA): bogs, seeps, margins of spring branches; common. April-June. Newfoundland to MN, south to w. NC, n. GA, TN, and e. AR. Records from the Piedmont and Coastal Plain of SC and GA are presumably misidentifications. [= RAB, C, G, GW, K, S, V, W, X, Y; > *V. cucullata* var. *cucullata* – F; > *V. obliqua* Hill]

Viola esculenta Elliott. {GA, NC, SC, VA} (VA Rare List). [= F, G, GW, S; < *V. septemloba* – RAB; < *V. palmata* var. *palmata* – C; = *V.* ×*esculenta* Elliott (pro sp.) (*septemloba* × *triloba*) – K]

Viola fimbriatula Smith. {NC, VA} In e. TN (Chester, Wofford, & Kral 1997). [= RAB, F, G, S, W, Y; < *V. sagittata* Aiton – C; = *V. sagittata* Aiton var. *ovata* (Nuttall) Torrey & A. Gray – K, V, X; *V. sagittata* var. *fimbriatula* Sm.]

Viola hastata Michaux, Spearleaf Violet, Silverleaf Violet, Halberd-leaf Violet. Mt, Pd (GA, NC, SC, VA): acidic coves, dry-mesic oak forests; common. Late March-May. PA and OH south to Ga and AL. [= RAB, C, F, G, K, S, W, X]

Viola hirsutula Brainerd. {GA, NC, SC, VA} [= RAB, F, G, K, S, W, V, X; < *V. villosa* Walter – C]

Viola incognita Brainerd. Mt (NC, SC?, VA): rare (VA Watch List). April-June. [= S; < *V. blanda* – RAB, C, X; > *V. incognita* var. *incognita* – F, G; > *V. incognita* var. *forbesii* Brainerd – F, G; = *V. blanda* Willdenow var. *palustriformis* A. Gray – K, V]

Viola labradorica Schrank, American Dog-violet. Mt (GA, NC, SC, VA), Cp (VA): moist alluvial woodlands and forests, seepage slopes, marl ravines; uncommon. Late March-May. Labrador west to AK, south to e. VA, nw. SC, AL, and OH. Ballard concluded that *V. conspersa* was not distinct from *V. labradorica*. [= K, V, X, Z; > *V. conspersa* Reichenbach – RAB, C, F, G, GW, S, W]

Viola lanceolata Linnaeus *var.* ***lanceolata***, Lanceleaf Violet. {NC, SC, VA}: [= C, F, V; < *V. lanceolata* – RAB, W, X; = *V. lanceolata* ssp. *lanceolata* – GW, K; = *V. lanceolata* – G, S]

Viola lanceolata Linnaeus *var.* ***vittata*** (Greene) Weatherby & Griscom, Strap-leaf Violet. {GA, NC, SC, VA}: [= C, F, V; < *V. lanceolata* – RAB, W, X; = *V. lanceolata* ssp. *vittata* (Greene) Russell – GW, K; = *V. vittata* Greene – G, S]

Viola macloskeyi F. Lloyd *var.* ***pallens*** (Banks ex A.P. de Candolle) C.L. Hitchcock, Wild White Violet. Mt (GA, NC, SC, VA), Pd (NC, VA): brookbanks, seepages; uncommon. Perhaps better recognized at the specific level, as *V. pallens*, which seems distinct from the narrowly distributed *V. macloskeyi*, of CA, OR and e. NV. Ballard et al. (2001) suggest that Hispaniolan *V. domingensis* Urban is conspecific with *V. macloskeyi sensu lato*. [= RAB, C; = *V. pallens* (Banks ex A.P. de Candolle) Brainerd – F, G, GW, S; > *V. pallens* var. *pallens* – G; > *V. pallens* var. *subreptans* Rousseaux – G; = *V. macloskeyi* ssp. *pallens* (Banks ex A.P. de Candolle) M.S. Baker – K, V, W; < *V. macloskeyi* F. Lloyd – X]

* ***Viola odorata*** Linnaeus, Sweet Violet, English Violet. Pd (NC, VA?), {GA}: gardens, lawns, disturbed places, persistent or weakly spreading from horticultural use; rare, native of Europe. [= C, F, G, K, S, V, Z]

Viola palmata Linnaeus *var.* ***palmata***, Wood Violet. [> *V. palmata* var. *palmata* – RAB; > *V. palmata* var. *triloba* (Schweinitz) Gingins ex A.P. de Candolle – RAB; < *V. palmata* var. *palmata* – C; > *V. triloba* Schweinitz var. *triloba* – F, G, K; > *V. stoneana* – F, G; >< *V. palmata* – F, G, S, V, W, X, in the narrow sense; > *V. chalcosperma* Brainerd – F, S; < *V* ×*palmata* Linnaeus (pro sp.) – K; ? *V. triloba* Schweinitz – S, W]

Viola palmata Linnaeus *var.* ***subsinuata*** Greene. (VA Watch List). [< *V. palmata* var. *palmata* – C; ? *V. triloba* Schweinitz var. *dilatata* (Elliott) Brainerd – F, G, K; = *V. subsinuata* Greene – V, X]

Viola pedata Linnaeus, Bird's-foot Violet. Mt, Pd, Cp (GA, NC, SC, VA): dry rocky or sandy forests, woodlands, glades, and roadbanks; common (uncommon in the outer Coastal Plain south of VA). March-May; May-June. Var. *ranunculifolia* is accepted by some recent authors; it needs additional study. [= RAB, C, K, S, V, W; > *V. pedata* var. *pedata* – F, G; > *V. pedata* var. *lineariloba* A.P. de Candolle – F, G; > *V. pedata* var. *pedata* – X; > *V. pedata* var. *ranunculifolia* (Jussieu ex Poiret) Ging. ex A.P. de Candolle – X]

Viola primulifolia Linnaeus, Primrose-leaf Violet. Cp, Pd, Mt (GA, NC, SC, VA): bogs, wet savannas, pocosins, moist organic soils along small streams; common. March-May. Newfoundland to Ontario, south to FL, and west to TX and se. OK. [= RAB, C, GW, S, V, W, X; > *V. primulifolia* var. *primulifolia* – F, G; > *V. primulifolia* var. *acuta* (Bigelow) Torrey & A. Gray – F; > *V. primulifolia* var. *villosa* Eaton – F, G; = *V* ×*primulifolia* Linnaeus (pro sp.) (*lanceolata* × *macloskeyi*) – K]

Viola pubescens Aiton *var.* ***pubescens***, Hairy Yellow Forest Violet. Pd, Mt (NC, VA): {GA, NC, SC, VA} March-May. [= K, V, X; = *V. eriocarpa* (Nuttall) Schweinitz var. *eriocarpa* – RAB; < *V. pubescens* – C, GW, W; > *V. pubescens* var. *pubescens* – F; > *V. pubescens* var. *peckii* House – F; = *V. pubescens* – G, S; *V. eriocarpon* (Nuttall) Schweinitz var. *eriocarpon*]

Viola pubescens Aiton *var.* ***scabriuscula*** Schweinitz ex Torrey, Smooth Yellow Forest Violet. {GA, NC, SC, VA} March-May. [= K, V, X; = *V. eriocarpa* (Nuttall) Schweinitz var. *leiocarpa* Fernald & Wiegand – RAB; < *V. pubescens* – C, GW, W, in part; > *V. pensylvanica* Michaux var. *pensylvanica* – F; > *V. pensylvanica* var. *leiocarpa* (Fernald & Wiegand) Fernald – F; = *V. eriocarpa* – G, S; = *V. eriocarpon* (Nuttall) Schweinitz var. *leiocarpon* Fernald & Wiegand; *V. pubescens* Aiton var. *leiocarpon* (Fernald & Wiegand) Seymour]

Viola rostrata Pursh, Long-spurred Violet. Mt (GA, NC, SC, VA), Pd (VA): mesic forests, often under *Tsuga*; common. April-May. NH and Québec west to WI, south to GA and AL. [= RAB, F, G, K, S, V, W, X, Z]

Viola rotundifolia Michaux, Round-leaf Yellow Violet, Early Yellow Violet. Mt (GA, NC, SC, VA): rich coves; common. March-April. ME to s. Ontario, south to w. NC, n. GA, and e. TN. [= RAB, C, F, G, K, S, V, W, X]

Viola sagittata Aiton, Arrowhead Violet. {GA, NC, SC, VA} [= RAB, F, S, W, Y; > *V. emarginata* (Nuttall) Le Conte var. *emarginata* – RAB, F, G; > *V. emarginata* var. *acutiloba* Brainerd – RAB, F, G; < *V. sagittata* – C (also see *V. fimbriatula*); > *V. sagittata* var. *sagittata* – G, K, V, X; ? *V. emarginata* – S]

Viola septemloba Le Conte. Cp (GA, NC, SC): sandy pinelands; rare. Late March-early May. [= F, G, GW, K, S, W, Y; < *V. septemloba* – RAB (also see *V. esculenta*); < *V. palmata* var. *palmata* – C; ? *V. septemloba* ssp. *septemloba* – X]

Viola septentrionalis Greene. {NC, VA}: (VA Watch List). NC (McMillan pers. comm.). e. TN (Chester, Wofford, & Kral 1997). [= G, K, W, Y; < *V. sororia* – C, V; ? *V. septentrionalis* var. *septentrionalis* – F; < *V. sororia* var. *sororia* – X]

Viola sororia Willdenow, Dooryard Violet, Confederate Violet, Common Blue Violet. Mt, Pd, CP (NC, SC), {GA, VA} [= W, Y; > *V. palmata* var. *sororia* (Willdenow) Pollard – RAB; > *V. papilionacea* Pursh – RAB, F, S; < *V. sororia* – C, V (also see *V. affinis, V. septentrionalis*); > *V. sororia* – F, G, K, S; > *V. langloisii* Greene – F, K, S; > *V. latiuscula* Greene – F; > *V. papilionacea* var. *papilionacea* – G; > *V. papilionacea* var. *priceana* (Pollard) Alexander – G; > *V. priceana* Pollard – S; ? *V. sororia* var. *sororia* – X]

Viola striata Aiton, Creamy Violet. Mt, Pd (GA, NC, SC, VA), Cp (VA): mesic forests and woodlands, disturbed areas; common. March-June. MA west to WI, south to GA, AR, and e. OK. [= RAB, C, F, G, GW, K, S, V, W, X, Z]

* ***Viola tricolor*** Linnaeus, Pansy, Johnny-jump-up. Cp, Pd, Mt (GA, NC, SC, VA): lawns, garden borders, railroad rights-of-way; commonly cultivated, uncommonly persistent and weakly spreading, introduced. March-June (and sporadically later). [= RAB, C, F, G, K, V]

Viola tripartita Elliott *var.* ***glaberrima*** (A.P. de Candolle) R.M. Harper. Cp (GA): {NC, SC, VA} [= RAB, G, S, W; < *V. tripartita* – C, F, K, X]

Viola tripartita Elliott *var.* ***tripartita***, Three-parted Violet. {GA, NC, SC, VA} [= RAB, G, S, W; < *V. tripartita* – C, F, K, X]

Viola villosa Walter, Southern Woolly Violet. Cp (GA, NC, SC), Pd (GA, SC): pocosin ecotones, other sites with moist soils; uncommon (NC Watch List, VA Watch List). Late February-early April. Reported for VA by Kartesz (1999), on the basis of Massey (1961); report requiring additional documentation. [= RAB, F, G, K, S, X, Y; < *V. villosa* – C (also see *V. hirsutula*)]

Viola walteri House, Walter's Violet. Mt (GA, NC, SC, VA), Pd (GA, NC, SC), Cp (GA, SC): nutrient-rich woodlands and forests, especially over mafic or calcareous rocks; uncommon (rare in Coastal Plain) (NC Watch List, VA Rare List). March-May. W. VA west to s. OH and AR, south to FL and TX. [= RAB, F, G, K, S, W, Z; = *V. walteri* var. *walteri* – X]

Viola egglestonii Brainerd. Mt (GA): calcareous barrens; rare. In c. and se. TN (Chester, Wofford, & Kral 1997), nw. GA (Jones & Coile 1988), IN, KY, and AL (Kartesz 1999). [= K, Y; < *V. palmata* var. *pedatifida* – C; = *V. egglestoni* – F, G, orthographic variant; = *V. septemloba* LeConte ssp. *egglestonii* (Brainerd) L.E. McKinney – X]

Viola missouriensis Greene. Throughout TN (probably in NC and VA), in KY (Kartesz 1999), and scattered in PA (Rhoads & Klein 1993). [= K, Y; < *V. sororia* Willdenow – C; = *V. sororia* var. *missouriensis* (Greene) L.E. McKinney – X] {add to synonymy}

Viola nephrophylla Greene, Northern Bog Violet, south to PA and WV (Kartesz 1999). [= C, K, V] {add to synonymy; not yet keyed}

Viola pedatifida G. Don, Crowfoot Violet. Mt (VA): shale barrens; rare. April-May. Ontario west to Alberta, south to OH, IN, AR, OK, NM, and AZ; disjunct in w. VA. [= F, G, K; *V. palmata* Linnaeus var. *pedatifida* (G. Don) Cronquist – C; = *V. pedatifida* G. Don ssp. *pedatifida* – X] {add to synonymy; not yet keyed}

VISCACEAE Batsch 1802 (Mistletoe Family)

A family of about 7 genera and 385 species, epiphytic hemiparasites, of cosmopolitan distribution. The recognition of the Viscaceae as distinct from Loranthaceae appears well warranted (see Kuijt 1982); however, the Viscaceae should perhaps be combined into the Santalaceae (Angiosperm Phylogeny Group 2003). References: Kuijt (1982)=Z.

Phoradendron Nuttall 1848 (Mistletoe)

A genus of about 235 species, epiphytic hemiparasites, of tropical and rarely temperate America. References: Kuijt (2003)=Y; Kuijt (1982)=Z.

Phoradendron serotinum (Rafinesque) M.C. Johnston *ssp.* ***serotinum***, American Mistletoe, Christmas Mistletoe. Cp, Pd, Mt (GA, NC, SC, VA): parasitic on various species of trees, especially abundant in swamp forests (perhaps because they are less frequently cut and have older, more mature hardwoods); common (uncommon in Piedmont and Mountains). October-November (-March); November-January (-May). Kuijt (2003) interprets this as a species with four subspecies; ssp. *serotinum* is the eastern component, ranging from NJ west to s. OH, s. IN, and s. MO, south to s. FL and s. TX. The other three subspecies are distributed in sw. United States and n. Mexico. *Phoradendron* is, of course, the mistletoe familiar (at least traditionally) in e. United States as a Christmas decoration. Z comments that "the superficial likeness of *Phoradendron serotinum* to the European *Viscum album*

has made the transfer of the latter's folklore to North America easy;" *Viscum album* was a sacred plant of Celtic and druidical pre-Christian European societies. The white berries of *Ph. serotinum* are extremely poisonous. Their sticky flesh promotes the dispersal of the seeds by birds from tree to tree. The nomenclatural argument about which Rafinesquian epithet to adopt is arcane; the basionym "*leucarpum*" has nomenclatural precedence by 3 years, but the combination in *Phoradendron* can be considered a later homonym of *Phoradendron leucocarpum* Patschovsky. I here follow Kuijt (2003) in his decision to reject "*leucarpum*." [= Y; = *Phoradendron leucarpum* (Rafinesque) Reveal & M.C. Johnston – K; < *Ph. serotinum* (Rafinesque) M.C. Johnston – RAB, C, W, Z; < *Ph. flavescens* (Pursh) Nuttall – F, G, S]

VITACEAE A.L. de Jussieu 1789 (Grape Family)

A family of about 14 genera and 750-850 species, vines (rarely small trees or herbs), of tropical, subtropical, and temperate regions of the Old and New Worlds. References: Soejima & Wen (2006); Wen in Kubitzki, Bayer, & Stevens (2007).

1 Branches and leaves distinctly fleshy, the leaves > 1 mm thick when fresh; leaves 3-foliolate ..... ***Cissus***
1 Branches and leaves herbaceous; leaves simple, 3-, 5-, or many-foliolate.
  2 Leaves simple, sometimes shallowly or deeply 3-5 (-7)-lobed.
    3 Tendrils not twining, terminating in adhesive disks ..... ***Parthenocissus***
    3 Tendrils twining, lacking adhesive disks.
      4 Petals separate at their tips, falling individually; pith continuous through the node ..... ***Ampelopsis***
      4 Petals connate at their tips, falling together; pith interrupted by a diaphragm at each node (except continuous in *V. rotundifolia*) ..... ***Vitis***
  2 Leaves compound with (3-) 5-numerous leaflets.
    5 Leaves bipinnate to tripinnate.
      6 Leaflets 2-6 cm long; [common native species of mesic to wet habitats] ..... ***Ampelopsis arborea***
      6 Leaflets 5-12 cm long (at least the larger > 8 cm long); [introduced species, rarely escaped] ..... ***[Ampelopsis megalophylla]***
    5 Leaves 3-5 (-7)-foliolate.
      7 Leaves pedately 5-foliolate (the lateral 2 leaflets on either side borne on a common stalk) ..... ***Cayratia***
      7 Leaves palmately 3-5 (-7)-foliolate.
        8 Leaflets pinnately lobed; tendrils twining, lacking adhesive tips; berries yellow to orange when ripe ..... ***Ampelopsis aconitifolia***
        8 Leaflets toothed or entire; tendrils not twining, usually terminating in adhesive tips; berries dark blue when ripe ..... ***Parthenocissus***

Ampelopsis Michaux 1803 (Peppervine)

A genus of about 25 species, woody vines, of temperate and subtropical America and Asia. Perhaps to be split based on molecular phylogenetics, with section *Leeaceifoliae* (*A. arborea* and *A. megalophylla*) elevated to a new genus (Soejima & Wen 2006). References: Soejima & Wen (2006); Wen in Kubitzki, Bayer, & Stevens (2007).

1 Leaves bipinnate to tripinnate, with > 11 leaflets; [native and alien species]; [section *Leeaceifoliae*].
  2 Leaflets 2-6 cm long; [common native species of mesic to wet habitats] ..... ***A. arborea***
  2 Leaflets 5-12 cm long (at least the larger > 8 cm long); [introduced species, rarely escaped] ..... ***[A. megalophylla]***
1 Leaves simple and palmately veined (grape-like), or palmately 5-foliolate (the leaflets additionally pinnately lobed); [alien species]; [section *Ampelopsis*].
  3 Leaves palmately 5-foliolate, the leaflets additionally pinnately lobed ..... ***A. aconitifolia***
  3 Leaves simple, grape-like, to 12 cm long and 9 cm wide.
    4 Leaves 3 (-5) lobed; young twigs pubescent ..... ***A. brevipedunculata***
    4 Leaves not lobed; young twigs glabrous ..... ***A. cordata***

* ***Ampelopsis aconitifolia*** Bunge. Pd (NC): planted as an ornamental, rarely escaping to suburban woodlands; rare, native of n. China. [= K]

Ampelopsis arborea (Linnaeus) Koehne, Peppervine. Cp, Pd (GA, NC, SC, VA), Mt (NC): swamp forests, marshes, wet thickets, moist to wet maritime forests; common (rare in Piedmont and Mountains). June-October. Se. VA (and MD?) south to s. FL, west to TX and n. Mexico, north in the interior to s. IL. [= RAB, C, F, G, GW, K, S, W]

* ***Ampelopsis brevipedunculata*** (Maximowicz) Trautvetter, Porcelain-berry. Pd, Cp (NC, VA), Mt (VA): thickets and disturbed areas; rare, native of ne. Asia. June-July; September. [= RAB, C, F, K; < *A. heterophylla* (Thunberg) Siebold & Zuccarini – S; = *A. heterophylla* (Thunberg) Siebold & Zuccarini var. *brevipedunculata* (Maximowicz) C.L. Li]

*? ***Ampelopsis cordata*** Michaux, Raccoon-grape, False-grape. Mt, Cp, Pd (GA, VA): moist forests, bottomlands, and thickets, particularly where disturbed; rare (perhaps introduced only in all or part of our area). May-July. E. VA south to panhandle FL, west to TX, north in the interior to s. OH, s. IN, s. IL, MO, and NE; also introduced at scattered sites inland. [= RAB, C, F, G, GW, K, S, W]

* *Ampelopsis megalophylla* Diels & Gilg, Bigleaf Peppervine. Planted in the Southeast; has potential to naturalize. Reports of its occurrence as naturalized in MS are based on *Cayratia* (S.W. Leonard, pers. comm.. 2006). Native of China.

Cayratia A.L. de Jussieu 1818 (Bushkiller)

A genus of 50-63 species, woody and herbaceous vines, of the Old World tropics and subtropics. References: Krings & Richardson (2006); Wen in Kubitzki, Bayer, & Stevens (2007).

* ***Cayratia japonica*** (Thunberg) Gagnepain, Bushkiller, Sorrel Vine. Pd (NC): suburban woodlands; rare, native of temperate and subtropical se. Asia. July-August. Reported for NC from several suburban areas, as in Forsyth County (Krings & Richardson 2006) and Mecklenburg County (J. Matthews, pers. comm., 2007). Also reported as naturalized in MS, LA, and TX. [= K]

Cissus Linnaeus 1753

A genus of about 350 species, woody vines, herbaceous vines, and rarely shrubs, of tropical and rarely warm temperate areas. References: Wen in Kubitzki, Bayer, & Stevens (2007).

Cissus trifoliata (Linnaeus) Linnaeus, Marine-ivy. Cp (FL, GA, *SC): dredge spoil; rare, the more northerly occurrences introduced. Se. SC (Jasper County) south through GA, FL, and west along the Gulf Coast to TX, AR, and Mexico. [= K, S; > *C. incisa* (Nuttall) Des Moulins – GW, S]

Parthenocissus Planchon 1887 (Virginia-creeper, Woodbine)

A genus of about 15 species, woody vines, of temperate Asia and North America. References: Wen in Kubitzki, Bayer, & Stevens (2007).

1 Leaves 3-lobed to 3-foliolate; [introduced ornamental, rarely escaped] ..... ***P. tricuspidata***
1 Leaves (3-) 5 (-7)-foliolate (only a few leaves on a plant 3-foliolate); [native].
  2 Inflorescence with a well-developed (zigzag) central axis, the dichotomous branches very unequal, the inflorescence therefore paniculiform; tendrils many-branched, usually with numerous adhesive disks (though young shoots may not have the disks yet formed); leaves usually dull above; [widespread in our area] ..... ***P. quinquefolia***
  2 Inflorescence without a well-developed central axis, the dichotomous branches relatively equal, the inflorescence therefore corymbiform, as wide or wider than long, with 2-3 main branches; tendrils few-branched, usually lacking adhesive disks (though sometimes swollen at the tip); leaves usually glossy above; [in our area in e. VA northward] ..... ***P. vitacea***

Parthenocissus quinquefolia (Linnaeus) Planchon, Virginia-creeper. Cp, Pd, Mt (GA, NC, SC, VA): swamp forests, bottomlands, maritime forests and thickets, rock outcrops, mesic forests; common. May-July; July-August. ME west to IA and NE, south to FL and TX. [= RAB, C, F, G, K, W; > *P. quinquefolia* – S; > *P. hirsuta* (Pursh) Graebner – S]

* ***Parthenocissus tricuspidata*** (Siebold & Zuccarini) Planchon, Boston-ivy. Pd (NC, SC): frequently grown for ornament, rarely persisting or escaped; rare, native of Japan and China. [= C, F, G, K]

Parthenocissus vitacea (Knerr) A. Hitchcock. Cp (VA): maritime thickets, rich alluvial forests, roadsides, and dumps; rare. Québec west to Manitoba, WY, and CA, south to e. VA, OH, MO, TX, and AZ. [= C, G, K; = *P. inserta* (Kerner) Fritsch – F, probably misapplied]

Vitis Linnaeus 1753 (Grape)

A genus of about 60-65 species, vines, of temperate regions of Eurasia and North America. Rossetti et al. (2002) conducted a molecular phylogenetic study of Vitaceae and suggested that recognition of *Muscadinia* as a genus may be warranted; Soejima & Wen (2006) conclude that *Vitis* s.l. is monophyletic, the muscadines apparently basal to the rest of the genera. References: Moore (1991)=Z; Ward (2006b)=Y; Wen in Kubitzki, Bayer, & Stevens (2007). Key adapted with little modification from Moore (1991).

1 Tendrils simple; bark adherent (on all but the largest stems), with prominent lenticels; pith continuous through nodes; leaves relatively small and coarsely toothed, never deeply lobed; [subgenus *Muscadinia*].
  2 Mature fruits < 10 mm in diameter; infructescences with 12-30 berries; leaf blades 4-8 cm long; [of s. GA southward] ..... ***V. rotundifolia var. munsoniana***
  2 Mature fruits > 12 mm in diameter; infructescences with 2-8 (-12) berries; leaf blades usually > 6 cm long; [widespread in our area] ..... ***V. rotundifolia var. rotundifolia***
1 Tendrils bifid to trifid; bark shedding, the lenticels inconspicuous; pith interrupted by diaphragms at nodes; leaves relatively large and finely toothed, often deeply lobed; [subgenus *Vitis*].
  3 Mature leaves glaucous beneath (the glaucescence sometimes rather obscured by pubescence); nodes often glaucous; [series *Aestivales*].
    4 Mature 3-4 seeded berries > 9 mm in diameter; mature leaves slightly to strongly arachnoid-pubescent beneath; nodes usually not glaucous; nodal diaphragms usually > 2 mm in diameter ..... ***V. aestivalis var. aestivalis***
    4 Mature 3-4 seeded berries < 9 mm in diameter; mature leaves glabrous to glabrate beneath; nodes usually glaucous; nodal diaphragms usually < 2 mm in diameter ..... ***V. aestivalis var. bicolor***
  3 Mature leaves not glaucous beneath; nodes not glaucous.
    5 Tendrils or inflorescences present at 3 or more consecutive nodes; leaves densely pubescent beneath; [series *Labruscae*] ..... ***V. labrusca***
    5 Tendrils or inflorescences present at only 2 consecutive nodes; leaves glabrous or moderately pubescent beneath.

6 Leaves reniform, glabrous beneath at maturity; tendrils absent, present only opposite the uppermost nodes, or sometimes extending down the stem; [section *Ripariae*] ..... ***V. rupestris***
6 Leaves cordate to cordate-ovate, glabrous to pubescent beneath at maturity; tendrils present opposite most nodes.
7 Nodal diaphragms < 1 mm wide, usually < 0.5 mm wide; growing shoot tips enveloped by enlarging, unfolded leaves; [section *Ripariae*] ..... ***V. riparia***
7 Nodal diaphragms > 1 mm wide; growing shoot tips not enveloped by enlarging, unfolded leaves.
8 Branchlets of the season more or less terete, glabrous or arachnoid-pubescent; mature 3-4 seeded berries usually > 8 mm in diameter; nodes usually not banded with red pigmentation; [series *Cordifoliae*].
9 Nodal diaphragms > 2.5 mm wide; leaves strongly 3-lobed, the tips usually long-acuminate; branchlets of the season with a red or purplish cast ..... ***V. palmata***
9 Nodal diaphragms < 2.5 mm wide; leaves unlobed or shallowly lobed, the tips acute to short-acuminate; branchlets of the season gray, green, or brown (sometimes purple only on one side) ..... ***V. vulpina***
8 Branchlets of the season angled, arachnoid-pubescent and/or hirtellous-pubescent (or nearly glabrous); mature 3-4 seeded berries < 8 mm in diameter; nodes frequently banded with red pigmentation; [series *Cinerescentes*].
10 Branchlets of the season sparsely to densely hirtellous pubescent, often with arachnoid pubescence as well; leaf undersurfaces usually more-or-less uniformly hirtellous on the veins; [west of our area, approaching it in w. KY, w. TN, and sc. AL] ..... ***[V. cinerea var. cinerea]***
10 Branchlets of the season lacking evident hirtellous trichomes (if present, obscured by the arachnoid pubescence; leaf undersurfaces lacking hirtellous pubescence, or only very sparsely so; [collectively widespread in our area].
11 Branchlets glabrate to only slightly arachnoid-pubescent; nodes usually banded with red pigmentation; leaves glabrous to very slightly arachnoid-pubescent beneath; [mostly of the Piedmont and Mountains] ..... ***V. cinerea var. baileyana***
11 Branchlets slightly to densely arachnoid-pubescent; nodes usually not banded with red pigmentation; leaves slightly to densely arachnoid-pubescent beneath; [mostly of the Coastal Plain] ..... ***V. cinerea var. floridana***

Vitis aestivalis Michaux *var.* ***aestivalis***, Summer Grape. Cp, Pd, Mt (GA, NC, SC, VA): forests and woodlands, mostly upland; common. May-June; September-October. MA west to MO and IA, south to FL and e. TX. [= RAB, C, F, G, K, Y, Z; = *V. aestivalis* – S; < *V. aestivalis* – GW, W]

Vitis aestivalis Michaux *var.* ***bicolor*** Deam, Silverleaf Grape. Mt (GA, NC, SC, VA): forests and woodlands, mostly upland; common. May-June; September-October. Ontario and MN south to n. GA and n. AL. [= Z; = *V. aestivalis* var. *argentifolia* (Munson) Fernald – RAB, C, F, G, K; = *V. bicolor* Le Conte – S; < *V. aestivalis* – GW, W]

Vitis cinerea (Engelmann in A. Gray) Engelmann ex Millardet *var.* ***baileyana*** (Munson) Comeaux, Possum Grape. Mt, Pd, Cp (GA, NC, SC, VA): forests and woodlands, mostly bottomlands; common (rare in Coastal Plain). Late May-June; September-October. S. PA, s. OH, and se. IN south to c. SC, c. GA, and AL. [= K, Z; = *V. baileyana* – RAB, C, F, G, S; < *V. vulpina* – GW; < *V. cinerea* – W]

Vitis cinerea (Engelmann in A. Gray) Engelmann ex Millardet *var.* ***floridana*** Munson, Florida Grape. Cp (GA, NC, SC, VA), Pd? (NC?, SC?, VA?): floodplain and other moist forests; common (rare in Piedmont). Late May-June; August-October. Se. VA south to FL, west to s. MS. [= RAB, C, F, G, K, Z; = *V. simpsonii* Munson – S, Y; < *V. cinerea* – GW, W]

Vitis labrusca Linnaeus, Fox Grape. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): forests and woodlands, wet, moist, and dry; common (uncommon in Mountains). May-June; September-October. ME west to s. MI, south to n. GA, n. AL, and n. MS. [= RAB, C, GW, K, S, W, Z; > *V. labrusca* var. *labrusca* – F, G; > *V. labrusca* var. *subedentata* Fernald – F, G]

Vitis palmata Vahl, Red Grape, Cat Grape, Catbird Grape. Cp (GA): floodplain forests, riverbanks; rare (GA Special Concern). Mid June-late June; late July-October. IN, c. TN (Chester, Wofford, & Kral 1997), sc. GA (Jones & Coile 1988), and FL Panhandle west to MO and TX. [= C, F, G, GW, K, S, Y, Z]

Vitis riparia Michaux, Riverbank Grape. Mt, Pd, Cp (NC?, VA): forests and woodlands, mostly moist to wet; uncommon. April-June; August-September. New Brunswick west to se. Saskatchewan, south to VA, NC, c. and w. TN, n. MS, LA, and e. TX, and in the Pacific Northwest. [= RAB, C, G, GW, K, Z, W; > *V. riparia* var. *riparia* – F]

Vitis rotundifolia Michaux *var.* ***munsoniana*** (Simpson ex Munson) M.O. Moore, Munson Grape, Bullace Grape. Cp (FL, GA): floodplain forests, banks of blackwater rivers; rare. Late April-May; late July-September. Sc. GA, s. AL, and FL. [= K, Y, Z; = ***Muscadinia munsoniana*** (Simpson ex Munson) Small – S; = *Vitis munsoniana* Simpson ex Munson]

Vitis rotundifolia Michaux *var.* ***rotundifolia***, Muscadine, Scuppernong. Cp, Pd, Mt (GA, NC, SC, VA): forests, swamps, dunes; common (uncommon in Mountains). May-June; August-October. DE west to KY and MO, south to FL and TX. Cultivars of this species are popular in the Southeastern United States for eating grapes and for a distinctive wine. [= K, Y, Z; = *V. rotundifolia* – RAB, C, F, GW, W; = ***Muscadinia rotundifolia*** (Michaux) Small – S]

Vitis rupestris Scheele. Mt, Pd (VA): along streams and in riverbank scour areas, especially in calcareous areas; uncommon (VA Rare List). April-May; August-September. MD, WV, sw. PA west to MO, south to VA, c. TN, and n. AR. [= C, F, K, W, S, Z]

Vitis vulpina Linnaeus, Frost Grape, Winter Grape, Chicken Grape. Pd, Mt, Cp (GA, NC, SC, VA): forests and woodlands, primarily upland, but also in bottomlands; common. May; July-September. Se. NY west to MO and e. KS, south to FL and nc. TX. [= RAB, C, F, G, K, W, Y, Z; < *V. vulpina* – GW; > *V. vulpina* – S; > *V. cordifolia* Michaux – S]

Vitis cinerea (Engelmann in A. Gray) Engelmann ex Millardet var. *cinerea*, Graybark Grape, Pigeon Grape, may occur in our primary area, but is primarily more western, ranging from VA (?), w. KY, wc. TN, IN, and WI, south to sc. AL and TX. [= RAB, C, F, G, K, Z; = *V. cinerea* – S; < *V. cinerea* – GW, W]

* *Vitis ×labruscana* Bailey [*aestivalis* × *labrusca*] is the commonly cultivated Concord Grape (and related cultivars). It is sometimes persistent after cultivation. [= K; = *V. labruscana* Bailey – F] {not keyed}

* *Vitis vinifera* Linnaeus, the European Wine Grape, has been increasingly cultivated in our area, especially in VA and NC, now significant wine-producing areas. [= K] {not keyed}

ZYGOPHYLLACEAE R. Brown 1814 (Creosote-bush Family)

A family of about 22-27 genera and 230-285 species, trees, shrubs, and (rarely) herbs, of tropical and subtropical regions of the Old and New Worlds. References: Sheahan in Kubitzki, Bayer, & Stevens (2007).

1 Fruit with tubercles, at maturity separating into 10 mericarps ..... ***Kallstroemia***
1 Fruit with spines, at maturity separating into 5 mericarps ..... ***Tribulus***

Kallstroemia Scopoli 1777

A genus of about 17 species, herbs, of tropical and subtropical America. References: Porter 1969)=Z; Sheahan in Kubitzki, Bayer, & Stevens (2007)

*? ***Kallstroemia maxima*** (Linnaeus) Hooker & Arnott, Greater Caltrop. Cp (GA, SC): disturbed areas, dunes; rare, native status uncertain. SC south to FL; West Indies; Mexico (Sinaloa and Tamaulipas) south throuigh Central America to northern South America (Venezuela, Colombia). Early collections from Charleston (Stephen Elliott) and Savannah suggest the likelihood of introduction via ballast. [= RAB, K, S, Z]

Tribulus Linnaeus 1753

A genus of about 25 species, herbs, of tropical and subtropical parts of the Old World (introduced in the New World). References: Sheahan in Kubitzki, Bayer, & Stevens (2007).

1 Petals 8-22 mm long; peduncle > 2 cm long; perennial ..... ***T. cistoides***
1 Petals 3-5 mm long; peduncle < 1 cm long; annual ..... ***T. terrestris***

* ***Tribulus cistoides*** Linnaeus, Jamaican Fever-plant. Cp (GA): disturbed areas; rare, native of Africa. Introduced in GA, FL, LA, and TX (Kartesz 1999). [= K, S]
* ***Tribulus terrestris*** Linnaeus, Puncture-weed, Caltrop, Devil's-thorn. Cp (GA, NC, SC): dunes, sandy roadsides, ballast; rare, native of Mediterranean Europe. June-December. [= RAB, C, F, G, K, S]

MONOCOTYLEDONS

ACORACEAE Martinov 1820 (Calamus Family)

The family consists only of *Acorus*. Although traditionally treated as part of the Araceae, a wide variety of morphological, anatomical, and embryological evidence supports the segregation of the Acoraceae (Grayum 1987), a segregation additionally supported by molecular studies (Duvall et al. 1993, Chase et al. 1993). The spathe in *Acorus* is not morphologically equivalent to the spathe of the Araceae. References: Thompson in FNA (2000); Bogner & Mayo in Kubitzki (1998b).

Acorus Linnaeus 1753 (Calamus, Sweetflag)

A genus of 2-4 species, widespread in north temperate and subtropical regions. References: Thompson in FNA (2000); Grayum 1987.

1 Midvein of the leaves not well-developed, about equally as prominent as the lateral veins; mature fruits produced ..... ***A. americanus***
1 Midvein of the leaves well-developed, distinctly more prominent than the lateral veins; mature fruits not produced..... ***A. calamus***

Acorus americanus (Rafinesque) Rafinesque, American Calamus, Sweetflag. Cp (VA?), Mt (GA): marshes, wet meadows, other wet areas, limey seeps; rare (GA Special Concern). May-June. Widespread in ne. North America. This species is apparently a fertile diploid. Because this species has not generally been recognized in floras, its distribution is poorly known; additional distributional records should be expected and sought. [= FNA, K; < *A. calamus* Linnaeus – RAB, C, F, G, GW; < *A. americanus* – W]

* ***Acorus calamus*** Linnaeus, European Calamus, Sweetflag. Cp, Mt (GA, NC, SC, VA), Pd (NC, SC, VA): marshes, wet meadows, other wet areas; uncommon, native of Eurasia, now widespread in e. North America. May-June. The aromatic rhizome and leaves have been used medicinally and candied as a confection. Populations of *A. calamus* in our area are apparently sterile triploids introduced from Europe, though diploid and tetraploid populations of *A. calamus* are known from Asia. [= FNA, K; < *A. calamus* Linnaeus – RAB, C, F, G, GW (also see *A. americanus*); < *A. americanus* – W]

AGAVACEAE Endlicher 1841 (Agave Family)

A family of about 11 genera and 315 species, herbs and rosette shrubs, of temperate and tropical America. The placement of *Camassia*, *Schoenolirion*, and *Hastingsia*, sometimes grouped as Hyacinthaceae subfamily Chlorogaloideae, is uncertain; they are probably better placed in the Agavaceae, a position supported by molecular, serological, and biogeographic evidence. References: Verhoek & Hess in FNA (2002a); Bogler & Simpson (1995, 1996); Verhoek in Kubitzki (1998a).

1 Plants with erect woody stems; leaves cauline ..... ***Yucca***
1 Plants acaulescent; leaves in basal rosettes.
  2 Margins of leaves fraying into coarse, whitish, curly fibers; tepals about 4 cm long; leaves stiff and > 15 mm wide ..... ***Yucca***
  2 Margins of leaves entire, not fraying; tepals < 2 cm long; leaves stiff and wiry (and < 5 mm wide), herbaceous, or fleshy.
    3 Leaves oblong-acute, 2-9 cm wide, 2-10× as long as wide, fleshy ..... ***Manfreda***
    3 Leaves linear, 0.3-1.8 cm wide, 20-100× as long as wide, herbaceous or wiry.
      4 Leaves narrowly linear, 3-5 mm wide, wiry and grasslike; inflorescence a diffuse panicle; perianth segments 2-4 mm long, white..... ..... ***[Nolina – see RUSCACEAE]***
      4 Leaves linear, 2-18 mm wide, herbaceous; inflorescence a raceme; perianth segments 13-18 mm long, blue or nearly white.
        5 Perianth segments 13-18 mm long, blue or nearly white ..... ***Camassia***
        5 Perianth segments 5-7 mm long, white, cream, or yellow ..... ***Schoenolirion***

Camassia Lindley 1832 (Wild Hyacinth, Quamash Lily, Camas Lily)

A genus of 6 species, of North America. The family placement of *Camassia* is uncertain; there is some increasing evidence that the affinities of *Camassia* are with the Agavaceae, rather than the Hyacinthaceae (Fay & Chase 1996, Bogler & Simpson 1996, Speta in Kubitzki 1998a). References: Ranker & Hogan in FNA (2002a); Speta in Kubitzki (1998a).

Camassia scilloides (Rafinesque) Cory, Wild Hyacinth, Quamash Lily, Eastern Camas Lily. Mt (GA, VA), Cp (NC), Pd (SC): moist forests, over circumneutral soils, in VA on limestone, in NC on slopes and natural levees along the Roanoke River, in SC over gabbro; rare. April-May. W. PA and s. Ontario west to s. WI and e. KS, south to nw. GA (Jones & Coile 1988) and TX, nearly entirely west of the Blue Ridge, with only a few disjunct occurrences in the Piedmont and Coastal Plain. [= RAB, C, F, FNA, G, K, W; = *Quamasia hyacintha* (Rafinesque) Britton – S]

Manfreda Salisbury 1866 (False-aloe)

AGAVACEAE

A genus of about 26 species, primarily in sw. United States, Mexico, and Central America. References: Verhoek in FNA (2002a); Speta in Kubitzki (1998a).

Manfreda virginica (Linnaeus) Salisbury ex Rose, Rattlesnake-master, Eastern False-aloe. Pd (GA, NC, SC), Cp (FL, GA, NC, SC), Mt (GA, NC, SC, VA): granite flatrocks, diabase glades, xeric woodlands over mafic or calcareous rocks, sandhill woodlands; uncommon (rare in VA). Late May-mid July; August-October. E. SC, c. NC, sw. VA, WV, s. OH, s. IN, s. IL, and MO south to c. peninsular FL and TX. [= FNA, K, W, WH; = *Agave virginica* Linnaeus – RAB, C, F; > *M. tigrina* (Engelmann) Small – S; > *M. virginica* – S; = *Polianthes virginica* (Linnaeus) Shinners]

Schoenolirion Torrey ex Durand (Sunnybell)

A genus of 3 species, herbs, of s. North America. References: Sherman in FNA (2002a).

1 Inflorescence with 1-6 branches; leaves without fleshy bases, withering to a persistent fibrous crown ..... ***Sch. albiflorum***
1 Inflorescence rarely branched; leaves with fleshy bases, not fibrous.
  2 Perianth golden-yellow ..... ***Sch. croceum***
  2 Perianth white ..... ***Sch. wrightii***

Schoenolirion albiflorum (Rafinesque) R.R. Gates, White Sunnybell. Cp (FL, GA): wet pinelands, cypress depressions, *Hypericum* depressions, wet hammocks; uncommon (rare in AL and GA). E. GA south to s. FL and west to AL. [= FNA, K, WH; = *Sch. elliottii* Feay ex A. Gray – GW; = *Oxytria albiflora* (Rafinesque) Pollard – S]

Schoenolirion croceum (Michaux) Wood, Yellow Sunnybell. Pd (GA, SC), Cp (FL, GA, NC?), Mt (GA): wet pine savannas, bogs, seepage slopes, seepages on granite flatrocks; rare. April-May; May-June. SC (and allegedly NC) south to ne. FL, west to se. TX; and in c. TN on limestone glades (Chester et al. 1993). The occurrence in NC in "wet pinelands" in Richmond County referred to in RAB has not been relocated or further documented. [= RAB, FNA, GW, K, WH; = *Oxytria crocea* (Michaux) Rafinesque – S]

Schoenolirion wrightii Sherman, Texas Sunnybell. Mt (AL): seepage over sandstone; rare. April-early May. N. AL; w. LA and e. TX. [= FNA, K; = *Oxytria texana* (Scheele) Pollard – S]

Yucca Linnaeus 1753 (Yucca, Adam's-needle)

A genus of about 40 species, of sw. North America, n. Mexico, se. United States, and the West Indies. References: Hess & Robbins in FNA (2002a); Speta in Kubitzki (1998a); Ward (2004c)=Z; Ward (2006a).

1 Leaf margins fraying into filamentous threads; plant acaulescent (or essentially so); fruit erect.
  2 Inflorescence branches glabrous; tepals 5-7 cm long; leaves 2-6 cm wide, stiff, the apex acute-acuminate to obtuse, often concave upward at the apex ..... ***Y. filamentosa***
  2 Inflorescence branches scurfy-pubescent; tepals 3-5 cm long; leaves 1.5-4 cm wide, pliable, the apex attenuate-acuminate, not notably concave ..... ***Y. flaccida***
1 Leaf margins not fraying, minutely notched-serrulate or entire, and hyaline; plant with a trunk; fruit pendulous (erect in *Y. recurvifolia*).
  3 Leaf margins minutely notched-serrulate, particularly toward the base; seeds 2.5 mm thick, marginless ..... ***Y. aloifolia***
  3 Leaf margins entire, smooth, hyaline-brown or hyaline-tellow; seeds ca. 1 mm thick, margined.
    4 Leaf blades rigid, straight; fruits pendent, 5.5-8 cm long; [of NC south to FL] ..... ***Y. gloriosa***
    4 Leaf blades recurved, flexible; fruits generally erect, 2.5-4.5 cm long; [of GA westward] ..... ***Y. recurvifolia***

Yucca aloifolia Linnaeus, Spanish Dagger. Cp (FL, GA, NC, SC): dunes; uncommon. June-early July; October-December. Ne. NC (Dare County) south to s. FL and west to LA. [= RAB, FNA, K, S, WH]

Yucca filamentosa Linnaeus, Curlyleaf Yucca, Spoonleaf Yucca. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): woodlands, forests, dunes, roadsides, disturbed areas; common. Late April-early June; September-October. MD or s. NJ south to GA, west to MS; escaped from cultivation over a broader area of e. United States. [= FNA, F, S, W, Z; = *Y. filamentosa* var. *filamentosa* – RAB; < *Y. filamentosa* – C, G, K (also see *Y. flaccida*); = *Y. concava* Haworth – S]

Yucca flaccida Haworth, Weakleaf Yucca. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA*): woodlands, roadsides, disturbed areas; common (rare north of GA. Late April-early June; September-October. C. NC and TN south to s. FL and AL. Whether or not this taxon is valid (and if so, as a variety or as a species) has been unclear; further research is needed. The occurrence of this species in VA is apparently the result of cultivation and persistence. [= FNA, S, W; = *Y. filamentosa* var. *smalliana* (Fernald) Ahles – RAB; < *Y. filamentosa* – C, G, K, WH; = *Y. smalliana* Fernald – F; > *Y. flaccida* var. *flaccida* – Z; > *Y. flaccida* var. *smalliana* (Fernald) D.B. Ward – Z]

Yucca gloriosa Linnaeus, Mound-lily Yucca, Spanish Bayonet. Cp (FL, GA, NC, SC): dunes, shell middens; uncommon (rare in FL and NC). (April), October; November-December. E. NC (Dare County) south to ne. FL, west to LA (Kartesz 1999). [= RAB, K, S; = *Y. gloriosa* var. *gloriosa* – FNA; < *Y. gloriosa* – WH]

Yucca recurvifolia Salisbury, Curve-leaf Yucca. Cp (FL?, GA): dunes, dry sandy soils; rare. GA west to LA (?). [= S; = *Y. gloriosa* Linnaeus var. *recurvifolia* (Salisbury) Engelmann – FNA; < *Y. gloriosa* – WH]

ALISMATACEAE Ventenat 1799 (Water-plantain Family)

A family of about 12 genera and 80 species, herbs, subcosmopolitan in distribution. References: Haynes & Hellquist in FNA (2000); Rogers (1983); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

1 Pistils in a single whorl, borne on a flat receptacle; stamens 6; inflorescence compound, many of the primary nodes bearing whorled branches which in turn bear whorled branches or whorled flowers ..... ***Alisma***
1 Pistils spiraled in several to many whorls, borne on a globose receptacle; stamens 6-many; inflorescence racemose (or in some species of both *Echinodorus* and *Sagittaria* somewhat compound, with the lowermost node or two bearing branches which in turn bear whorled flowers).
  2 Achenes turgid, with ribs or ridges; flower whorls subtended by 3 bracts and additional bracteoles ..... ***Echinodorus***
  2 Achenes flattened, with winged margins and often also with irregular corky ornamentations on the faces; flower whorls subtended by 3 bracts, with no additional bracteoles ..... ***Sagittaria***

Alisma Linnaeus 1753 (Water-plantain)

A genus of about 9 species, herbs, subcosmopolitan in distribution. References: Haynes & Hellquist in FNA (2000); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

1 Leaf blades 2.7-5× as long as wide (or even narrower on submerged leaves), tapering at the base; petals pink, 2.3-3.7 mm long; achene with a dorsal ridge flanked by two dorsal grooves ..... ***A. gramineum***
1 Leaf blades 1.3-2.5 (2.7)× as long as wide, rounded to subcordate at the base; petals white, **either** 1.8-2.5 mm **or** 3.8-4.5 mm long; achene with a single dorsal groove.
  2 Petals 1.8-2.5 mm long, 1.4-2.0 mm wide ..... ***A. subcordatum***
  2 Petals 3.8-4.5 mm long, 3.0-3.9 mm wide ..... ***[A. triviale]***

Alisma gramineum Lejeune, Grassleaf Water-plantain. Cp (VA): in seasonally flooded areas in impoundments; rare (VA Watch List). June-August. This species is circumboreal, ranging in North America south to e. VA, NY, WI, MO, NM, and CA. The occurrence of this species in our area may be the result of dispersal by waterfowl; first reported for our area by Wieboldt et al. (1998). [= C, F, FNA, K; < *A. plantago-aquatica* Linnaeus var. *americanum* J.A. Schultes – G]

Alisma subcordatum Rafinesque, Southern Water-plantain. Mt, Pd (GA, NC, SC, VA), Cp (NC, VA): marshes, ponds, stream edges; uncommon. April-November. MA west to ND, south to GA and TX. [= RAB, C, F, FNA, G, GW, K, S, W, WV; = *A. plantago-aquatica* Linnaeus ssp. *subcordatum* (Rafinesque) Hultén; *A. plantago-aquatica* var. *parviflorum* (Pursh) Torrey]

Alisma triviale Pursh, Northern Water-plantain, ranges south to s. PA and KY (and according to Fernald to MD and WV). [= C, F, FNA, K, WV; < *A. plantago-aquatica* Linnaeus var. *americanum* J.A. Schultes – G]

Echinodorus L.C. Richard ex Engelmann 1848 (Burhead)

A genus of about 27 species, herbs, primarily of the American tropics and subtropics. References: Haynes & Hellquist in FNA (2000); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

1 Leaf blades 1-3 cm long, 0.2-2 cm wide; achenes 10-20 per head; stamens 6 or 9; petals 1-3 mm long; scapes 5-10 cm tall, erect; [subgenus *Helanthium*] ..... ***E. tenellus***
1 Leaf blades 5-20 cm long, 3-15 cm wide; achenes 40 or more per head; stamens ca. 21; petals 6-12 mm long, scapes 20-120 cm tall, erect or arching/reclining; [subgenus *Echinodorus*].
  2 Scapes arching and rooting down at maturity; veins of the sepals papillose-roughened ..... ***E. cordifolius ssp. cordifolius***
  2 Scapes rigidly erect at maturity; veins of the sepals smooth.
    3 Stamens 9-15; plants to 70 cm tall ..... ***E. berteroi***
    3 Stamens 21; plants to 200 cm tall ..... ***E. floridanus***

Echinodorus berteroi (Sprengel) Fassett, Tall Burhead. Cp (GA): ponds, marshes, ditches; rare. OH, IL, and ND south to e. Panhandle FL, sw. GA, and TX. [= FNA, K, WH; > *E. berteroi* var. *lanceolatus* (Engelmann ex S. Watson & Coulter) Fassett – C; = *E. cordifolius* – S, misapplied; ? *E. rostratus* (Nuttall) Engelmann – GW] {synonymy}

Echinodorus cordifolius (Linnaeus) Grisebach *ssp.* ***cordifolius***, Creeping Burhead. Cp (GA, NC, SC, VA): swamps, ditches, wet thickets, especially on base-rich substrates, such as over calcareous or mafic rocks; common (uncommon in FL). June-November. MD south to c. peninsular FL, west to TX, south into tropical America, and north in the interior (primarily in the Mississippi Embayment) to s. IL. [= FNA; < *E. cordifolius* – RAB, F, G, GW, K, WH; = *E. cordifolius* var. *cordifolius* – C; = *E. radicans* (Nuttall) Engelmann – S]

Echinodorus floridanus R.R. Haynes & J.R. Burkhalter, Florida Burhead. Cp (FL): swamps; rare. A recently named endemic, known only from Escambia County, FL. [= FNA, K, WH]

Echinodorus tenellus (Martius) Buchenau, Mud-babies, Dwarf Burhead. Cp (FL, GA, NC, SC, VA), Mt (GA, VA): on drawdown zones of Coastal Plain ponds, pineland ponds, blackwater riverbanks, or ponds in the Mountains with Coastal Plain affinities (Augusta County, VA); uncommon (rare north of FL). MA west to MN, south to c. peninsular FL and e. TX, but widely scattered and disjunct in that range. See Belden et al. (2004) for a discussion of the species in Virginia. [= FNA, G, K, WH; > *E. parvulus* Engelmann – G, GW; > *E. tenellus* (Martius) Buchenau var. *parvulus* (Engelmann) Fassett – C; > *Helanthium parvulum* (Engelmann) Britton – S]

Sagittaria Linnaeus 1753 (Arrowhead)

A genus of about 25 species, herbs, primarily of the Americas. References: Haynes & Hellquist in FNA (2000); Bogin (1955)=Z; Wooten (1973)=Y; Beal, Wooten, & Kaul (1982)=X; Sorrie, Keener, and Edwards (2007); Preston & Adams (1961); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

Identification notes: Portions of this key (and treatment) are provisional. The taxonomy and best characters to use in the linear-leaved species is particularly problematic.

1 Leaf blades sagittate or cordate (at least some of the leaves on a plant with sagittate or cordate basal lobes; some species are keyed both here and below).
  2 Leaf blades pubescent; [subgenus *Sagittaria*] ..... ***S. latifolia** var. **pubescens***
  2 Leaf blades glabrous.
    3 Sepals appressed in fruit; lower flowers perfect, the stamens either functional or not; stamen filaments roughened with minute scales (except glabrous in *S. spatulata*); [subgenus *Lophotocarpus*].
      4 Leaves primarily phyllodial, lanceolate or spatulate (sagittate leaves rare in the population and few on a given plant); flowers in 1-2 (-3) whorls; stamen filaments glabrous (use 10×); [native, of tidal marshes] ..... ***S. spatulata***
      4 Leaves primarily sagittate (phyllodial leaves rare in the population and few on a given plant); flowers in 3-12 whorls; stamen filaments roughened with minute scales (use 10×); [**either** introduced aliens, sometimes in tidal marshes, **or** native, found in inland alkaline sites].
        5 Petals white, immaculate; stamens of pistillate flowers functional; [of inland sites, native or introduced at a given locality] ..... ***S. calycina***
        5 Petals white, with a purple spot at the base; stamens of pistillate flowers generally nonfunctional; [exotic, introduced around coastal ports] ..... ***S. montevidensis***
    3 Sepals reflexed or at least widely spreading in fruit; lower flowers pistillate; stamens glabrous (except roughened with minute scales in *S. rigida*); [subgenus *Sagittaria*].
      6 Leaves cordate basally, floating; stalks of the pistillate flowers stout, reflexed in fruit; stamens mostly fewer than 15 ..... ***S. filiformis***
      6 Leaves sagittate basally, emersed; stalks of the pitillate not notably stout, ascending in fruit; stamens 15 or more.
        7 Beak of the achene lateral (at a right angle to the long axis of the achene); bracts of the inflorescence 2-14 mm long, boat-shaped, obtuse or broadly acute.
          8 Lowermost (pistillate) flowers on long pedicels (at least 20 mm), the pedicels of the lowermost flowers longer than those in whorls above; inflorescence normally not bent; stamen filaments glabrous ..... ***S. latifolia** var. **latifolia***
          8 Lowermost (pistillate) flowers sessile or on short pedicels (to 5 mm or rarely 10 mm long), the pedicels of the lowermost flowers notably shorter than those in whorls above; inflorescence normally bent at the lowest whorl of flowers; stamen filaments minutely roughened with minute scales ..... ***S. rigida***
        7 Beak of the achene terminal (extending along the long axis of the achene; bracts of the inflorescence 5-40 mm long, either blunt or acuminate, not boat-shaped.
          9 Bracts of the inflorescence thick and herbaceous, 5-25 mm long, rounded at the tip; flowers in 2-4 whorls; achenes with facial resin-ducts; [of acidic, blackwater habitats of the Coastal Plain] ..... ***S. engelmanniana***
          9 Bracts of the inflorescence papery and tan, 7-40 mm long, acuminate at the tip; flowers in 5-12 whorls; achenes without resin-ducts; [primarily of other habitats, commectively widespread].
            10 Petiole sharply 5-wing-angled in cross-section; inflorescence unbranched; fruiting heads 1.0-1.5 cm in diameter, globular ..... ***S. australis***
            10 Petiole corrugated but not wing-angled in cross-section; inflorescence often branched at the base; fruiting heads (1.2-) 1.7-2.2 cm in diameter, often globular-depressed ..... ***S. brevirostra***
1 Leaf blades linear or lanceolate, or modified as linear, bladeless phyllodia, these often of spongy texture.
  11 Stalks of the pistillate flowers reflexed in fruit, often stout; stamen filaments glabrous (except roughened with minute scales in *S. platyphylla* and *S. calycina*).
    12 Sepals appressed in fruit; lower flowers perfect, the stamens either functional or not; [subgenus *Lophotocarpus*].
      13 Leaves generally primarily sagittate (phyllodial leaves generally rare in the population); flowers in 3-12 whorls; stamen filaments roughened with minute scales (use 10× magnification); [of inland alkaline sites] ..... ***S. calycina***
      13 Leaves primarily phyllodial, lanceolate or spatulate (sagittate leaves rare in the population and few on a given plant); flowers in 1-2 (-3) whorls; stamen filaments glabrous (use 10× magnification); [of tidal marshes] ..... ***S. spatulata***
    12 Sepals reflexed or at least widely spreading in fruit; lower flowers pistillate; [subgenus *Sagittaria*].
      14 Plant generally with erect, emersed leaves with well-developed blades with firm texture, the blades lanceolate, elliptic, or ovate, 2-8 cm wide; stamen filaments roughened with minute scales ..... ***S. platyphylla***
      14 Plant with all leaves phyllodial, if expanded at the summit, the expanded blade of weak texture, floating.
        15 Leaves 2-10 (-30) cm long, 3-8 mm wide (sometimes with dilated tip to 20 mm wide); [of tidal, fresh to brackish waters] ..... ***S. subulata***
        15 Leaves 30-300 (or more) cm long, **either** 1-3 **or** 7-14 mm wide; [of nontidal waters].
          16 Leaves very variable from population to population, in swiftly flowing black water typically about 100 cm long and 1-3 mm wide, in more stagnant water (or when emersed by dropping water levels, typically with lax petioles and floating blades, the blades lanceolate, or elliptic, the base cuneate, rounded, or cordate; [of blackwater streams and ponds, MA south to FL, west to s. AL] ..... ***S. filiformis***
          16 Leaves 100-300 (or more) cm long, 7-14 mm wide; [of springs and spring-runs, endemic to FL] ..... ***S. kurziana***
  11 Stalks of the pistillate flowers ascending or spreading in fruit, not notably stout; stamen filaments roughened with minute scales (except glabrous in *S. engelmanniana*).
    17 Stamen filaments linear, less thick than the anther, changing little in diameter from near base to near summit.
      18 Bracts of the inflorescence firm in texture, smooth; stamen filaments glabrous; [of inland acidic wetlands] ..... ***S. engelmanniana***
      18 Bracts of the inflorescence either papillose or longitudinally striate-ribbed; stamen filaments roughened with minute scales; [of estuarine areas and associated nontidal wetlands].

19 Bracts and sepals striate-ribbed; stamen filaments 2-5 mm long; [rare, from e. SC southward] ..... ***S. lancifolia var. lancifolia***
19 Bracts and sepals papillose; stamen filaments 1.5-3.5 mm long; [common, throughout our coastal area]..... ***S. lancifolia var. media***
17 Stamen filaments **either** distinctly dilated toward the base (often broadly conic) **or** thickened throughout, the filament (at least basally) as thick or thicker than the anther.
20 Lowermost (pistillate) flowers sessile or on short pedicels (to 5 mm or rarely 10 mm long); inflorescence normally bent at the lowest whorl of flowers ..... ***S. rigida***
20 Lowermost (pistillate) flowers on longer pedicels; inflorescence normally not bent.
21 Leaves all phyllodia, the phyllodia terete or nearly so.
22 Phyllodia of emersed flowering plants elongate (1/2-1× as long as scape), slender, emersed or laxly ascending and submersed in water; phyllodia of stranded flowering plants elongate (1/3-1× as long as scape, but may be shorter), relatively stiff; [of se. NC and southward] ..... ***S. isoetiformis***
22 Phyllodia of emersed flowering plants short (2-8 cm), very thick, deeply submersed; when plants are stranded, phyllodia of stranded flowering plants elongate (1/2-1× as long as scape), slender, stiffly erect; [of DE-MD and northward] ..... [***S. teres***]
21 Leaves with blades and petioles, or if all phyllodia, the phyllodia flattened on upper surface or triangular in cross-section; [collectively widespread].
23 Plants with corms and/or stolons, lacking coarse rhizomes.
24 Blades of emersed leaves lanceolate, narrowly spatulate, > 5 mm wide; [of Mountain and upper Piedmont bogs, swamp forests, and adjacent ditches] ..... ***S. fasciculata***
24 Blades of emersed leaves linear (< 3 mm wide, rarely to 4 mm) or phyllodial; [coastal plain depression ponds and impoundments]
25 Achenes 1.5-2.0 (-2.5) mm long; achene faces with 3 or more keels and 2 or more resin ducts; inflorescence bracts connate for > 50% of length; [of se. NC and southward] ..... ***S. isoetiformis***
25 Achenes (2.2-) 2.4-3.0 mm long; achene faces with 2-3 keels and 1-2 resin ducts; inflorescence bracts connate for < 40% of length; [restricted to Sandhills region of NC andSC, likely in e GA] ..... ***S. macrocarpa***
23 Plants with coarse rhizomes, lacking corms and stolons.
26 Abaxial wing of fruit scalloped or toothed; [plants of n. AL] ..... ***S. secundifolia***
26 Abaxial wing of fruit entire; [plants collectively widespread].
27 Larger phyllodes 0.8-2.5 cm wide, the apices blunt (rarely acute); longer pistillate pedicels 2-5 (-6.5) cm long; median resin duct of mature achene linear, about as wide as the posterior duct (or ducts absent) ..... ***S. weatherbiana***
27 Larger phyllodes to 1 cm wide (except sometimes wider in *S. chapmanii*), the apices avute; longer pistillate pedicels 1-4 cm long; median resin duct of mature achene club-shaped and 2× the diameter of the posterior duct.
28 Inflorescence branched at the base (in at least some plants of a population); bracts of the inflorescence only slightly connate, the free tips narrowly triangular, 6-15 mm long ..... ***S. chapmanii***
28 Inflorescence unbranched at the base; bracts of the inflorescence slightly to almost fully connate ..... ***S. graminea***

Sagittaria australis (J.G. Smith) Small. Cp (FL, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): marshes, swamps, margins of ponds and lakes; common. June-October. NY west to s. IN and se. MO, south to SC, Panhandle FL, and MS. [= C, F, FNA, K, W, WV, X; > *S. australis* – S; = *S. longirostra* – RAB, S, misapplied; = *S. engelmanniana* J.G. Smith ssp. *longirostra* – G, GW, Z, misapplied]

Sagittaria brevirostra Mackenzie & Bush, Midwestern Arrowhead. Mt (VA): {habitat}; rare. June-October. OH west to ND, south to w. VA, e. TN, AL, and TX. [= C, F, FNA, K, W, X; = *S. engelmanniana* J.G. Smith ssp. *brevirostra* (Mackenzie & Bush) Bogin – G, Z]

Sagittaria calycina Engelmann. Pd* (NC*, SC*), Mt (VA): ponds; rare (VA Rare). May-September. N. OH and MI west to SD and CO, south to sw. VA, c. TN, LA, TX, and Mexico; disjunct in CA. Presumably only introduced in North Carolina and South Carolina. First reported for South Carolina by Hill & Horn (1997). [= RAB, C, W; = *Lophotocarpus calycinus* (Engelmann) J.G. Smith – F, WV; = *S. montevidensis* Chamisso & Schlechtendahl ssp. *calycina* (Engelmann) Bogin – FNA, G, GW, Z; > *S. calycina* var. *calycina* – K, WH]

Sagittaria chapmanii (J.G. Smith) C. Mohr, Chapman's Arrowhead. Cp (FL, GA, NC, SC): limesink (doline) ponds with drawdown hydrology, mucky ditches; uncommon (rare in NC and SC). May-September. Se. NC south to s. FL, west to s. AL. First reported for SC by Nelson & Kely (1997). Analyses of allozyme variation in the *S. graminea* complex revealed great differentiation between *S. graminea*, *S. chapmanii*, and *S. platyphylla*; *S. graminea* and *S. platyphylla* appeared to be more closely related to one another than either was to *S. chapmanii* (Hauber & Legé 1999). Therefore, it seems best to treat these three taxa at equal rank and at the species level. [= S; = *S. graminea* Michaux ssp. *chapmanii* (J.G. Smith) R.R. Haynes & C.B. Hellquist – FNA; = *S. graminea* Michaux var. *chapmanii* J.G. Smith – GW, K, WH, Y; = *S. graminea* Michaux var. *chapmani* J.G. Smith – Z, orthographic variant]

Sagittaria engelmanniana J.G. Smith. Cp (GA, NC, SC, VA), Pd (GA?, NC, VA): blackwater streambanks, sphagnum bogs, pocosins, beaver ponds; rare (NC Watch List, VA Rare). June-October. MA and NY south to n. FL and s. MS, primarily on the Coastal Plain. [= RAB, C, F, FNA, K, W, X; = *S. engelmanniana* ssp. *engelmanniana* – G, GW, Z]

Sagittaria fasciculata E.O. Beal, Bunched Arrowhead. Mt (NC, SC), Pd (SC): bogs, ditches adjacent to drained bogs, wooded seepage areas; rare. May-July. Endemic to a several-county area in sw. NC and nw. SC, where most of its former habitat has been drained. [= RAB, FNA, GW, K, W, Y; = *S. macrocarpa* J.G. Smith – S, misapplied; < *S. graminea* Michaux var. *macrocarpa* (J.G. Smith) Bogin – Z, mostly misapplied]

Sagittaria filiformis J.G. Smith. Cp (GA, NC, SC, VA?): swiftly flowing water of blackwater rivers and streams, blackwater lake shores; rare (NC Rare). May-September. As conceived here, probably ranging from MA south to FL and s. AL. The forms growing in swiftly flowing black water are remarkable and unlikely to be recognized as a *Sagittaria* unless in flower, with linear leaves over 100 cm long and only 1-3 mm wide, with 5-7 parallel ribbed veins, resembling *S. kurziana*. The proper taxonomic treatment and associated nomenclature to apply to these plants remains unclear (see synonymy). [= FNA, K; = *S. subulata* (Linnaeus) Buchenau var. *gracillima* (S. Watson) J.G. Smith – RAB, F, G, Z; = *S. stagnorum* Small – GW; < *S. subulata* – C, in part; > *S. filiformis* – S; > *S. lorata* (Chapman) Small – S; > *S. stagnorum* – S]

Sagittaria graminea Michaux. Cp (FL, GA, NC, SC, VA), Pd (VA), Mt (GA, VA): marshes, ponds, tidal areas; common (uncommon north of FL, rare in the Piedmont and Mountains). May-November. Newfoundland and Labrador west to MN and SD, south to s. FL and c. TX; West Indies. [= *S. graminea* Michaux var. *graminea* – RAB, C, G, GW, K, WH, Y; > *S. graminea* – F; > *S. eatonii* J.G. Smith – F; = *S. graminea* ssp. *graminea* – FNA; > *S. graminea* – S; > *S. cycloptera* (J.G. Smith) C. Mohr – S; < *S. graminea* – W; < *S. graminea* var. *graminea* – Z (also see *S. isoetiformis*); = *S. graminea* – WV]

Sagittaria isoetiformis J.G. Smith. Cp (FL, GA, NC, SC): pineland ponds, clay-based Carolina bays, other seasonally flooded depressions; uncommon. June-September. Se. NC south to s. peninsular FL, west to s. MS (Sorrie & Leonard 1999). See Godfrey & Adams (1964) for additional discussion of this species. [= FNA, GW, K, S, Y; < *S. teres* – RAB, S, misapplied; < *S. graminea* Michaux var. *graminea* – Z]

Sagittaria kurziana Glück, Spring-tape. Cp (FL): spring-runs; rare. Panhandle and n. peninsular FL. [= GW, K, S, WH; = *S. subulata* (Linnaeus) Buchenau var. *kurziana* (Glück) Bogin -- Z]

Sagittaria lancifolia Linnaeus *var.* ***lancifolia***. Cp (FL, GA, SC): marshes, swamps; uncommon (rare in GA and SC). May-June. E. SC south to s. FL, west to FL Panhandle; West Indies; n. South America. [= C; = *S. lancifolia* – RAB; = *S. lancifolia* ssp. *lancifolia* – FNA, GW, K, WH, Z; > *S. angustifolia* Lindley – S; > *S. lancifolia* – S, in a narrow sense]

Sagittaria lancifolia Linnaeus *var.* ***media*** Micheli. Cp (FL, GA, NC, SC, VA): freshwater to brackish tidal marshes, ditches; common (uncommon in FL). June-October. S. DE south to ne. FL, FL Panhandle, west to TX; scattered in Central America. If recognized as a species, this taxon is *S. falcata*. [= C; = *S. falcata* Pursh – RAB, F, G, S; = *S. lancifolia* ssp. *media* (Micheli) Bogin – FNA, GW, K, WH, Z]

Sagittaria latifolia Willdenow *var.* ***latifolia***. July-October. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): marshes, swamps, farm ponds, ditches, bogs; common. June-September. Nova Scotia west to British Columbia, south to tropical America (rare in the Appalachian region). In addition to the pubescence difference, var. *latifolia* and var. *pubescens* can be separated by the presence (var. *latifolia*) or absence (var. *pubescens*) of resin-ducts on the achene-faces. [= C, G, GW, W, Z; > *S. latifolia* var. *latifolia* – RAB, F; > *S. latifolia* var. *obtusa* (Engelmann) Wiegand – RAB, F; > *S. planipes* Fernald – F; < *S. latifolia* – FNA, K, WH; > *S. latifolia* – S; > *S. ornithorhyncha* Small – S; > *S. latifolia* – WV]

Sagittaria latifolia Willdenow *var.* ***pubescens*** (Muhlenberg ex Nuttall) J.G. Smith. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): bogs, marshes; common (uncommon in FL). July-October. C. PA, OH, and TN, south to n. FL and e. TX, primarily in the Appalachians. [= RAB, C, F, G, GW, W, Z; < *S. latifolia* – FNA, K, WH; = *S. pubescens* Muhlenberg ex Nuttall – S, WV]

Sagittaria macrocarpa J.G. Smith. Cp (NC, SC): beaverponds, old millponds; rare. Apparently endemic to the Coastal Plain of the Carolinas; potentially to be expected in e. GA. See Sorrie, Keener, & Edwards (2007) for detailed discussion. [< *S. graminea* Michaux var. *macrocarpa* (J.G. Smith) Bogin – Z, misapplied] {not yet keyed}

* ***Sagittaria montevidensis*** Chamisso & Schlechtendahl. Cp (FL, GA, NC, SC): disturbed areas, marshes; rare, native of South America. July. Most of the collections from the southeastern United States are old collections around major seaports, suggesting that this plant was introduced on the ballast of sailing ships. [= RAB, K, S, WH; = *S. montevidensis* ssp. *montevidensis* – FNA, GW, Z]

Sagittaria platyphylla (Engelmann) J.G. Smith. Cp (FL, GA, SC, VA), Pd (NC): marshes, ditches, farm ponds; rare, perhaps introduced from the s. Midwest. June. The distribution of this species is primarily in the Mississippi drainage; occurrences east of the Appalachians may be introduced, either by humans or by waterfowl. First reported for VA by Wieboldt et al. (1998). Known from numerous counties in sc. GA (Jones & Coile 1988). [= F, FNA, K, WH, Y; = *S. graminea* Michaux var. *platyphylla* Engelmann – RAB, G, Z; > *S. platyphylla* – S; > *S. mohrii* J.G. Smith – S]

Sagittaria rigida Pursh, Sessile-fruited Arrowhead. Mt (VA): mountain ponds, wet meadows; rare (VA Rare). July-October. ME and MN, south to w. VA, nc. TN, MO, and NE. [= C, F, FNA, G, K, S, W, WV, Y, Z]

Sagittaria secundifolia Kral, Little River Water-plantain. Mt (AL, GA): crevices in sandstone bedrock in streambeds; rare (US Threatened, GA Threatened). Nw. GA and nc. AL. See Kral (1982) and Threlkeld & Soehren (2003) for additional information. [= FNA, K]

Sagittaria spatulata (J.G. Smith) Buchenau. Cp (NC, VA): tidal marshes; uncommon (NC Watch List, VA Rare). May-September. New Brunswick south to e. NC along the coast. [= C, G; > *Lophotocarpus spongiosus* (Engelmann) J.G. Smith – F; > *S. calycina* var. *spongiosa* Engelmann – K, WH; > *S. montevidensis* Chamisso & Schlechtendahl ssp. *spongiosa* (Engelmann) Bogin – FNA, Z]

Sagittaria subulata (Linnaeus) Buchenau. Cp (FL, GA, NC, SC, VA): tidal marshes and mud flats; uncommon. May-September. MA and NY south to n. peninsular FL and AL. [= FNA, GW, K, S, WH; = *S. subulata* var. *subulata* – RAB, G, Z; < *S. subulata* – C, in part (also see *S. stagnorum*); > *S. subulata* var. *subulata* – F; > *S. subulata* var. *natans* (Michaux) J.G. Smith – F]

Sagittaria weatherbiana Fernald. Cp (FL, GA, NC, SC, VA): fresh to brackish marshes, streambanks, pineland pools; uncommon (rare in FL). April-June. Se. VA south to Panhandle FL. Isozyme studies by Hauber & Legé (1999) provide evidence that this taxon should be given species status; its genetic identity with var. *graminea* is low, and comparable to the difference between *S. graminea* (in the narrow sense) and *S. platyphylla*. [= F; = *S. graminea* Michaux var. *weatherbiana* (Fernald) Bogin – RAB, C, G, GW, K, WH, Y, Z; = *S. graminea* Michaux ssp. *weatherbiana* (Fernald) R.R. Haynes & C.B. Hellquist – FNA]

Sagittaria teres S. Watson. Ponds. MA south to DE and NJ. [= C, F, FNA, G, K; = *S. graminea* Michaux var. *teres* (S. Watson) Bogin – Z]

ALLIACEAE J. Agardh 1858 (Onion Family)

References: Fay & Chase (1996); Rahn in Kubitzki (1998a).

1 Inflorescence a solitary flower; flowers blue, lavender, or white; fresh plant with an onion odor; [subfamily *Gillesioideae*] ..... ***Tristagma***
1 Inflorescence an umbel; flowers white, greenish white, cream, pink, or magenta-purple; fresh plant with or without an onion odor.
  2 Tepals 2-9 mm long; ovary 3-celled, each with 1-2 ovules; fresh plant with an onion odor; [subfamily *Allioideae*] ..... ***Allium***
  2 Tepals 10-15 mm long; ovary 3-celled, each with 6-10 ovules; fresh plant usually without an onion odor; [subfamily *Gillesioideae*] ..... ***Nothoscordum***

Allium Linnaeus 1753 (Onion, Garlic, Leek, Ramps, Chives)

A genus of 500-700 species, herbs, of Eurasia, n. Africa, and North America (especially diverse in c. Asia). References: Mathew (1996)=Z; Rahn in Kubitzki (1998a); McNeal & Jacobsen in FNA (2002a). [also see *Nothoscordum*]

1 Leaves appearing before the flowers and withering before anthesis; leaves lanceolate to elliptic (the margins not parallel for most of the length), mostly > 2 cm wide; [subgenus *Rhizirideum*].
  2 Leaves (1.5-) 2-4 (-4.5) cm wide, without a distinct petiolar base, the basal portion white; flowers (6-) 10-18 (-25) per umbel (fruits often fewer by abortion); spathe bracts 1-2 cm long; fruiting pedicels (8-) 10-15 (-18) mm long ..... ***A. burdickii***
  2 Leaves (3-) 5-8 (-9) cm wide, with a distinct petiolar base, the petioles usually red or pink; flowers (15-) 30-55 (-63) per umbel (fruits often fewer by abortion); spathe bracts 2-3 cm long; fruiting pedicels (10-) 15-25 (-30) mm long ..... ***A. tricoccum***
1 Leaves present at flowering; leaves linear (the margins parallel for most of the length), mostly < 2 cm wide.
  3 Leaves cylindric (round or channeled-indented in cross section), hollow.
    4 Stem stout, usually > 10 mm in diameter; peduncles with a distinct swollen portion ..... ***A. cepa***
    4 Stem slender, < 5 mm in diameter; peduncles without a distinct swollen portion; [subgenus *Allium*] ..... ***A. vineale***
  3 Leaves variously flattened or keeled (flat or V-shaped in cross section), not hollow.
    5 Stem leafy for half its length; leaves 1.5-4.5 cm wide; [subgenus *Allium*].
      6 Inflorescence of flowers only ..... ***A. ampeloprasum***
      6 Inflorescence of flowers and bulblets ..... ***A. sativum***
    5 Stem scapose, leafy only at its base; leaves < 1.4 cm wide; [subgenus *Amerallium*].
      7 Inflorescence erect, the peduncle not bent.
        8 Ovary or capsule crested with projections about 1 mm long; perianth segments acuminate.
          9 Spathe bracts usually 5-nerved; ovary crests contorted, ascending; tepals reflexed; leaves 3-10 mm wide ..... ***A. cuthbertii***
          9 Spathe bracts 1-nerved; ovary crests plane, flattened, spreading; tepals spreading; leaves 1-2 mm wide ..... ***A. speculae***
        8 Ovary or capsule not crested with projections; perianth segments acute.
          10 Inflorescence partly or entirely of bulblets ..... ***A. canadense*** *var.* ***canadense***
          10 Inflorescence entirely of normal flowers ..... ***A. canadense*** *var.* ***mobilense***
      7 Inflorescence nodding, the peduncle bent 30-150 degrees in its uppermost several cm (at least in bud – in *A. stellatum* becoming erect in flower or fruit).
        11 Flowers stellate, the tepals spreading; scape nodding in bud, becoming erect in flower or fruit; bulb ovoid ..... ***[A. stellatum]***
        11 Flowers urceolate, campanulate, to nearly rotate, the tepals strongly to slightly incurved; scape nodding in bud, flower, and fruit; bulb elongate.
          12 Perianth urceolate, deep magenta-purple; sepals obtuse; [plants of moderate to high elevations in the Mountains] ..... ***A. allegheniense***
          12 Perianth campanulate to nearly rotate, pink, pale pink, or nearly white; sepals acute (obtuse in *A. oxyphilum*); [of moderate to low elevations in the Mountains, Piedmont, and Coastal Plain].
            13 Plants flowering late August-early October; petals 6-9 mm long, pale pink to nearly white; leaves moderately to strongly keeled in cross section (the angle between the two lower flat faces generally 90-135 degrees), 4-12 mm wide; [of calcareous wet savannas of the outer Coastal Plain] ..... ***A. species 1***
            13 Plants flowering June-early August; petals 5-6.5 mm long, pink to pale pink (white to greenish white in *A. oxyphilum*); leaves rounded to moderately keeled in cross section (if keeled, the angle between the two lower flat faces generally 120-165 degrees), 2-8 mm wide; [of the Piedmont and Mountains].
              14 Pedicels relatively stout, 1.6-3 cm long; petals pink or pale pink (sometimes nearly white); plants flowering June to early August; [widespread in our area, on moderately to strongly calcareous substrates] ..... ***A. cernuum***
              14 Pedicels relatively slender, 2-4 cm long; petals greenish white to white; plants flowering August; [of barrens developed over strongly acid shales in e. WV] ..... ***A. oxyphilum***

Allium allegheniense Small, Allegheny Onion. Mt (NC, VA): in thin soils around outcrops, generally of mafic rocks (such as amphibolite or hornblende gneiss) or calcareous rocks, primarily at moderate to fairly high elevations (1000-1600m); uncommon (VA Watch List). July-early September; August-October. Known from w. NC, w. VA, and e. WV, possibly more widespread. Although not recognized by most recent authors, *A. allegheniense* seems distinctive enough in morphology, ecology, and distribution to warrant taxonomic recognition at some level. [= K, S; < *A. cernuum* – RAB, C, F, FNA, G, W]

* ***Allium ampeloprasum*** Linnaeus, Wild Leek. Cp, Pd, Mt (NC, SC, VA), {GA}: roadsides and other disturbed areas; rare, native of Eurasia. Late May-early July; July-August. [= RAB, C, F, FNA, G, W, Z; > *A. ampeloprasum* var. *ampeloprasum* – K; > *A. ampeloprasum* var. *atroviolaceum* (Boiss.) Regel – K]

Allium burdickii (Hanes) A.G. Jones, Narrow-leaf Ramps, White Ramps. Mt (NC?, VA): northern hardwood forests, primarily at higher elevations than *A. tricoccum*, perhaps also in cove forests and rich mountain slopes; rare (VA Watch List). June; August. Only recently determined to be a separate taxon, *A. burdickii* is apparently rare in the Southern Appalachians. It blooms about a month earlier than *A. tricoccum*. See Jones (1979) for more details and discussion. Largely sympatric with *A. tricoccum*, it is somewhat more northern and midwestern, ranging from ME west to ND and south to NJ, and in the Mountains to (?) w. VA. All material ascribed to *A. burdickii* in w. NC and e. TN appears to be *A. tricoccum*. [= K, W; = *A. tricoccum* var. *burdickii* Hanes – C, FNA; < *A. tricoccum* – F, G]

Allium canadense Linnaeus *var.* ***canadense***, Wild Onion. Pd (NC, SC, VA), Cp (FL, NC, SC, VA), Mt (NC, SC, VA), {GA}: bottomland forests, pastures, roadsides; common. Mid April-May; late May-June. New Brunswick west to ND, south to c. peninsular FL and TX. Though native, often appearing weedy. [= RAB, C, FNA, K, WH; = *A. canadense* – F, G, S, W]

Allium canadense Linnaeus *var.* ***mobilense*** (Regel) Ownbey. Cp, Pd (SC), {GA, NC}: dry woodlands; uncommon (rare in SC). Mid April-May; Late May-June. S. SC south to ne. FL and Panhandle FL, west to TX. This taxon is perhaps better treated as a distinct species. [= RAB, FNA, K, WH; > *A. microscordion* Small – S; = *A. mutabile* Michaux – F; > *A. arenicola* Small – S; *A. canadense* ssp. *mobilense* (Regel) Traub & Ownbey]

* ***Allium cepa*** Linnaeus, Garden Onion. Cp, Pd, Mt (NC, SC): persisting from gardens, or appearing around compost or trash piles; rare as an escape (commonly grown), native to Eurasia. May-June; July. [= RAB, C, FNA, G; > *A. cepa* var. *cepa* – K]

Allium cernuum Roth, Nodding Onion. Pd, Mt (GA, NC, SC, VA): generally in open woodlands or around outcrops of shale, mafic, or calcareous rocks, in the mountains at low elevations; uncommon (SC Rare). June-early August; August-October. NY, MI, MN, and British Columbia, south to GA and AZ. See discussion of *A. oxyphilum* at end of genus. [= S; < *A. cernuum* – RAB, C, F, FNA, G, W (also see *A. allegheniense* and/or *A. oxyphilum*); > *A. cernuum* var. *cernuum* – K]

Allium cuthbertii Small, Cuthbert's Onion. Pd (GA, NC, SC), Cp (FL, GA, SC): sandhills, granite domes and flatrocks, in NC in thin soils around rock outcrops, receiving nutrient-rich seepage and occurring with many strict calciphiles; uncommon (rare in NC). May-June; June-July. The bright emerald green ovary of the fresh flowers is striking and distinctive. Two morphological forms occur in our area, probably warranting taxonomic recognition. Typical *A. cuthbertii* occurs on xeric Coastal Plain sands from c. SC south through GA and AL to ne. FL; the perianth is white and the plants 1.5-3.5 dm tall. In NC, a peculiar form of *A. cuthbertii* is apparently limited to a series of unusual granitic domes in the Brushy Mountains of Alexander and Wilkes counties; these plants are more robust (4-8 dm tall), and the perianth is always pink. [= RAB, FNA, K, S, W, WH]

Allium oxyphilum Wherry. Mt (VA): shale barrens; rare. Endemic to WV (Greenbrier, Mercer, Monroe, and Summers counties). Although there has been much discussion of its taxonomic status, it is apparently distinct from *A. cernuum*. It should be expected in VA, although the outcrops of suitable shales are quite limited (Bartgis, pers. comm.; Wieboldt, pers. comm.). [= K; < *A. cernuum* – C, F, FNA, G, W]

* ***Allium sativum*** Linnaeus, Garlic. Cp, Pd (SC): gardens, trash heaps, fields; commonly cultivated, rarely occurring as a waif or persistent in gardens. [= C, F, FNA, G, K, Z]

Allium species 1, Savanna Onion. Cp (NC): wet savannas over coquina limestone (marl); rare (NC Rare). Late August-early October; late September-November. This remarkable Coastal Plain relative of *A. cernuum* was first discovered in 1981 by Steve Leonard in Pender County; it has since been found in similar sites in Onslow and Brunswick counties, always associated with other endemic species of primarily montane genera, such as *Thalictrum cooleyi* and *Parnassia caroliniana*. It appears to warrant taxonomic status.

Allium speculae Ownbey & Aase, Flatrock Onion. Pd (GA): seepy edges of vegetation mats on Lithonia granitic gneiss (and on sandstone in ne. AL); rare (GA Threatened). May-June; mid June-mid July. Endemic to wc. GA and ne. AL. See Patrick, Allison & Krakow (1995) for additional information. [= FNA, K]

Allium tricoccum Aiton, Ramps, Red Ramps, Wild Leek, Rampscallions. Mt (GA, NC, VA): cove forests and mesic slope forests; common. June-July: August-September. See *A. burdickii* for a discussion of the two species of ramps. Nova Scotia and ND south to n. GA, n. AL, and MO. [= RAB, K, W; < *A. tricoccum* – F, G (also see *A. burdickii*); = *A. tricocum* var. *tricoccum* – C, FNA; = *Validallium tricoccum* (Aiton) Small – S]

* ***Allium vineale*** Linnaeus, Field Garlic. Pd, Cp, Mt (GA, NC, SC, VA): lawns, pastures, other disturbed places; common, native of Eurasia. Late May-June; June-August. This is the common weed, often known as "onion grass". [= RAB, C, F, FNA, G, S, W; > *A. vineale* ssp. *vineale* – K; > *A. vineale* var. *vineale* – Z; > *A. vineale* var. *capsuliferum* Koch – Z; > *A. vineale* var. *compactum* (Thuill.) Coss. – Z]

Allium neapolitanum Cirillo, White Garlic. Cp (FL): disturbed areas; rare, native of Europe. [= WH] {not yet keyed; add to synonymy; nomenclatural confusion re *Nothoscordum*, etc.}

Allium stellatum Nuttall ex Ker-Gawler occurs east to c. TN. [= C, F, FNA, G, K]

Other members of the genus are widely cultivated for food, spice, or ornament; some may escape or persist. Some of the more familiar are *A. porrum* Linnaeus (Leek), *A. oleraceum* Linnaeus (Field Garlic), and *A. schoenoprasum* Linnaeus (Chives), introduced from Eurasia.

Nothoscordum Kunth 1843 (Grace Garlic, False Garlic)

A genus of about 25 species, herbs, of the Americas (primarily South America). References: Rahn in Kubitzki (1998a)=Z; Jacobsen & McNeal in FNA (2002a).

1 Leaves 1-4 mm wide; flowers 17 or fewer per umbel; flowers fragrant ..... ***N. bivalve***
1 Leaves 4-12 mm wide; flowers 15 or more per umbel; flowers not fragrant ..... ***N. gracile***

Nothoscordum bivalve (Linnaeus) Britton, Grace Garlic, False Garlic. Cp, Pd (GA, NC, SC, VA), Mt (GA): around granite flatrocks, in glades and barrens of various kinds, in open woodlands, and also weedy in fields and along roadsides; common (VA Rare). Mid March-mid May, and again in September-October; May-June, and again in October-November. Se. VA west to s. OH and KS, south to c. peninsular FL, TX, and South America. An onion-like plant, but generally lacking the odor of onion. [= C, F, G, K, S, W, WH, Z; = *Allium bivalve* (Linnaeus) Kuntze – RAB]

* ***Nothoscordum gracile*** (Aiton) Stearn. Cp (FL, GA, SC): disturbed areas; rare, native of South America. [= FNA, K; = *Nothoscordum borbonicum* Kunth – WH, Z, misapplied?; = *Allium inodorum* Aiton – RAB; = *N. fragrans* (Ventenat) Kunth – S]

Tristagma Poepp. (Star-of-Bethlehem)

A genus of 3 species, herbs, of South America. References: Rahn in Kubitzki (1998a).

* ***Tristagma uniflorum*** (Graham) Traub, Star-of-Bethlehem. Cp (GA, NC, SC, VA), Pd (NC, SC, VA): commonly cultivated, escaping to lawns, suburban woodlands, bottomlands, disturbed places; rare, native of South America. March-April. Reported for South Carolina by Hill & Horn (1997). [= K; = *Ipheion uniflorum* (Graham) Rafinesque – RAB]

ALSTROEMERIACEAE Dumortier 1829 (Peruvian-lily Family)

Alstroemeria

A genus of about 60 species, perennials, of South America. References: Holmes in FNA (2002a).

* ***Alstroemeria pulchella*** Linnaeus f., Peruvian-lily. Cp (FL, GA): disturbed areas, roadsides near plantings; rare, native of Brazil. Naturalized in GA, FL, AL, MS, LA, and TX (Holmes in FNA 2002; Singhurst, Keith, & Holmes 2005). [= FNA, WH]

AMARYLLIDACEAE J. St. Hilaire 1805 (Amaryllis Family)

A family of about 59 genera and 850 species, nearly cosmopolitan (especially diverse in the tropics). References: Dahlgren, Clifford, & Yeo (1985); Müller-Doblies & Müller-Doblies (1996); Meerow & Snijman in Kubitzki (1998a). [also see *AGAVACEAE* and *HYPOXIDACEAE*]

1 Corona present (a fused tubular or flattened petaloid structure in the center of the flower, above the tepals).
  2 Filaments fused with the corona; corona very membranous in texture, distinctly thinner than the tepals; flowers white; [native, of riverine or tidal shores and marshes]; [tribe *Hymenocallideae*, subtribe *Hymenocallidinae*] ..... ***Hymenocallis***
  2 Filaments not fused with the corona; corona membranous in texture, but similar to the tepals (in texture, though sometimes of a different color); flowers usually at least partly yellow or orange (sometimes purely white); [alien, naturalized in primarily upland and disturbed habitats]; [tribe *Narcisseae*, subtribe *Narcissinae*] ..... ***Narcissus***
1 Corona absent.
  3 Flowers red; stamens about 2× as long as the tepals; [tribe *Lycoridae*] ..... ***Lycoris***
  3 Flowers white, yellow, or white-pink; stamens shorter than or about as long as the tepals.
    4 Flowers yellow; [tribe *Narcisseae*, subtribe *Narcissinae*] ..... ***Sternbergia***
    4 Flowers white or white-pink.
      5 Tepals 3-16 cm long, white or sometimes white-pink.
        6 Tepals spreading, separate, the perianth rotate; inflorescence a several-flowered umbel terminating the stem; leaves arranged spirally; leaf margins finely toothed; [tribe *Amaryllideae*, subtribe *Crininae*] ..... ***Crinum***
        6 Tepals ascending, overlapping, the perianth tubular; inflorescence of a single flower; leaves arranged distichously; leaf margins smooth; [tribe *Hippeastreae*; subtribe *Zephyranthinae*] ..... ***Zephyranthes***
      5 Tepals 0.4-2.5 cm long, white, with small green or yellow spots; [tribe *Narcisseae*, subtribe *Galanthinae*].
        7 Inner 3 tepals distinctly shorter and blunter than the outer 3 tepals ..... ***Galanthus***
        7 Inner 3 tepals and outer 3 tepals of similar size and shape ..... ***Leucojum***

Crinum Linnaeus 1753 (Swamp Lily, String Lily)

A genus of about 65 species, pantropical, extending locally into warm temperate regions. References: Holmes in FNA (2002a); Meerow & Snijman in Kubitzki (1998a).

Identification notes: *Crinum* can be distinguished vegetatively from *Hymenocallis* by its spiral (vs. distichous) leaf arrangement and leaf margins finely toothed (vs. entire).

1 Flowers sessile; umbels 2-7-floweredl sepals and petals shorter than the tube ..... ***C. americanum***
1 Flowers pedicellate; umbels 8-13-flowered; sepals and petals longer than the tube ..... ***C. bulbispermum***

Crinum americanum Linnaeus, Swamp Lily, String Lily. Cp (GA, NC, SC): swamp forests; rare (NC Rare). June-October. Se. NC south to s. FL and west to TX. [= GW, K, S; *C. americanum* var. *americanum* – FNA]

* ***Crinum bulbispermum*** (Burman f.) Milne-Redhead & Schweickerdt. Cp (GA?, NC, SC): commonly cultivated, occasional in waste areas; rare, introduced. June-July. [= FNA, K; *C. longifolium* (Linnaeus) Thunberg – S]

Galanthus Linnaeus 1753 (Snowdrop)

A genus of about 17 species, of Europe and w. Asia. See Bishop, Davis, & Grimshaw (2001) for detailed information on the genus, especially on cultivars. References: Stace (1997)=Z; Straley & Utech in FNA (2002a); Bishop, Davis, & Grimshaw (2001); Meerow & Snijman in Kubitzki (1998a).

1 Leaves inrolled as they unfold, at least one leaf > 1 cm wide at flowering; inner tepals with green blotch at base and apex; [series *Latifolii*] ..... ***[G. elwesii]***
1 Leaves flat as they unfold, all leaves <1 cm wide at flowering; inner tepals with green blotch at apex only; [series *Galanthus*] ..... ***G. nivalis***

* ***Galanthus nivalis*** Linnaeus, Snowdrop. Pd (NC, VA): persistent after cultivation; rare, native of s. and c. Europe. February-March. [= F, FNA, K, Z]

* *Galanthus elwesii* Hooker f., Giant Snowdrop, Greater Snowdrop, is reported as cultivated and rarely naturalized in PA (Rhoads & Klein 1993). It is native of the eastern Meditteranean. [= FNA, Z; = *G. elewesii* – K, orthographic error]

Hymenocallis Salisbury 1812 (Spider-lily)

A genus of about 50 species, from s. North America and the West Indies south to ne. South America. The appropriate systematics and nomenclature of *Hymenocallis* in se. United States are still unstable and uncertain. Recent publications by Smith and co-workers (e.g. Smith & Garland 1996, 2003; Smith & Flory 1990; Smith & Flory in FNA (2002a) have greatly improved our understanding of southeastern United States *Hymenocallis*. References: Smith & Garland (2003)=Z; Meerow & Snijman in Kubitzki (1998a); Smith & Flory in FNA (2002a). Key adapted from on Smith & Flory in FNA (2002a).

Identification notes: *Hymenocallis* can be distinguished vegetatively from *Crinum* by its distichous (vs. spiral) leaf arrangement and leaf margins entire (vs. finely toothed).

1 Staminal cup >4.5 cm long; [of rocky river shoals of the Piedmont] ..... ***H. coronaria***
1 Staminal cup <4.5 cm long; [of the Coastal Plain, Piedmont floodplains, and the GA Ridge and Valley].
  2 Leaves oblanceolate, distinctly wider toward the tip.
    3 Leaves coriaceous, not glaucous; scape bracts 3-4 (-6) cm long, the tip acute; bulbs rhizomatous; [of wet habitats] ..... ***H. choctawensis***
    3 Leaves not coriaceous, distinctly glaucous; scape bracts 4-7 cm long, the tip long-acuminate; bulbs rhizomatous; [of moist but not mucky habitats] ..... ***H. occidentalis var. occidentalis***
  2 Leaves liguliform, not wider toward the tip, the margins parallel throughout.
    4 Staminal cups rotate at full anthesis; leaves chiefly arching low, often appearing prostrate; [of s. GA south into FL] ..... ***H. duvalensis***
    4 Staminal cups funnelform at full anthesis but gradually spreading in time; leaves suberect to erect; [of se. NC south to FL].
      5 Perianth segments (6-) 7-11.5 cm long; leaves 3-7 dm long ..... ***H. crassifolia***
      5 Perianth segments 5.0-6.5 cm long; leaves 1.5-2.5 dm long ..... ***H. pygmaea***

Hymenocallis choctawensis Traub, Florida Panhandle Spiderlily, Choctaw Spiderlily. Cp (GA): floodplains; rare (GA Watch List). GA (floodplain of the Ochlockonee River) and FL west to LA. [= FNA, K, Z; < *Hymenocallis sp. ?* – GW]

Hymenocallis coronaria (LeConte) Kunth, Shoals Spiderlily, Cahaba Lily. Pd (GA, SC): rocky river shoals, usually with *Justicia americana* and *Podostemum ceratophyllum*; rare (GA Endangered). Mid May-July; July-September. SC south and west to AL. Notable stands of this spectacular plant occur at Landsford Canal State Park (on the Catawba River south of Rock Hill, SC), on the Saluda River (SC), on the Savannah River below I-20 (GA-SC border), and on the Cahaba River (Bibb County, AL). [= FNA, Z; *? H. occidentalis* (Le Conte) Kunth – RAB, S, misapplied; < *Hymenocallis sp. ?* – GW; *? H. caroliniana* (Linnaeus) Herbert – K, misapplied]

Hymenocallis crassifolia Herbert. Cp (GA, NC, SC): tidal marshes, margins of tidal guts, banks of blackwater rivers; common. May-June; June-July. Se. NC south to ne. FL. [= RAB, FNA, S, Z; < *Hymenocallis sp. ?* – GW; *? H. floridana* (Rafinesque) Morton – K, misapplied]

Hymenocallis duvalensis Traub, Dixie Spiderlily, Duval Spiderlily. Cp (GA): blackwater floodplain (Suwanee River); rare (GA Watch List). S. GA (floodplain of the Suwanee River) south to n. FL. [= FNA, K, Z; < *Hymenocallis sp. ?* – GW]

Hymenocallis occidentalis (LeConte) Kunth *var.* ***occidentalis***, Hammock Spiderlily, Woodland Spiderlily. Cp (GA, SC), Pd (GA, NC), Mt (GA, NC?): mesic soils of slopes and floodplain forests, gabbro glades and other calcareous upland flats; uncommon. NC west to AR and LA. Var. *eulae* (Shinners) G. Lom. Smith & Flory is endemic in the West Gulf Coastal Plain. [= FNA, Z; < *Hymenocallis sp. ?* – GW; < *H. occidentalis* – S; *H. caroliniana* (Linnaeus) Herbert – K, misapplied]

Hymenocallis pygmaea Traub, Pygmy Spiderlily, Waccamaw Spiderlily. Cp (NC, SC): banks of blackwater rivers; rare. May-June; June-July. Se. NC south to ne. SC, perhaps endemic to the Waccamaw River drainage. Needing further study, but strikingly different in appearance from *H. crassifolia*. [= FNA, Z; < *Hymenocallis sp. ?* – GW; < *H. palmeri* S. Watson – K]

Hymenocallis franklinensis G. Lom. Smith, L.C. Anderson, and Flory, Cow Creek Spiderlily. Endemic to Franklin and Wakulla counties in the FL Panhandle. [= FNA, Z; < *Hymenocallis sp. ?* – GW] {not yet keyed; synonymy incomplete}

Hymenocallis godfreyi G. Lom. Smith & Darst, Godfrey's Spiderlily, St. Marks Marsh Spiderlily. Endemic to Wakulla County in the FL Panhandle. [= FNA, K, Z; < *Hymenocallis sp. ?* – GW] {not yet keyed; synonymy incomplete}

Hymenocallis henryae Traub var. *glaucifolia* J.N. Henry & G. Lom. Smith, Henry's Spiderlily, Green Spiderlily. Endemic to Liberty County in the Panhandle of FL. [= FNA, Z; < *Hymenocallis sp. ?* – GW; < *H. henryae* – K] {not yet keyed; synonymy incomplete}

Hymenocallis henryae Traub var. *henryae*, Henry's Spiderlily, Green Spiderlily. Endemic to Bay, Gulf, and Walton counties in the Panhandle of FL. [= FNA, Z; < *Hymenocallis sp. ?* – GW; < *H. henryae* – K] {not yet keyed; synonymy incomplete}

Hymenocallis liriosme (Rafinesque) Shinners, Western Marsh Spiderlily; Louisiana Marsh Spiderlily. From s. AL westward to TX. [= FNA, Z; < *Hymenocallis sp. ?* – GW; > *H. liriosme* – K

Hymenocallis palmeri S. Watson, Alligator-lily. From ne. FL (Bradford and Duval counties) south to s. peninsular FL. [= FNA, Z; < *Hymenocallis sp. ?* – GW; < *H. palmeri* S. Watson – K] {not yet keyed; synonymy incomplete}

Hymenocallis rotata (Ker Gawler) Herbert, Spring-run Spiderlily. Endemic to FL, in the Panhandle (Wakulla County) and n. peninsular FL (Alachua, Columbia, and Duval counties southward to c. peninsular FL). [= FNA, K, Z; < *Hymenocallis sp. ?* – GW] {not yet keyed; synonymy incomplete}

Leucojum Linnaeus 1753 (Snowflake)

A genus of about 10 species, of Europe, n. Africa, and w. Asia. References: Straley & Utech in FNA (2002a); Meerow & Snijman in Kubitzki (1998a).

* ***Leucojum aestivum*** Linnaeus, Snowflake. Cp (NC, SC, VA), Pd (VA): persistent after cultivation; rare, native of Europe. March-April. Reported naturalized in NC by Leonard (1971b). [= RAB, C, F, FNA, G; > *L. aestivum* ssp. *aestivum* – K]

Lycoris Herbert 1819 (Magic Lily)

A genus of about 20 species, primarily e. Asian. References: Meerow & Snijman in Kubitzki (1998a).

* ***Lycoris radiata*** (L'Héritier) Herbert, Magic Lily, Surprise Lily, Hurricane Lily. Pd, Cp (NC, SC), Mt (NC): frequently cultivated, sometimes persistent for long periods of time, especially in lawns around older homes; rare, native of e. Asia. September-October. Leaves and flowers are not present at the same time. Reported as "established as waifs over past decade in lawn" in Jackson County, NC by Pittillo & Brown (1988). [= RAB, K]

Narcissus Linnaeus 1753 (Daffodil, Jonquil, Narcissus, Buttercup)

A genus of about 40-60 species, of Europe, n. Africa, and w. Asia. References: Stace (1997)=Z; Jefferson-Brown (1991)=Y; Straley & Utech in FNA (2002a); Hanks (2002); Jefferson-Brown (1969); Meerow & Snijman in Kubitzki (1998a).

Identification notes: The familiar flower consists of 6 tepals spreading in more or less a plane, and a fused, tubular, corona. The hypanthial tube is below the perianth lobes.

1 Perianth lobes 10-15 mm long; corona 3-5 mm long; leaves and stems cylindrical, hollow; umbel (or spathe, or stem) with 3-10 flowers ..... ***N. jonquilla***
1 Perianth lobes 20-50 mm long; corona 5-50 mm long; leaves and stems flattened, solid; umbel (or spathe, or stem) with 1-4 flowers.
  2 Hypanthial tube (below the tepals) parallel-sided (though sometimes suddenly expanded at its apex); corona < 10 mm long, usually wider than high; corona < 0.5× as long as the perianth lobes; corona rarely undulate; umbel (or spathe, or stem) with 1-10 flowers.
    3 Corona of a single color, all white or yellow; umbel (or spathe, or stem) with (1-) 2 (-3) flowers..... ***N. ×medioluteus***
    3 Corona rim red, contrasting with the white or yellow corona; umbel (or spathe, or stem) with 1 flower..... ***N. poeticus***
  2 Hypanthial tube (below the tepals) distinctly widening toward its apex; corona usually > 10 mm long, usually as long as wide or longer than wide; corona > 0.5× as long as the perianth lobes; corona margin undulate; umbel (or spathe, or stem) with 1 flower.
    4 Tepals linear to lanceolate, < 5 mm wide ..... ***N. bulbocodium***
    4 Tepals ovate, triangular-ovate, or suborbicular, > 10 mm wide.
      5 Corona 10-25 mm long, distinctly shorter than the perianth lobes..... ***N. ×incomparabilis***
      5 Corona 30-50 mm long, about as long as the perianth lobes ..... ***N. pseudonarcissus***

* ***Narcissus bulbocodium*** Linnaeus, Hoop-petticoat Daffodil. Cp (NC): grassy roadsides, established; rare, native of Eurasia. March. [= Y, Z]

* ***Narcissus ×incomparabilis*** P. Miller (pro sp.) [*poeticus* × *pseudonarcissus*], Nonesuch Daffodil. Cp, Pd (GA, NC, SC, VA): cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; common, native of Europe. March-April. [= C, K, Z; = *N. incomparabilis* – RAB, F, G]

* ***Narcissus jonquilla*** Linnaeus, Jonquil. Cp (GA, NC, SC): cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; uncommon, native of Europe. March-April. [= RAB, C, F, FNA, G, K, Z]

* ***Narcissus ×medioluteus*** P. Miller (pro sp.) [*poeticus* × *tazetta*], Primrose-peerless. Cp, Pd, Mt (NC, SC, VA): cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; common, native of Europe. March-May. [= K, Z; = *N. tazetta* × *poeticus* – RAB]

* ***Narcissus poeticus*** Linnaeus, Poet's Narcissus, Pheasant's-eye Daffodil. Cp, Pd, Mt (GA, NC, SC, VA): cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; common, native of Europe. March-May. [= RAB, C, F, FNA, G, K, Z]

* ***Narcissus pseudonarcissus*** Linnaeus, Daffodil, Buttercup. Cp, Pd, Mt (GA, NC, SC, VA): cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; common, native of Europe. February-April. [= RAB, C, FNA, K, Z; = *N. pseudo-narcissus* – F, G, orthographic variant]

Other taxa are under cultivation and may be expected as persistent or escaped in our area. Manuals of cultivated plants and the extensive horticultural literature on *Narcissus* (such as the references listed above) should be consulted by those interested in more information on members of this genus.

Sternbergia Waldst. & Kit. 1805 (Winter Daffodil)

A genus of about 8 species, of Mediterranean Europe, n. Africa, and w. Asia. References: Meerow & Snijman in Kubitzki (1998a).

* ***Sternbergia lutea*** (Linnaeus) Ker-Gawler ex Sprengel, Winter Daffodil. Cp (VA): cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; rare, native of Europe. This species has yellow, *Crocus*-like flowers, in the autumn. [= K]

Zephyranthes Herbert 1821 (Atamasco-lily, Zephyr-lily, Rain-lily)

A genus of about 50 species, from s. North America and the West Indies south to s. South America. References: Flagg, Smith, & Flory in FNA (2002a); Meerow & Snijman in Kubitzki (1998a).

1 Flowers (from base of ovary to apex of perianth) 3-5 cm long; stamens 1.5-2.5 cm long; stigma 1, 3-lobed; [introduced species, escaped from cultivation]..... ***Z. candida***
1 Flowers 6-10 cm long; stamens 4.5-8 cm long; stigmas 3; [native species, sometimes also cultivated].
  2 Style and stigma as long as or shorter than the anthers; perianth segments erect-ascending at full anthesis, mostly 3-6 cm long..... ***Z. simpsonii***
  2 Style and stigmas extending beyond the anthers; perianth segments spreading at full anthesis, mostly 5-8 cm long.
    3 Mature leaves concave, 3-8 mm wide; perianth tube usually <2.3 cm long; filaments > 1.5× as long as the perianth tube..... ***Z. atamasca***
    3 Mature leaves grooved, 1-4 mm wide; perianth tube usually >2.3 cm long; filaments < 1.5× as long as the perianth tube..... ***Z. treatiae***

Zephyranthes atamasca (Linnaeus) Herbert, Common Atamasco-lily. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC): bottomland forests and adjacent road shoulders, wet meadows; common (rare in VA Piedmont, rare in Mountains, rare in FL). Late March-April; May-June. Se. and sc. VA south to n. FL, west to s. MS. [= FNA; = *Z. atamasco* – RAB, C, F, G, GW, orthographic variant; = *Zephyranthes atamasca* var. *atamasca* – K, WH; = *Atamosco atamasco* (Linnaeus) Greene – S, orthographic variant]

* ***Zephyranthes candida*** (Lindley) Herbert. Cp (FL, GA, NC, SC): cultivated, persistent or spreading from cultivation; rare, native of South America. Late September-October. [= RAB, FNA, K, WH; = *Atamosco candida* (Lindley) Small – S]

Zephyranthes simpsonii Chapman, Florida Atamasco-lily. Cp (GA, NC, SC): dry to dry-mesic sandy soils (usually with admixture of shell hash) of coastal fringe sandhills or mainland maritime forests, usually associated with *Quercus hemispherica*, on barrier islands or within about 10 km of the ocean (NC, SC), pine flatwoods (GA); rare (GA Special Concern, NC Rare). April-May; May-June. Se. NC (Brunswick and Columbus counties) and ne. SC (Horry and Georgetown counties); s. GA, c. and s. peninsular FL. The disjunct populations in NC and SC may differ from *Z. simpsonii* (sensu stricto) of s. GA and c. and s. peninsular FL, and need additional study. [= RAB, FNA, GW, K; = *Atamosco simpsonii* (Chapman) Greene – S]

Zephyranthes treatiae S. Watson. Cp (FL, GA): wet savannas; uncommon. January-April. S. GA (Jones & Coile 1998) south to c. peninsular FL. [= FNA, GW; = *Z. atamasca* (Linnaeus) Herbert var. *treatiae* (S. Watson) Meerow – K, WH; = *Atamasco treatiae* (S. Watson) Greene – S]

ARACEAE A.L de Jussieu 1789 (Arum Family)

A family of about 100-110 genera and about 4000 species, herbs and reduced aquatic herbs, cosmopolitan, but mostly tropical and subtropical. The Lemnaceae is phylogenetically embedded in the Araceae, and is here included in it as subfamily Lemnoideae (Angiosperm Phylogeny Group 1998, 2003; Keating 2004). References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b); Keating (2004); Serviss, McDaniel, & Bryson (2000); Landolt in FNA (2000); Landolt (1980); Landolt (1986); Landolt in Kubitzki (1998b); Les & Crawford (1999); Bown (2000). [includinjg *LEMNACEAE*; also see *ACORACEAE*]

1 Plant a floating aquatic (or stranded), the individual leaves <2 cm long; [subfamily *Lemnoideae*].
  2 Fronds rootless; fronds without nerves; reproductive pouch 1, terminal.
    3 Fronds thick, globoid, < 2 mm long..... ***Wolffia***
    3 Fronds flat, elongate and curved, 4-14 mm long..... ***Wolffiella***
  2 Fronds with roots; fronds with 1 or more nerves; reproductive pouches 2, lateral.
    4 Roots 1 per frond; fronds with 1-5 (-7) nerves..... ***Lemna***
    4 Roots (1-) 2-21 per frond; fronds with (3-) 5-21 nerves.
      5 Roots (1-) 2-7 (-12) per frond; fronds with (3-) 5-7 nerves; fronds 1.5-3× as long as wide; all of the roots perforating the scalelike leaflet..... ***Landoltia***
      5 Roots 7-21 per frond; fronds with 7-16 (-21) nerves; fronds 1-1.5× as long as wide; only some of the roots perforating the scalelike leaflet (borne on the underside)..... ***Spirodela***
1 Plant terrestrial, rooted in wetlands, or a floating aquatic (if a floating aquatic – *Pistia* – the individual leaves > 2 cm long).
  6 Plant a floating aquatic, with gray-green, velvety, cabbage-like leaves; [subfamily *Aroideae*, tribe *Pistieae*]..... ***Pistia***
  6 Plant rooted (even when growing in water), the leaves various, but not as above.
    7 Leaves compound; [subfamily *Aroideae*, tribe *Arisaemateae*].

8 Bulblets lacking on the petiole; spadix free from the spathe; [native, common in our area] ..... ***Arisaema***
8 Bulblets present at base and summit of the petiole; spadix fused to the spadix; [alien, rare] ..... ***[Pinellia]***
7 Leaves simple.
9 Leaves peltate and cordate-hastate; [subfamily *Aroideae*, tribe *Colocasieae*] ..... ***Colocasia***
9 Leaves not peltate, either cuneate, rounded, cordate, or hastate.
10 Spathe absent or obscure; leaf blade 2.5-4× as long as wide, cuneate at the base, lanceolate or narrowly elliptic; leaf venation parallel; [subfamily *Orontioideae*, tribe *Orontieae*] ..... ***Orontium***
10 Spathe present, surrounding the spadix, at least at its base; leaf blade 1-2.5× as long as wide, either hastate at the base (*Arum*, *Peltandra*, and *Xanthosoma*), or rounded (*Symplocarpus*), or cordate (*Calla*), broadly ovate in outline.
11 Spathe white; leaves cordate; plants from elongate rhizomes; [subfamily *Calloideae*] ..... ***[Calla]***
11 Spathe green or white; leaves hastate or rounded at base; plants from fibrous roots, a short thick rhizome, tuber, or a corm.
12 Leaves ovate, rounded or subcordate at the base; spathe purple, or purple flecked with white; [subfamily *Orontioideae*, tribe *Symplocarpeae*] ..... ***Symplocarpus***
12 Leaves hastate at the base (somewhat arrowhead-shaped); spathe green or white; [subfamily *Aroideae*].
13 Larger leaf blades > 5 dm long; longer petioles 10-20 dm long; [subfamily *Aroideae*, tribe *Caladieae*] ..... ***Xanthosoma***
13 Larger leaf blades < 5 dm long; longer petioles < 7 dm long.
14 Plant from a horizontal tuber; leaves variegated; [alien, of moist soils]; [subfamily *Aroideae*, tribe *Areae*] ..... ***Arum***
14 Plant from fibrous roots; leaves not variegated; [native, of wetlands]; [subfamily *Aroideae*, tribe *Peltandreae*] ..... ***Peltandra***

Arisaema Martius 1831 (Jack-in-the-pulpit, Indian-turnip)

A genus of about 150-170 species, of Asia, e. North America, e. Africa, and Arabia. Some of the taxa here recognized as subspecies of *A. triphyllum* might better be considered as species with relatively subtle morphological distinctions. They are broadly sympatric, and sometimes occur together in mixed populations with little sign of introgression or hybridization. Ssp. *triphyllum* is tetraploid and does not produce fertile seed when crossed with the other (diploid) subspecies (Treiber 1980). References: Thompson in FNA (2000); Huttleston (1981)=Z; Treiber (1980)=Y; Huttleston (1949)=X; Gusman & Gusman (2002)=Q; Renner, Zhang, & Murata (2004); Mayo, Bogner, & Boyce in Kubitzki (1998b). Key based on the references.

1 Leaf with (5-) 7-15 leaflets, arranged pedately on a semicircular axis; spadix 9-20 cm long, attenuate, long-exserted from the spathe; [section *Tortuosa*] ..... ***A. dracontium***
1 Leaf with 3-5 leaflets, arranged palmately; spadix 3.5-8 cm long, clavate or cylindrical and blunt, included in the spathe; [section *Pedatisecta*].
2 Leaves glaucous beneath at maturity; spathe flange 2-9 mm broad; spathe hood green, or green with purple stripes; sterile spadix (appendix) clavate or cylindrical.
3 Lateral leaflets (of primary leaf if more than one) 2-parted or 2-lobed (rarely unlobed); sterile spadix 1-3 mm in diameter, cylindrical, curved outward; spathe hood green ..... ***A. triphyllum ssp. quinatum***
3 Lateral leaflets (of primary leaf if more than one) undivided (rarely lobed); sterile spadix 4-10 mm in diameter, clavate, straight; spathe hood green, or green striped with purple ..... ***A. triphyllum ssp. triphyllum***
2 Leaves green beneath at maturity (very rarely glaucous); spathe flange 1-3 mm broad; spathe hood green with white stripes, green with purple stripes, solid green, or solid purple; sterile spadix (appendix) cylindrical.
4 Spathe tube not fluted (rarely weakly fluted); spathe hood solid green or solid purple ..... ***A. triphyllum ssp. pusillum***
4 Spathe tube strongly fluted; spathe hood green with white or purple stripes ..... ***A. triphyllum ssp. stewardsonii***

Arisaema dracontium (Linnaeus) Schott, Green Dragon. Pd, Mt, Cp (GA, NC, SC, VA): bottomlands and floodplains; uncommon (rare in Mountains and Coastal Plain). May; July. S. Québec, MI, and WI, south to n. peninsular FL and e. TX. [= RAB, C, F, FNA, G, GW, K, Q, W, WH; = *Muricauda dracontium* (Linnaeus) Small – S]

Arisaema triphyllum (Linnaeus) Schott *ssp.* ***pusillum*** (Peck) Huttleston, Small Jack-in-the-pulpit. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): swamps and moist forests; common. March-May. CT, NY, and IN, south to FL and LA. Widespread in e. North America. This taxon is diploid (2n=28). [= K, X, Z; < *A. triphyllum* – RAB, F, FNA, GW, W, WH; = *A. triphyllum* var. *pusillum* Peck – C, G; > *A. pusillum* (Peck) Nash – S; > *A. acuminatum* Small – S; < *A. triphyllum* ssp. *pusillum* – Q, Y (also see ssp. *quinatum*)]

Arisaema triphyllum (Linnaeus) Schott *ssp.* ***quinatum*** (Nuttall) Huttleston, Southern Jack-in-the-pulpit, Preacher John. Mt, Pd (GA, NC, SC), Cp (FL, GA): mesic forests; uncommon. March-April. Sc. NC, sw. NC, se. TN south to Panhandle FL and e. TX. This taxon is of uncertain validity; Treiber lumps it with ssp. *pusillum*, while Huttleston recognizes it as a full species (Huttleston 1949) or as a ssp. (Huttleston (1981). This taxon is diploid (2n=28). [= K, Z; < *A. triphyllum* – RAB, FNA, W; = *A. quinatum* (Nuttall) Schott – GW, S, WH, X; < *A. triphyllum* ssp. *pusillum* – Q, Y; ? *A. polymorphum* Buckley]

Arisaema triphyllum (Linnaeus) Schott *ssp.* ***stewardsonii*** (Britton) Huttleston, Bog Jack-in-the-pulpit. Mt (NC, VA): bogs and peaty swamps; rare (NC Rare). April-May. Nova Scotia west to MN, south to w. NC, e. TN, and n. IN (Treiber 1980). This subspecies is the most northern, and also has the most distinctive habitat, being restricted to distinctly wet, peaty sites. This taxon is diploid (2n=28). [= K, Q, X, Y, Z; < *A. triphyllum* – RAB, FNA, GW, W; = *A. triphyllum* var. *stewardsonii* (Britton) G.T. Stevens – C, G; = *A. stewardsonii* Britton – F]

Arisaema triphyllum (Linnaeus) Schott *ssp.* ***triphyllum***, Common Jack-in-the-pulpit. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): mesic forests; common. March-April. New Brunswick west to se. Manitoba, south to FL, LA, and e. TX (Treiber 1980). This taxon is tetraploid (2n=56). [= K, Q, X, Y, Z; < *A. triphyllum* – RAB, FNA, GW, W, WH; = *A. triphyllum* var. *triphyllum* – C; > *A. triphyllum* – F; > *A. atrorubens* (Aiton) Blume – F; = *A. triphyllum* – S]

Arum Linnaeus 1753 (Arum)

A genus of about 26 species, of temperate Eurasia. References: Thompson in FNA (2000); Boyce (1993)= Z; Mayo, Bogner, & Boyce in Kubitzki (1998b).

* ***Arum italicum*** Linnaeus *ssp.* ***italicum***, Arum. Pd (NC): suburban woodlands; rare, native of Europe and n. Africa, weakly naturalizing from horticultural use. It has a large (> 10 cm long) white spathe. [= Z; < *A. italicum* – FNA]

Calla Linnaeus 1753 (Calla)

A monotypic genus, of circumboreal distribution. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b).

Calla palustris Linnaeus, Wild Calla, Water-arum, is a circumpolar species of seepage swamps, ranging south in North America to sw. PA, w. MD, n. IL, c. MN, and British Columbia. [= C, F, FNA, G, K]

Colocasia Schott 1832 (Elephant's-ear, Taro, Dasheen)

A genus of about 8 species, of tropical Asia. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b); Serviss, McDaniel, & Bryson (2000)=Z.

* ***Colocasia esculenta*** (Linnaeus) Schott, Elephant's-ear, Taro, Dasheen. Cp (FL, GA, NC, SC): naturalized in ditches or shores; uncommon (rare north of FL), native of the Tropics. Frequently planted for its "tropical" appearance, becoming naturalized, for instance at Lake Waccamaw, Columbus County, NC, where it grows scattered along much of the shoreline, spread by fragments of rhizome. In our area, it is generally infertile. In the Tropics, *Colocasia* is a food crop cultivated for its rhizomes and shoots. The rhizomes are the source of "poi," a starchy staple of the Hawaiian Islands. See Serviss, McDaniel, & Bryson (2000) for a discussion of various varieties cultivated in the southeastern United States, their identification, and their weediness. [= FNA, GW, K, WH; > *C. antiquorum* Schott – S; > *C. esculenta* var. *antiquorum* (Schott) Hubb. & Rehder – Z; > *C. esculenta* var. *esculenta* – Z]

Landoltia D.H. Les & D.J. Crawford

A monotypic genus, now cosmopolitan. References: Landolt in FNA (2000); Landolt (1980)=Z; Landolt (1986)=Y; Landolt in Kubitzki (1998b); Les & Crawford (1999)=X.

* ***Landoltia punctata*** (G.F.W. Meyer) D.H. Les & D.J. Crawford. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; uncommon, native of the Southern Hemisphere. Widespread worldwide. An introduced aquarium plant. Les & Crawford (1999) make a good case for recognition of this species in the monotypic genus *Landoltia*, very possibly more closely related to *Lemna* than to *Spirodela*. [= FNA, X; = *Spirodela punctata* (G.F.W. Meyer) C.H. Thompson – C, GW, K, Y, Z; = *Spirodela oligorrhiza* (Kurz) Hegelmann – RAB, F, G]

Lemna Linnaeus 1753 (Duckweed)

A genus of 13 species, cosmopolitan. References: Landolt (1980)=Z; Landolt (1986)=Y; Landolt in Kubitzki (1998b); Landolt in FNA (2000). Key adapted closely from Landolt (1980, 1986) and Landolt in FNA (2000).

1 Margin of fronds denticulate in the distal portion; fronds narrowed basally to an elongated, persistent, green stalk, the fronds therefore cohering in long, often branched chains of 3-50 fronds; fronds submerged (except when flowering or fruiting); [section *Hydrophylla*] ..... ***L. trisulca***

1 Margin of fronds entire; fronds rounded basally, with a very small white stipe soon decaying, the fronds therefore cohering in simple clusters of 2-5; fronds normally floating.

2 Fronds with (0-) 1 nerve; anthocyanin absent in fronds (fronds green); [section *Uninerves*].

3 Fronds 1-2× as long as wide; nerve indistinct to fairly prominent, reaching at most 2/3 of the distance from node to apex (nerve about as long as or shorter than the aerenchymatous portion of the frond); fruit 0.6-1.0 mm long ..... ***L. minuta***

3 Fronds 1.3-3× as long as wide; nerve mostly prominent, reaching at least 3/4 of the distance from node to apex (nerve longer than the aerenchymatous portion of the frond); fruit 1.0-1.35 mm long ..... ***L. valdiviana***

2 Fronds with 3-5 (-7) nerves; anthocyanin absent or present in fronds (fronds green or red).

4 Root sheath winged at the base; root tip sharply pointed; roots not longer than 3 cm long; anthocyanin absent in fronds; [section *Alatae*].

5 Seeds with 8-26 prominent ribs, brownish, falling from the fruit when ripe; fronds with only 1 papilla above the node, which is smaller than the papule at the apex; wing of the root sheath 1-2.5× as long as wide ..... ***L. aequinoctialis***

5 Seeds with 35-70 obscure ribs, whitish, remaining in the fruit when ripe; fronds very often with 2-3 papilla above the node, which are larger than the papule at the apex; wing of the root sheath 2-3× as long as wide ..... ***L. perpusilla***

4 Root sheath not winged at the base; root tip mostly rounded; roots often longer than 3 cm long; anthocyanin present or absent in fronds; [section *Lemna*].
  6 Plants forming small, olive-brown rootless turions, 0.8-1.6 mm in diameter, which sink to the bottom ..... ***[L. turionifera]***
  6 Plants without distinct turions.
    7 Fronds not reddish on the lower surface (or if so only slightly so and much less so than on the upper surface); greatest spacing of veins near the middle of the frond or towards its base ..... ***L. minor***
    7 Fronds often reddish on the lower surface (and more intensely so than on the upper surface); greatest spacing between the veins near the middle of the frond or towards its tip.
      8 Fronds often gibbous; fronds with very distinct papillae above the node and near the apex on the upper surface, but not between the node and the apex; seeds with 10-16 distinct ribs ..... ***L. obscura***
      8 Fronds flat; fronds with mostly distinct papillae on the midline on the upper surface; seeds with 3-60 indistinct ribs ..... ***[L. turionifera]***

Lemna aequinoctialis Welwitsch. Cp (FL, GA, NC, SC, VA): still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; common, rare in VA. Widespread worldwide, except in n. North America and n. Eurasia. [= FNA, K, WH, Y, Z]

Lemna minor Linnaeus. Cp (FL, GA, NC, VA), Pd (NC): still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; common (rare in FL). Widespread in the Northern Hemisphere; scattered in the Southern Hemisphere, where perhaps in part introduced. [= FNA, K, WH, Y, Z; < *L. minor* – RAB, C, F, G, W (also see *L. obscura*)]

Lemna minuta Kunth. Cp (FL, GA), Mt (GA, VA), Pd (VA?): quiet waters, seepages; rare. Widespread in North America, Central America, and South America; more local in Europe and Japan. [= C, FNA, K, WH; = *L. valdiviana* Philippi var. *abbreviata* Hegelmann – F; = *L. minuscula* Herter – Y, Z]

Lemna obscura (Austin) Daubs. Cp (FL, GA, NC, SC, VA): still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; common. NY west to MN and NE, south to s. FL, TX, Mexico, and the Bahamas. [= FNA, K, WH, Y, Z; < *L. minor* – RAB, C, F]

Lemna perpusilla Torrey. Cp (NC), Pd (NC, VA): still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; uncommon, rare in NC. Québec west to MN, south to NC, TN, and TX. [= RAB, C, F, FNA, G, K, W, Y, Z]

Lemna trisulca Linnaeus. Mt (VA): still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; rare. Widespread in the Northern Hemisphere; scattered in the Southern Hemisphere. [= C, F, FNA, G, K, W, Y, Z]

Lemna valdiviana Philippi. Cp (FL, GA, NC, SC, VA), Mt (GA, VA): still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; common. Widespread in North America, Central America, and South America. [= RAB, C, FNA, G, K, W, WH, Y, Z; = *L. valdiviana* var. *valdiviana* – F]

Lemna turionifera Landolt. South and east to c. PA (Rhoads & Klein 1993), WV, and n. AL (FNA). [= FNA, K; < *L. minor* Linnaeus -- C]

Orontium Linnaeus 1753 (Golden Club)

A monotypic genus, an aquatic herb, of e. North America. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b).

Orontium aquaticum Linnaeus, Golden Club, Bog Torches, Never-wet. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC, VA): generally in peaty and stagnant water, such as beaver ponds, blackwater streams, swamps, pools in low pocosins, streambeds in the Piedmont, bogs and swamps in the mountains; common (rare in Piedmont and Mountains). March-April. MA and c. NY south to s. FL and west to LA, north in the inland to w. NC, KY, and WV, primarily but by no means strictly Coastal Plain. Fresh leaves are unwettable, silvery-glistening when forced under water. [= RAB, C, F, FNA, G, GW, K, S, W, WH]

Peltandra Rafinesque 1819 (Arrow-arum)

A genus of 2 species, endemic to e. North America. References: Thompson in FNA (2000); Blackwell & Blackwell (1974)=Z; Mayo, Bogner, & Boyce in Kubitzki (1998b).

Identification notes: *Peltandra* is often confused in vegetative condition with *Pontederia* and *Sagittaria*, superficially similar emergent aquatics with hastate or sagittate leaves. *Peltandra* leaves have pinnate venation, a prominent midvein, a prominent vein running parallel to the leaf margin, and the hastate lobes with rounded to acute apices. *Pontederia* leaves have parallel venation, lack a prominent midvein and a prominent vein parallel to the leaf margin, and have hastate lobes with broadly rounded apices. The leaves of sagittate species of *Sagittaria* have parallel venation, a prominent midrib, a vein at 90 degrees to the midrib at the junction of the main blade and each of the hastate lobes that forks, with at least one fork directed apically and at least one fork directed into the basal lobe, lack a prominent vein parallel to the margin, and have hastate-sagittate lobes with acuminate apices.

1 Spathe green at base, bright white above (the white portion not merely a margin), flared open and therefore only loosely surrounding the spadix, succulent below, the white portion thin and herbaceous, the margins generally nearly entire and plane; fruits red; distal portion of leaf blade lacking broad, coarse veins similar to the midvein (all the veins alike and fine) ..... ***P. sagittifolia***
1 Spathe green (rarely with a narrow cream-colored or whitish margin up to 1.7 cm wide), tightly surrounding the spadix, thick and succulent throughout, the margins crisped; fruits green to dark purplish-green; distal portion of leaf blade often with several broad, coarse veins similar to the midvein, the remainder of the veins fine (sometimes the distal portion of the leaf with fine veins only) ..... ***P. virginica***

Peltandra sagittifolia (Michaux) Morong, Spoonflower, White Arrow-arum. Cp (FL, GA, NC, SC): pocosins of the outer Coastal Plain, sphagnous swamps; uncommon (rare in GA, NC, SC). July-August. A Southeastern Coastal Plain endemic: e.

NC south to c. peninsular FL and west to se. LA. The reduction of *P. sagittifolia* to a subspecies of *P. virginica* (Blackwell & Blackwell 1974) was based on confusion of true *P. sagittifolia* with forms of *P. virginica*. The two species are distinct. [= FNA, GW, K, WH; = *P. sagittaefolia* (Michaux) Morong – RAB (an orthographic variant); *P. glauca* (Elliott) Feay – S; = *P. virginica* ssp. *luteospadix* (Fernald) Blackwell & Blackwell – Z]

Peltandra virginica (Linnaeus) Schott, Green Arrow-arum, Tuckahoe. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): marshes, bogs, beaver ponds, pocosins, other stagnant, aquatic situations; common (rare in Mountains). May-June. ME, s. Québec, and n. MI south to s. FL and e. TX. [= RAB, C, FNA, G, GW, K, S, W, WH; > *P. virginica* – F; > *P. luteospadix* Fernald – F; > *P. virginica* ssp. *virginica* – Z]

Pinellia Tenore 1839 (Pinellia)

A genus of about 6 species, herbs, of temperate e. Asia. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b).

* *Pinellia ternata* (Thunberg) Makino ex Breitenbach, Pinellia, is introduced from Japan and rarely naturalized, at least in the northern portion of our area, as in DC, se. PA, NJ, and s. NY. It is likely naturalized in our primary area, at least in n. VA. [= C, F, FNA, G, K]

Pistia Linnaeus 1753 (Water Lettuce)

A genus of probably a single species, widespread in the tropics of both hemispheres. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b).

Pistia stratiotes Linnaeus, Water Lettuce. Cp (FL, GA?, SC*?), Pd* (NC*): stagnant or slow-moving waters of rivers, sometimes cultivated in ponds, where it persists for a while (presumably eventually eliminated by cold winters); rare, introduced from farther south. This floating aquatic, pantropically distributed, appeared in the Waccamaw River of SC (downstream from NC) in 1990 and 1991, apparently successfully overwintering (Nelson 1993). Further south it is paradoxically considered as native and a noxious water-weed. Its occurrence as a naturalized component of GA's flora is undocumented; it is at least present as a cultivated plant in water gardens and presumable escapes. The original distribution is unclear. [= FNA, GW, K, S, WH]

Spirodela Schleiden 1839

A genus of 2 species (with *Landoltia* removed), cosmopolitan. References: Landolt in FNA (2000); Landolt (1980)=Z; Landolt (1986)=Y; Landolt in Kubitzki (1998b); Les & Crawford (1999)=X. [also see *Landoltia*]

Spirodela polyrrhiza (Linnaeus) Schleiden, Greater Duckweed, Minnow-fole. Cp (FL, GA, NC, SC, VA), Pd (GA, VA), Mt (VA): still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; common. Widespread worldwide. [= RAB, FNA, K, X, Y, Z; = *S. polyrhiza* – C, F, G, GW, S, W, WH, orthographic variant]

Symplocarpus R.A. Salisbury ex Nuttall 1818 (Skunk Cabbage)

A genus of 3 species, of north temperate e. North America and ne. Asia. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b).

Symplocarpus foetidus (Linnaeus) Salisbury ex W.P.C. Barton, Skunk Cabbage. Mt, Pd, Cp (NC, VA): seepage-fed bogs and nonalluvial swamps; common in VA across the state, uncommon in NC (rare in Piedmont and Coastal Plain of NC). January-March; July-September. Nova Scotia and s. Québec west to MN, south to n. NC, ne. TN, s. OH, and IL. [= RAB, C, F, FNA, G, GW, K, W; = *Spathyema foetida* (Linnaeus) Rafinesque – S]

Wolffia Horkel ex Schleiden 1844 (Watermeal, Mud-mary)

A genus of 11 species, cosmopolitan. References: Landolt in FNA (2000); Landolt (1980)=Z; Landolt (1986)=Y; Landolt in Kubitzki (1998b).

1 Fronds globoid to ovoid, 1-1.5× as deep as wide; thallus not brownish punctate above ..... ***W. columbiana***
1 Fronds nutshell-like, 0.5-1.0× as deep as wide; thallus punctate above with brownish pigment cells (most visible on dead fronds).
  2 Frond 1.3-2× as long as wide, the upper side slightly convex, with an upward point apically ..... ***W. borealis***
  2 Frond 1-1.5× as long as wide, the upper side with a prominent papilla centrally ..... ***W. brasiliensis***

Wolffia borealis (Engelmann) Landolt. Mt?, Pd? (VA?): still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; rare. Québec west to British Columbia, south to PA, VA (?), KY, TN, MO, and CA. The occurrence in VA is

uncertain. [= FNA, K, Y, Z; = *W. punctata* Grisebach – C, F, G, GW, misapplied; < *Bruneria punctata* (Grisebach) Nieuwland – S, misapplied]

Wolffia brasiliensis Weddell. Cp (FL, VA), Pd (VA), Mt (VA): still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; uncommon, rare in Piedmont and Mountains. Widespread in e. North America, Central America, and South America. [= FNA, K, W, WH, Y, Z; = *W. papulifera* C. Thompson – RAB, C, F, G, GW; < *Bruneria punctata* (Grisebach) Nieuwland – S]

Wolffia columbiana Karsten. Cp (FL, NC, VA) Mt (VA), {also GA and SC according to FNA}: still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; uncommon. Widespread in North America, Central America, and South America. [= RAB, C, F, FNA, G, GW, K, WH, Y, Z; = *Bruneria columbiana* (Karsten) Nieuwland – S]

Wolffiella Hegelmann 1895

A genus of 10 species, cosmopolitan. References: Landolt in FNA (2000); Landolt (1980)=Z; Landolt (1986)=Y; Landolt in Kubitzki (1998b).

1 Fronds (4-) 6-15 (-20) × as long as wide; angle of pouch 25-50 degrees..... ***W. gladiata***
1 Fronds 1.5-8× as long as wide; angle of pouch 45-90 degrees..... ***[W. oblonga]***

Wolffiella gladiata (Hegelmaier) Hegelmaier, Mud-midgets. Cp (FL, GA, NC, SC, VA): ponds, ditches, beaver-ponds millponds; common. April-June. MA and n. IL (s. WI?) south to s. FL and TX; Mexico. [= FNA, K, WH, Y, Z; > *Wolffiella floridana* (Donnell-Smith) C. Thompson – RAB, C, F, G, GW, S; > *W. gladiata* – GW]

Wolfiella oblonga (Philippi) Hegelmaier. N. peninsular FL, MS, LA, TX south to Mexico, Central America, South America; West Indies. [= FNA, GW, K, WH]

Xanthosoma Schott 1832

A genus of about 60 species, herbs, of tropical Central and South America. References: Mayo, Bogner, & Boyce in Kubitzki (1998b); Serviss, McDaniel, & Bryson (2000)=Z.

* ***Xanthosoma sagittifolium*** (Linnaeus) Schott, Elephant-ear. Cp (FL): ditches; rare, native of tropical America. It can be seen in ditches adjacent to ornamental plantings; it is uncertain whether it can be considered naturalized in the more northern parts of our area. It is superficially similar to *Colocasia*, differing in its non-peltate leaves. [= K, WH, Z; = *Xanthosma sagittifolium* – GW, orthographic error]

ARECACEAE Schultz 1832 *or* ***PALMAE*** de Jussieu 1789 (Palm Family)

A family of about 190 genera and 2000 species, trees and shrubs, of tropical and subtropical regions of both hemispheres. Cold-hardy palms in other genera are sometimes planted in thje southern parts of our area, particularly near the coast. References: Zona in FNA (2000); Dransfield & Uhl in Kubitzki (1998b).

1 Leaves pinnate (with a well-developed central axis, the leaf blade much longer than wide); [introduced species]; [subfamily *Arecoideae*, tribe *Cocoeae*].
  2 Petiole with spines; leaflets 44-80 per leaf side, glaucous; fruit 1.8-3.5 cm long..... ***[Butia]***
  2 Petiole unarmed; leaflets 75-100 per leaf side, green; fruit 20-30 cm long..... ***[Cocos]***
1 Leaves palmate or costapalmate (lacking a central axis or with a shortcentral axis, the leaf blade about as long as wide; [native species]; [subfamily *Coryphoideae*, tribe *Corypheae*].
  3 Petioles armed with sharp recurved teeth; [subtribe *Livistoninae*]..... ***Serenoa***
  3 Petioles smooth, unarmed (leaf sheaths with long needle-like spines in *Rhapidophyllum*).
    4 Petioles and lower leaf surfaces more or less silvery pubescent; leaf sheaths bearing long (10-50 cm) needle-like spines; [subtribe *Thrinacinae*]..... ***Rhapidophyllum***
    4 Petioles and lower leaf surfaces green and glabrous; leaf sheaths without spines; [subtribe *Sabalinae*]..... ***Sabal***

Butia (Beccari) Beccari 1916 (Butia)

A genus of about 8 species, trees, native of subtropical regions of South America. References: Dransfield & Uhl in Kubitzki (1998b).

* *Butia capitata* (Martius) Beccari, Brazilian Butia, South American Jelly Palm, Pindo Palm. Widely planted in the outer Coastal Plain of se. NC, e. SC, e. GA, and FL; native of s. Brazil and Uruguay. It persists and can appear naturalized in apparently semi-natural situations. [= WH]

Cocos Linnaeus (Coconut Palm)

A monotypic genus, the single species now pantropical. References: Zona in FNA (2000).

* *Cocos nucifera* Linnaeus, Coconut Palm. Rarely reaches our shores as propagules (coconuts), but is not established; native region unknown, but probably tropical islands of the western Pacific (now pantropical). Photographic evidence has been supplied from Bear Island, Onslow County, NC, 11 June 1996 (Dave Owen, pers. comm. and photograph). [= FNA, K, S]

Rhapidophyllum H. Wendl. & Drude ex Drude 1876 (Needle Palm)

A monotypic genus, a shrub of se. North America (Henderson, Galeano, & Bernal 1995). The closest relative to *Rhapidophyllum* is apparently *Trachycarpus* of the Himalayan region of se. Asia (Zona in FNA 2000). References: Zona in FNA (2000); Clancy & Sullivan (1990); Dransfield & Uhl in Kubitzki (1998b); Zona (1997)=Z.

Rhapidophyllum hystrix (Pursh) H. Wendl. & Drude ex Drude, Needle Palm. Cp (FL, GA, SC): moist to wet soils of small blackwater stream swamps, especially where underlain with coquina limestone ("marl"), hydric hammocks and rich, wetland-upland transitions; uncommon (rare in GA and SC). Se. SC (Beaufort and Jasper counties) south to c. peninsular FL, and west to s. MS. Becoming somewhat popular as a hardy palm that can be grown in the Southeast, north of its natural range. [= FNA, GW, K, S, WH, Z]

Sabal Adanson 1763 (Palmetto)

Sabal has 16 species, primarily distributed around the Caribbean Sea. The other species of se. United States are *S. etonia* Swingle ex Nash, of scrub habitats in peninsular FL, *S. miamiensis* Zona, endemic of s. FL pine rocklands, and *S. mexicana* Martius, of the s. TX coast (Henderson, Galeano, & Bernal 1995). References: Zona in FNA (2000); Zona (1997)=Z; Zona (1990)=Y; Dransfield & Uhl in Kubitzki (1998b).

Identification notes: the hastula is the midrib of the leaf, as seen on the **upper** surface.

1 Tree, with erect trunk (though young plants appear as trunkless shrubs, similar in habit to *S. minor*); leaves 15-30 per plant; hastula 5.3-18 cm long, acute to acuminate; margins of leaf segments with filamentose fibrils; leaf segment apices 2-cleft ..... ***S. palmetto***
1 Shrub, with subterranean, rhizomatous "trunk" (very rarely emerging as much as 1 meter from the ground); leaves 4-10 per plant; hastula 0.8-4.7 cm long, obtuse to acute; margins of leaf segments with or without filamentose fibrils; leaf segment apices 2-cleft (*S. etonia*) or entire (*S. minor*).
  2 Margins of leaf segments with filamentose fibrils; hastula acute; fruits 9-15.4 mm in diameter; segment apices 2-cleft; [of dry sandy habitats] ..... ***S. etonia***
  2 Margins of leaf segments without filamentose fibrils; hastula obtuse; fruits 6.4-9.7 mm in diameter; segment apices generally entire; [of moist to wet habitats] ..... ***S. minor***

Sabal etonia Swingle ex Nash, Scrub Palmetto. Cp (FL): Florida scrub; rare. Late May-July. Endemic to FL (Clay County, FL south to Miami-Dade County, FL, primarily on the Lake Wales Ridge but also on coastal and intermediate ridges). See Zona & Judd (1986) for extensive information about the ecology and distribution of this species. [= FNA, K, S, WH, Y, Z]

Sabal minor (Jacquin) Persoon, Dwarf Palmetto. Cp (FL, GA, NC, SC), Pd (GA): swamps, maritime forests, low moist woods, especially in calcareous soils developed from shell limestone (marl); common. May-July; September-November. Ne. NC (Currituck County) south to c. peninsular FL, west to e. TX, c. TX, se. OK, and s. AR; disjunct in Nuevo León (Goldman 1999). This palm reaches its northern limit at Monkey Island, Currituck County, NC (L. Musselman, J. Boggan, pers. comm., 2006). No other New World palm has a native range extending so far north. [= RAB, FNA, GW, K, WH, Z; > *S. minor* – S; > *S. deeringiana* Small -- S]

Sabal palmetto (Walter) Loddiges ex J.A. & J.H. Schultes, Cabbage Palmetto. Cp (FL, GA, NC, SC): maritime forests, marsh edges, and other near-coastal communities; common, rare in NC. July; October-November. This palm is the state tree of South Carolina and is common and conspicuous (both as a native tree and in plantings) along the South Carolina coast; it currently reaches its northern limit as a native species in Brunswick County, NC, where it is a conspicuous part of the forest on Smith Island complex (Bald Head Island, Middle Island, Bluff Island). It is planted elsewhere (and further north) on the coast. Periodic disturbance by hurricanes helps maintain populations of *Sabal palmetto*, which survives winds and flooding that topple or kill *Quercus virginiana*. Curtis (1883) reports that "Cape Hatteras is, or was, the northern limit of this Palm... It is to be deeply regretted, however, that a reckless indifference to the future, which has been charged as a characteristic of Americans, is likely to efface, at no very distant time, every vestige of this interesting ornament of our coast. The inner portion of the young plant is very tender and palatable, somewhat resembling the Artichoke and Cabbage in taste (hence its name of *Cabbage Tree*), and is often taken for pickling, and the stock is ruined by the process. Thus for a pound or two of pickles, no better either than many other kinds, the growth of half a century is destroyed in a moment, and posterity left to the wretched inheritance of vain mourning for the loss of the greatest beauty of our maritime forest." [= RAB, FNA, GW, K, S, WH, Z]

Serenoa Hooker f. 1828 (Saw Palmetto)

Serenoa is monotypic shrub (Henderson, Galeano, & Bernal 1995). *Serenoa* is most closely related to *Acoelorraphe*, of the West Indies, including s. FL (Zona in FNA 2000). References: Zona in FNA (2000); Zona (1997)=Z; Dransfield & Uhl in Kubitzki (1998b).

Serenoa repens (Bartram) Small, Saw Palmetto. Cp (FL, GA, SC): pine flatwoods and maritime forests; common (rare though locally dominant in SC). May-July; October-November. Se. SC (in maritime forests in Charleston and Colleton counties, and in spodosolic flatwoods in Beaufort and Jasper counties) south to s. FL and west to e. LA. *Serenoa* forms extensive clonal patches, connected by underground rhizomes, and is a dominant plant in many parts of FL and other Gulf Coast states, for instance in pine flatwoods or coastal scrub. [= RAB, FNA, GW, K, S, WH]

ASPARAGACEAE A.L. de Jussieu 1789 (Asparagus Family)

A family of a single genus and 170-300 species, widespread in Europe, Africa, Asia, and Australia (introduced elsewhere). References: Dahlgren, Clifford, & Yeo (1985); Kubitzki & Rudall in Kubitzki (1998a).

Asparagus Linnaeus (Asparagus)

A genus of 170-300 species, widespread in Europe, Africa, Asia, and Australia (introduced elsewhere). References: Kubitzki & Rudall in Kubitzki (1998a); Straley & Utech in FNA (2002a).

1 Cladophylls flattened, ca. 2 mm wide ..... ***A. aethiopicus***
1 Cladophylls filiform, < 0.7 mm wide.
  2 Flowers in 1-3-flowered axillary racemes; berries 6-10 mm long, red; erect herb (sometimes arching in age) ..... ***A. officinalis***
  2 Flowers in 1-4-flowered terminal umbels; berries 4-5 mm long, purplish-black; scrambling vine ..... ***A. setaceus***

* ***Asparagus aethiopicus*** Linnaeus, Sprenger's Asparagus-fern, Emerald-fern. Cp (FL): disturbed areas; rare, native of s. Africa. [= FNA, WH]
* ***Asparagus officinalis*** Linnaeus, Asparagus, Sparrowgrass, Garden Asparagus. Mt, Pd, Cp (GA, NC, SC, VA): commonly cultivated, commonly escaped to fencerows, roadsides, disturbed areas; common, native of Eurasia. April-May (or later); July-October. [= RAB, C, F, FNA, G, K, S, W]
* ***Asparagus setaceus*** (Kunth) Jessop, Climbing Asparagus-fern. Cp (FL): disturbed areas; rare, native of e. and s. Africa. [= FNA, WH]

BROMELIACEAE A.L. de Jussieu 1789 (Bromeliad or Pineapple Family)

A family of about 56 genera and 2600 species, herbs, shrubs, and trees, of the New World tropics and subtropics (very rarely warm temperate). References: Luther & Brown in FNA (2000); Smith & Till in Kubitzki (1998b).

Tillandsia Linnaeus 1753 (Spanish-moss)

A genus of about 540 species, herbs, of s. North America south to s. South America. References: Luther & Brown in FNA (2000); Smith & Till in Kubitzki (1998b). Key based in part on FNA.

1 Leaves distichous; inflorescence 1-2 (-3) flowered.
  2 Plants in dense, more or less spherical clusters; inflorescence scapose, exserted from the cluster; corolla violet ..... ***T. recurvata***
  2 Plants in elongate, pendulous festoons; inflorescence sessile; corolla yellowish green ..... ***T. usneoides***
1 Leaves spiral in a rosette; inflorescence > 3-flowered.
  3 Leaves narrowly linear, 1-5 mm wide.
    4 Leaves densely and coarsely lepidote, appearing gray; floral bracts rose; corolla violet ..... ***T. bartramii***
    4 Leaves finely lepidote, appearing green or reddish; floral bracts green or reddish; corolla lavender ..... ***T. setacea***
  3 Leaves broader, 10-35 mm wide.
    5 Scape 10-35 cm long; floral bracts imbricate, covering all of the rachis, or nearly all ..... ***T. fasciculata*** *var.* ***densispica***
    5 Scape 20-50 cm long; floral bracts widely spaced, leaving much of the rachis exposed at anthesis ..... ***T. utriculata***

Tillandsia bartramii Elliott, Bartram's Air-plant. Cp (FL, GA): on tree branches in bayswamps, tidal swamp forests, and mesic hardwood bluffs; uncommon (rare in GA). E. GA south through Florida; disjunct in Tamaulipas. In five counties in e. GA, as far north as Liberty County (Jones & Coile 1988), and reported for SC as extirpated (Kartesz 1999). [= FNA, K, WH; ? *T. myriophylla* Small – S]

Tillandsia fasciculata Swartz *var.* ***densispica*** Mez, Quill-leaf Airplant. Cp (FL, GA): branches of trees, especially evergreen oaks; rare. Se. GA south through FL, and in the West Indies, Mexico, and Central America. [= FNA, K, WH; < *T. fasciculata* – S]

Tillandsia recurvata (Linnaeus) Linnaeus, Ball-moss, Bunch-moss. Cp (FL, GA, SC*): on tree branches in maritime forests; rare. Se. GA (Duncan 1985) south to s. FL; LA to AZ and south through Mexico, Central America , and South America;

West Indies. Introduced in e. SC (Beaufort, Jasper, Charleston, Georgetown counties) via landscaping plants (P. McMillan, pers. comm. 2005). Outside of our area, this species also occurs on rock cliffs and is frequent on powerlines. [= FNA, K, WH; = *Diaphoranthema recurvata* (Linnaeus) Beer – S]

Tillandsia setacea Swartz, Wild-pine, Pine-needle Airplant. Cp (FL, GA): in tree branches, especially on hardwoods, in mesic bluff forests; rare. Se. GA south to s. FL; West Indies; Mexico and Central America. [= FNA, K; *T. tenuifolia* Linnaeus – S, misapplied]

Tillandsia usneoides (Linnaeus) Linnaeus, Spanish-moss. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): branches of trees, especially in swamps, but elsewhere where air humidity is high enough, often even in dry forests (near Wilmington, NC *Tillandsia* is abundant on *Quercus laevis* in an extensive dry sandhill area which receives frequent fog from the Cape Fear, Brunswick, and Northeast Cape Fear rivers); common, very rare in lower Piedmont (rare in VA). April-June. S. MD (historically), se. VA south to s. FL, west to TX and Mexico, extending south to South America. *T. usneoides* is the only member of a very large genus to occur north of s. GA. The epithet *'usneoides'* refers to its resemblance to the common lichen *Usnea*. [= RAB, C, F, FNA, G, K, WH; ≐ *Dendropogon usneoides* (Linnaeus) Rafinesque – S]

Tillandsia utriculata Linnaeus, Giant Wild-pine. Cp (FL): on tree branches in hammocks qnd cypress swamps; rare. FL (and GA?); West Indies, Mexico, Central America, South America. Reported for GA by Kartesz (1999), but not by Luther & Brown in FNA (2000). [= FNA, K, S, WH]

BURMANNIACEAE Blume 1827 (Burmannia Family)

A family of about 13-15 genera and 130 species, pantropical and warm-temperate. References: Wood (1983a)=Z; Lewis in FNA (2002a); Maas-van de Kamer in Kubitzki (1998a).

1 Floral tube terete; ovary 1-locular ..... ***Apteria***
1 Floral tube 3-angled or 3-winged; ovary 3-locular ..... ***Burmannia***

Apteria Nuttall (Nodding Nixie)

A monotypic genus, the single species distributed from s. North America south to c. South America. References: Lewis in FNA (2002a); Maas-van de Kamer in Kubitzki (1998a).

Apteria aphylla (Nuttall) Barnhart ex Small, Nodding Nixie. Cp (FL, GA): wet hammocks, acid swamps; uncommon (rare in GA). E. GA (Glynn County) west to e. TX, south to c. South America, and in the West Indies. [= FNA, GW, K, S, WH]

Burmannia Linnaeus (Burmannia)

A genus of about 63 species, autotrophic or mycotrophic herbs, pantropical (to warm temperate). References: Lewis in FNA (2002a); Maas-van de Kamer in Kubitzki (1998a).

Identification notes: Both species of *Burmannia* are very small and easy to overlook; they occasionally occur together.

1 Floral tube 3-winged, violet; flowers in a spicate cyme (solitary in depauperate individuals) ..... ***B. biflora***
1 Floral tube obtusely 3-angled, greenish to creamy white; flowers in a capitate cluster (solitary in depauperate individuals) ..... ***B. capitata***

Burmannia biflora Linnaeus, Violet Burmannia. Cp (FL, GA, NC, SC, VA), Pd (SC): savannas, bogs, shores of Coastal Plain depression ponds; common (uncommon in GA, rare in SC and VA). August-November. Se. VA south to FL, west to e. TX. [= RAB, C, F, FNA, G, GW, K, S, WH]

Burmannia capitata (J.F. Gmelin) von Martius, White Burmannia. Cp (FL, GA, NC, SC), Pd (GA, SC): savannas, bogs, shores of Coastal Plain depression ponds; common (uncommon north of FL). July-November. E. NC south to s. FL, west to TX and se. OK; West Indies, Central America, and South America. [= RAB, FNA, GW, K, S, WH]

CANNACEAE A.L. de Jussieu 1789 (Canna Family)

A family of a single genus, herbs, of tropical and warm temperate America. References: Kress & Prince in FNA (2000); Kubitzki in Kubitzki (1998b).

Canna Linnaeus 1753 (Canna)

A genus of about 10-25 species, of tropical and warm temperate America. References: Kress & Prince in FNA (2000); Kubitzki in Kubitzki (1998b).

BURMANNIACEAE

Identification notes: The petals are generally sepaloid (sometimes brightly colored); the showy, colored portions of the flower are the staminodes.

1 Flowers not tubular at the base (or with a short tube to 2 cm long); petals erect; [alien, cultivated and persistent] ..... ***C. ×generalis***
1 Flowers tubular at the base; petals reflexed; [native or cultivated].
  2 Flowers yellow; capsule 5-6 cm long, ellipsoid (longer than broad); leaves glaucous; [native] ..... ***C. flaccida***
  2 Flowers red, orange, or mixed red-and-yellow; capsule 1.5-3 cm long, globose or subglobose (about as long as broad); leaves green; [alien, cultivated and persistent] ..... ***C. indica***

Canna flaccida Salisbury, Golden Canna, Yellow Canna. Cp (GA, SC): wet pine savannas, marshes, ditches; uncommon. May-early July; July-August. E. SC south to FL, west to TX, and south into Central America. [= RAB, FNA, K, S]
* ***Canna ×generalis*** L.H. Bailey (pro sp.) [= *C. glauca × indica*], Common Garden Canna. Cp, Pd (GA, NC, SC): cultivated and persisting; rare. June-September; August-October. [= RAB, FNA, K]
* ***Canna indica*** Linnaeus, Indian-shot, Platanillo. Cp, Pd (GA, NC, SC): cultivated and persisting; rare. June-September; August-October. [= FNA, GW, K, S]

COLCHICACEAE A.P. de Candolle 1805 (Meadow Saffron Family)

As here circumscribed, a family of about 15 genera and about 250 species, nearly cosmopolitan. References: Vinnersten & Manning (2007); Dahlgren, Clifford, & Yeo (1985); Nordenstam in Kubitzki (1998a).

1 Plant acaulescent, from a tunicated bulb; [tribe *Colchiceae*] ..... ***Colchicum***
1 Plant with leafy stem, from a rhizome or tuber.
  2 Tepals red or orange, reflexed; leaves attenuate into a tendril-like tip; [alien] ..... ***Gloriosa***
  2 Flowers yellow, tepals not reflexed; leaves acute to obtuse; [native]; [tribe *Uvularieae*] ..... ***Uvularia***

Colchicum Linnaeus 1753 (Meadow Saffron)

A genus of about 100 species, of s. Europe, n. Africa, and w. and c. Asia, here circumscribed to include *Androcymbium*, following Vinnersten & Manning (2007). References: Vinnersten & Manning (2007); Nordenstam in Kubitzki (1998a).

* ***Colchicum autumnale*** Linnaeus, Meadow Saffron, Autumn-crocus. Pd (NC): planted as an ornamental, at least long-persistent; rare, native of s. Europe. September-October. [= C, F, G, K]

Gloriosa Linnaeus 1753 (Flamelily)

A genus of about 5 species, perennials, native of Africa and Asia.

* ***Gloriosa superba*** Linnaeus, Flamelily, Glory-lily. Cp (FL): disturbed areas; rare, native of tropical Africa. [= FNA, K, WH]

Uvularia Linnaeus 1753 (Bellwort, Merrybells)

A genus of about 5 species, of temperate eastern North America. References: Wilbur (1963b)=Z; Uttal (1991)=Y; Utech & Kawano in FNA (2002a); Nordenstam in Kubitzki (1998a).

1 Leaves perfoliate, the margins scarious but smooth; [section *Uvularia*].
  2 Tepals glabrous within; leaves puberulent beneath (or rarely glabrate); leaves below the fork (0-) 1 (-2) ..... ***U. grandiflora***
  2 Tepals conspicuously granular-papillose within; leaves glabrous and often glaucous beneath; leaves below the fork 2-4 ..... ***U. perfoliata***
1 Leaves sessile, the margins scarious and minutely papillose-denticulate; [section *Oakesiella*].
  3 Undivided portion of the style 0.5-1× as long as the style branches; upper stem and lower leaf surfaces puberulent to glabrous, light green; rhizome very short, with clustered, thickened roots.
    4 Leaves cuneate at base, thin in texture, faintly reticulate on the undersurface, glabrous (rarely puberulent becoming glabrate); stems usually glabrous; [of the Coastal Plain and Piedmont] ..... ***U. puberula var. nitida***
    4 Leaves broadly rounded to somewhat clasping at base, firm in texture, obviously reticulate on the undersurface, puberulent (sometimes becoming glabrate); stems usually minutely puberulent in lines; [of the Mountains and Piedmont] ..... ***U. puberula var. puberula***
  3 Undivided portion of the style 3-5× as long as the style branches; upper stem and lower leaf surfaces glabrous, usually also glaucous; rhizome elongate, with scattered, fibrous roots.
    5 Pedicel bearing a sessile, leaf-like bract 5-17 mm below the flower; capsule sessile at base, conspicuously beaked at apex ... ***U. floridana***
    5 Pedicel bractless; capsule on a stalk 2-4 (-6) mm long, not beaked ..... ***U. sessilifolia***

Uvularia floridana Chapman, Florida Bellwort. Cp (FL, GA, SC): alluvial forests, moist ravines; rare. Mid March-early April. C. SC south to ne. FL, and panhandle FL, west to c. MS, rare and local throughout its range. [= RAB, FNA, GW, K, WH, Z; = *Oakesiella floridana* (Chapman) Small – S]

Uvularia grandiflora J.E. Smith, Large-flowered Bellwort. Mt (GA, NC, VA), Pd (NC, VA): cove forests and other moist, rich, forested sites; common. Mid April-mid May; July-August. S. Québec west to ND, south to w. NC, w. SC, n. GA, c. AL, MS, c. AR, and e. OK. [= RAB, C, F, FNA, G, K, S, W, Z]

Uvularia perfoliata Linnaeus, Perfoliate Bellwort. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist to fairly dry hardwood forests; common (rare in FL). April-early May; June-August. S. NH, s. Ontario, and c. OH, south to Panhandle FL and LA. [= RAB, C, F, FNA, G, K, S, W, WH, Z]

Uvularia puberula Michaux *var.* ***nitida*** (Britton) Fernald, Coastal Bellwort. Cp (GA, NC, SC, VA): dry to moist upland, acidic forests; uncommon. Late March-late April; August-October. Var. *nitida* ranges from Long Island NY south to GA in the Coastal Plain and Sandhills. Var. *nitida* is reported to intergrade with var. *puberula* in c. NC; elsewhere, the 2 varieties appear to be geographically allopatric and more-or-less morphologically distinguishable. While Wilbur (1963b) chose not to recognize varieties, Uttal (1991) supports varietal recognition. [= C, Y; < *U. pudica* (Walter) Fernald – RAB, nomen dubium; = *U. pudica* var. *nitida* (Britton) Fernald – F, G; < *U. puberula* – FNA, K, W, Z; < *Oakesiella puberula* (Michaux) Small – S]

Uvularia puberula Michaux *var.* ***puberula***, Appalachian Bellwort. Mt, Pd (GA, NC, SC, VA): dry to moist upland, acidic forests, up to at least 1500m; common. Early April-Early May; August-October. Var. *puberula* ranges from s. PA to GA in the Mountains and (more rarely) Piedmont. [= C, Y; < *U. pudica* (Walter) Fernald – RAB, nomen dubium; = *U. pudica* var. *pudica* – F, G; < *U. puberula* – FNA, K, W, Z; < *Oakesiella puberula* (Michaux) Small – S]

Uvularia sessilifolia Linnaeus, Straw-lily, Wild-oats. Pd, Mt (GA, NC, SC, VA), Cp (FL, NC, SC, VA): moist hardwood forests, on slopes and mainly in bottomlands; common (rare in FL). Late March-early May; August-October. Nova Scotia west to ND, south to panhandle FL and n. LA. [= RAB, C, F, FNA, K, W, WH, Z; = *Oakesiella sessilifolia* (Linnaeus) S. Watson – S]

COMMELINACEAE R. Brown 1810 (Spiderwort Family)

A family of about 41 genera and 650 species, herbs, of tropical and warm temperate regions of both hemispheres. References: Faden in FNA (2000); Faden in Kubitzki (1998b); Tucker (1989).

1 Spathes paired, terminating the stem, resembling foliage leaves in size, shape, texture, and coloration; [tribe *Tradescantieae*]..... ***Tradescantia***
1 Spathes single (or paired in *Callisia*), either terminal or axillary, differing from the foliage leaves (in *Commelina* folded, heart-shaped when spread, and usually pale-green, in *Cuthbertia* and *Murdannia* scale-like, scarious, and inconspicuous, sometimes hidden by foliage leaves in *Murdannia*).
  2 Spathe folded, heart-shaped when unfolded, usually pale-green, closely subtending and surrounding the flower pedicels; petals unequal, the 2 upper petals larger and usually more deeply colored than the lower petal (which is sometimes absent); [tribe *Commelineae*]..... ***Commelina***
  2 Spathe scale-like, scarious, and inconspicuous, not closely subtending and surrounding the flower pedicels; petals equal, in size and coloration.
    3 Leaves linear, > 20× as long as wide; petals bright pink (rarely white); [tribe *Tradescantieae*] ..... ***Cuthbertia***
    3 Leaves lanceolate, < 20× as long as wide; petals white, pink, purplish, or bluish.
      4 Fertile stamens 3, alternating with 3 staminodia; petals pink to purplish or bluish; [tribe *Commelineae*]..... ***Murdannia***
      4 Fertile stamens 0-6, all fertile; petals white; [tribe *Tradescantieae*] ..... ***Callisia***

Callisia Loefling
(also see *Cuthbertia*)

A genus of ca. 15-18 species, of tropical America. References: Faden in FNA (2000); Tucker (1989)=Z.

1 Inflorescences pedunculate; flowers on pedicels; capsule with 3 locules..... ***C. cordifolia***
1 Inflorescences sessile; flowers sessile or nearly so; capsule with 2 locules..... ***C. repens***

* ***Callisia cordifolia*** (Swartz) E.S. Anderson & Woodson. Mt (GA): disturbed area?; rare, presumably introduced from the native range in peninsular FL, Mexico, the West Indies, and n. South America. Reported for nw. GA (Faden in FNA 2000). [= FNA, K; ? *Tradescantella floridana* (S. Watson) Small – S; = *Tradescantia cordifolia* Swartz]

* ***Callisia repens*** (Jacquin) Linnaeus. Cp (FL): disturbed areas; rare, native of tropical America. [= FNA, K, WH]

Commelina Linnaeus 1753 (Dayflower)

A genus of about 170 species, herbs, cosmopolitan. References: Faden in FNA (2000); Tucker (1989)=Z; Faden (1993)=Y; Brashier (1966)=X; Faden in Kubitzki (1998b). The key is adapted in part from X, Y, and Z.

1 Spathes with margins free to the base; [introduced species, usually in weedy habitats].
  2 Spathes generally whitish or pale green toward the peduncle, with contrasting dark green veins; middle petal white or paler than the others; capsules with 2 locules (the third aborting); seeds rugose foveate-reticulate.
    3 Larger petals light blue; sterile anthers entirely yellow..... ***C. communis var. communis***
    3 Larger petals intense violet blue; sterile anthers with brownish-purple spot..... ***C. communis var. ludens***
  2 Spathes lacking contrasting veins; middle petal about the same color as the others; capsules with 3 locules; seeds reticulate or smooth to faintly alveolate.

4 Spathes not at all to slightly falcate (the lower margin straight or very nearly so); upper cyme usually vestigial (rarely well-developed and 1-flowered); seeds smooth to faintly alveolate; peduncles of the spathes with hairs to 0.5 mm long ..... ***C. caroliniana***
4 Spathes usually distinctly falcate (the lower margin curved); upper cyme in larger spathes usually well-developed and 1-several-flowered; seeds deeply reticulate; peduncles of the spathes with hairs to 0.1 mm long ..... ***C. diffusa***
1 Spathes with margins fused basally; [native species, usually in natural habitats, or introduced and weedy].
5 Flowers peach-colored ..... ***[C. gambiae]***
5 Flowers white and/or bluish.
6 Leaf sheaths ciliate with coarse reddish-brown hairs, the sheath not auriculate; middle petal blue, lilac, or lavender; [mostly of moist soils].
7 Annual from fibrous roots, the stem decumbent; leaf blades broadly elliptic-ovate, 2-9 cm long; leaf margin and upper surface pubescent; [alien, weedy] ..... ***C. benghalensis***
7 Perennial from horizontal rhizomes, often forming clonal patches of erect stems; leaf blades lance-oblong, 6-20 cm long; leaf margin and upper surface scabrous; [native, mostly of moist floodplain forests] ..... ***C. virginica***
6 Leaf sheaths ciliate with white hairs, the sheath prolonged upward into auricles; middle petal white; plant perennial from thickened, fibrous roots, not forming clonal patches; [mostly of dry, sandy or rocky soil].
8 Larger leaves 4-10 (-13) cm long, 0.4-1.4 cm wide; spathes 1-2 (-2.5) cm long; [primarily of the Coastal Plain, especially on sandhills and dunes] ..... ***C. erecta var. angustifolia***
8 Larger leaves (6-) 10-15 cm long, (1.1-) 1.5-3.5 cm wide; spathes (2.0) 2.5-3.6 cm long; [primarily of the Piedmont and Mountains].. ..... ***C. erecta var. erecta***

* ***Commelina benghalensis*** Linnaeus, Tropical Spiderwort, Bengal Dayflower. Cp (GA, NC, SC): fields; common, native of tropical Asia and becoming a serious weed. This annual, pantropical weed is well established in FL and s. GA (Faden 1993). Spot infestations have been reported in NC (Wayne County), SC (Edgefield County), and MS as well. "This annual species can be recognized by: its funnelform spathes that are often clustered; relatively broad leaves that frequently have red hairs at the summit of the sheath; and cleistogamous flowers that are borne at the base of the plant and are usually subterranean (in addition to normal, aerial, chasmogamous flowers)" (Faden 1993). [= FNA, K, Y]

* ***Commelina caroliniana*** Walter, Indian Dayflower. Cp (GA, NC, SC): moist disturbed areas; rare, native of India and Bangladesh. June-October. Faden (1989, 1993) discusses in detail the taxonomy and history of this species. It was apparently introduced to our area early, probably as a weed in rice. [= RAB, C, FNA, G, K, S, Y; < *C. diffusa* – GW, X, Z, in part; > *C. hasskarlii* C. B. Clarke (the earliest name applied to the species in India)]

* ***Commelina communis*** Linnaeus *var.* ***communis***, Common Dayflower. Cp, Pd, Mt (GA, NC, SC, VA): gardens, bottomlands, disturbed ground; common, native of the Old World. May-October. [= F, G, K, Z; < *C. communis* – RAB, C, FNA, GW, S, W, X, Y]

* ***Commelina communis*** Linnaeus *var.* ***ludens*** (Miquel) C.B. Clarke, Bright-blue Dayflower. {NC, VA} introduced. The distribution of this taxon in our area is poorly known. May-October? Not recognized by many recent authors (see synonymy). [= F, G, K, Z; < *C. communis* – RAB, C, FNA, GW, S, W, X, Y]

* ***Commelina diffusa*** Burmann f., Creeping Dayflower. Cp, Pd, Mt (GA, NC, SC, VA): roadsides, fields, disturbed ground; uncommon, native of the Old World. June-October. [= RAB, C, F, G, W; < *C. diffusa* – GW, X, Z, in part only (also see *C. caroliniana*); *C. longicaulis* Jacquin – S; *C. diffusa* var. *diffusa* – FNA, K, Y]

Commelina erecta Linnaeus *var.* ***angustifolia*** (Michaux) Fernald, Sand Dayflower. Cp (GA, NC, SC), Pd (GA, VA), Mt (VA): dunes and dry sand flats on barrier islands, sandhills, other dry sandy sites, shale barrens, other dry rocky sites; common. June-October. E. NC south to s. FL, west to TX, and north and west in the interior to IA, nw. NE, CO, and NM. Contrary to the specific epithet, *C. erecta* var. *angustifolia* is a trailing plant, the stems sometimes as long as 1.3 m. The taxonomy and distribution of the two varieties here recognized need further study. [= C, F, FNA, G, K, X; < *C. erecta* – RAB, W, Y, Z; > *C. angustifolia* Michaux – S; > *C. crispa* Wooton – S]

Commelina erecta Linnaeus *var.* ***erecta***, Erect Dayflower. Cp, Pd, Mt (GA, NC, SC, VA): dry openings and woodlands, especially in thin soil around rock outcrops; common (uncommon in Mountains). June-October. PA west to MO and e. KS, south to FL and TX. [= C, F, FNA, G, K, X; < *C. erecta* – RAB, W, Y, Z; = *C. erecta* – S]

Commelina virginica Linnaeus, Virginia Dayflower. Cp, Pd, Mt (GA, NC, SC, VA): bottomlands, swamp forests, other moist to wet forests and forest edges; common (rare in the upper Piedmont and Mountains). July-October. Our most robust species of *Commelina*. NJ west to KS and OK, south to FL and TX. [= RAB, C, F, FNA, G, GW, K, S, W, X, Y, Z]

* *Commelina gambiae* C.B. Clarke, a West African species first collected in North America in 1976 (Manatee County, FL), is immediately distinguishable from our species by its peach-colored flowers and fused spathes. Faden (1993) reports that it "appears to be spreading rapidly," but whether it can spread northward from peninsular FL is questionable. [= FNA; = *Commelina nigritana* Bentham var. *gambiae* (C.B. Clarke) Brenan – K, Y]

Cuthbertia Small 1903 (Roseling)

A genus of 3 species, herbs, of se. North America. There seems ample reason for recognizing *Cuthbertia* as distinct from *Tradescantia*, based on the single spathes (vs. paired), glabrous filaments (vs. hairy), differently shaped anther connectives, etc. Hunt (1983, 1986) has treated *Cuthbertia* as a section of *Callisia* Loefling, a decision followed with little additional comment or discussion by Tucker (1989). While this course may be warranted, the authors advocating it have presented little evidence to support it. Hunt (1986), in discussing a number of small tropical genera which he also reduces to sections of *Callisia*, states "this leaves two alternatives: to recognize numerous (perhaps 10) genera of 1-2 species, or to experiment with an amplification and sectionalization of *Callisia*, which I find the lesser of the two evils." He mentions that "the succulent habit ... is a principal unifying feature of the enlarged genus as a whole, reflecting the concentration of its species in tropical seasonal habitats, often on

rocks." *Cuthbertia* is endemic to se. North America (a separate and more northerly distribution than the remainder of a broad *Callisia*), is only slightly succulent, occurs primarily in sandy habitats, and has a different base chromosome number (x=6) than some components of a broad *Callisia*. Until and unless a more compelling case is presented for the inclusion of *Cuthbertia* in *Callisia*, I prefer a more conservative and traditional maintenance of *Cuthbertia*, which is also more in line with the philosophy on the circumscription of genera. References: Faden in FNA (2000); Tucker (1989)=Z; Giles (1942); Giles (1943); Lakela (1972); Faden in Kubitzki (1998b).

1 Leaves loosely spreading, the leaf blades 4-15 mm wide (as wide as or wider than the sheaths) ..... ***C. rosea***
1 Leaves erect or ascending, the leaf blades 1-5 mm wide (narrower than the sheaths)
  2 Plants cespitose; roots glabrous to sparsely puberulent; inflorescence bracts scarious and small or to 14 mm long and green; petals 8-10 mm long; [of se. VA south to c. FL peninsula] ..... ***C. graminea***
  2 Plants not cespitose; roots persistently densely woolly; inflorescence bracts 1-3 (-5) mm long, scarious; petals 9-13 mm long; [of the FL peninsula, disjunct in Gulf County in the FL panhandle] ..... ***C. ornata***

Cuthbertia graminea Small, Grassleaf Roseling. Cp (FL, GA, NC, SC, VA): sandhills; common (rare in VA). May-July. *Cuthbertia graminea* includes 3 morphologically distinguishable cytological races, occupying different (but partially overlapping) ranges (Giles 1942, Giles 1943, Tucker 1989). The predominant race is tetraploid, occupying the outer Coastal Plain of VA, NC, and SC, middle Coastal Plain of NC and SC, fall-line sandhills of SC, and south into FL. The diploid race is endemic to the fall-line sandhills of sc. NC and nc. SC, a distribution similar to those of *Pyxidanthera barbulata* var. *brevifolia*, *Liatris cokeri*, and *Lycopus cokeri*. Rare hexaploids have been found at scattered sites in SC and FL. The tetraploid race averages about 25 % larger than the diploid in most vegetative and floral characters, and is reported to exhibit a greater ecological amplitude (Giles 1942, 1943). [= S; = *Tradescantia rosea* Ventenat var. *graminea* (Small) E.S. Anderson & Woodson – RAB, C, F, G; = *Callisia graminea* (Small) G. Tucker – FNA, K, WH, Z]

Cuthbertia ornata Small, Florida Roseling. Cp (FL): sandhills, scrub, dunes; rare. FL peninsula; disjunct in Gulf County in the FL Panhandle. [= S; = *Callisia ornata* (Small) G. Tucker – FNA, K, WH, Z; = *Tradescantia rosea* Ventenat var. *ornata* (Small) E.S. Anderson & Woodson]

Cuthbertia rosea (Ventenat) Small, Common Roseling. Cp (FL, GA, SC), Pd (GA, NC, SC): sandhills, other dry woodlands; common (uncommon in NC). May-July. MD south to peninsular FL, west to s. AL. [= S; = *Tradescantia rosea* Ventenat var. *rosea* – RAB; = *Callisia rosea* (Ventenat) D.R. Hunt – FNA, K, WH, Z]

Murdannia Royle 1839 (Murdannia)

A genus of about 50 species, herbs, of tropical and warm temperate regions. References: Faden in FNA (2000); Tucker (1989)=Z; Faden in Kubitzki (1998b).

1 Flowers solitary or in 2-4-flowered racemes borne in the upper leaf axils; capsules 8-10 mm long; seeds ca. 3 mm long; pedicels much longer than the capsule ..... ***M. keisak***
1 Flowers in stalked cymose racemes borne terminally or the uppermost leaf axil; capsules 4-5 mm long; seeds 1.0-1.5 mm long; pedicels about as long as the capsule ..... ***M. nudiflora***

* ***Murdannia keisak*** (Hasskarl) Handel-Mazzetti. Cp, Pd, Mt (GA, NC, SC, VA): stream banks, canals, ditches, marshes, swamp forests, wet disturbed places; common (primarily in the Coastal Plain, uncommon in the Piedmont, rare in the Mountains), native of Asia, now widespread in the se. United States. September-October. [= C, FNA, G, GW, K, W, Z; = *Aneilema keisak* Hasskarl – RAB, F]

* ***Murdannia nudiflora*** (Linnaeus) Brenan. Cp (GA, NC, SC), Pd? (GA?): moist sands, ditches, wet disturbed places; rare, native of Asia, now widespread in the tropics and subtropics of both hemispheres. May-October. This species apparently arrived in the se. United States earlier than *M. keisak* (S, for instance, treats this species and not *M. keisak*), but is distinctly less common. [= FNA, GW, K, Z; = *Aneilema nudiflorum* (Linnaeus) Sweet – RAB, S]

Tradescantia Linnaeus 1753 (Spiderwort)

A genus of about 70 species, herbs, of the New World. References: Faden in FNA (2000); Anderson & Woodson (1935)=Y; Tucker (1989)=Z; Faden in Kubitzki (1998b). [also see *Callisia* and *Cuthbertia*]

1 Plant sprawling, rooting at the nodes; leaves 2.5-5 cm long, < 4× as long as wide; [exotic] ..... ***T. fluminensis***
1 Plant erect or ascending, not rooting at the nodes; leaves > 4 cm long, > 5× as long as wide; [native].
  2 Leaf blades of the upper stem constricted at their bases to a narrower subpetiolar sheath, the opened sheath narrower than the leaf blade; leaf blades 6-27 cm long, 1.0-5.0 cm wide, mostly < 10× as long as wide; stomates much more abundant on the lower leaf surface than on the upper, giving the lower surface a much paler color.
    3 Pedicels 2.0-3.2 cm long; sepals 9-16 mm long ..... ***T. ernestiana***
    3 Pedicels 1.0-1.7 cm long; sepals 4-10 mm long ..... ***T. subaspera***
  2 Leaf blades of the upper stem not constricted to a subpetiolar sheath, the opened sheath about as wide or wider than the leaf blade; leaf blades 11-45 cm long, 0.4-2.0 (-4.5) cm wide, mostly > 10× as long as wide; stomates slightly more abundant on the lower leaf surface than on the upper, or about equally distributed on the two surfaces, the lower surface slightly to not at all paler than the upper.
    4 Sepals, pedicels, and ovary pubescent with glandular hairs or a mixture of glandular and eglandular hairs; leaves slightly to densely puberulent or pubescent.

5 Leaves dull green, densely pilose (rarely glabrate); sepals, pedicels, and ovary pubescent with a mixture of glandular and eglandular hairs; pedicels 2.0-3.5 cm long ..... ***T. hirsuticaulis***
5 Leaves glaucous to subglaucous, puberulent; sepals, pedicels, and ovary puberulent with glandular hairs only; pedicels 1.2-2.5 cm long ..... ***T. roseolens***
4 Sepals, pedicels, and ovary glabrous or pubescent with eglandular hairs only (use 10× magnification); leaves glabrous or pilose at the junction of the blade and the sheath (or pilose throughout in *T. hirsutiflora*).
6 Pedicels pubescent; sepals eglandular-villous; leaves green; sepals green, inflated-turgid (*T. virginiana*) or not (*T. hirsutiflora*).
7 Stems usually hirsute or pilose throughout; roots 1.0-1.5 (-2.0) mm thick; sepals not inflated ..... ***T. hirsutiflora***
7 Stems glabrous, or sparsely puberulent on the upper stem only; roots (1.5-) 2.0-4.0 mm thick; sepals usually inflated ..... ***T. virginiana***
6 Pedicels glabrous; sepals glabrous or the tip with a tuft of eglandular hairs; leaves glaucous or green; sepals glaucous (or rarely also suffused with purple), not inflated-turgid.
8 Plants distinctly glaucous; leaves 5-45 cm long, arcing, at an acute angle to the stem ..... ***T. ohiensis***
8 Plants green or slightly glaucous; leaves 4-11 cm long, straight, at nearly right angles to the stem ..... ***[T. paludosa]***

Tradescantia ernestiana E.S. Anderson & Woodson. Mt (GA): {habitat}; rare. Primarily Ozarkian (AR, MO, OK, disjunct east to nw. GA and ne. AL, and west to n. TX (Faden in FNA 2000). [= FNA, K, Y, Z; < *T. pilosa* J.G.C. Lemaire – S]

* ***Tradescantia fluminensis*** Vellozo, Wandering Jew. Cp (GA): disturbed areas; rare, introduced and naturalized from GA south and west. [= FNA, K, Z]

Tradescantia hirsuticaulis Small, Hairy Spiderwort. Mt (NC, SC), Pd (GA, SC), Cp (GA): dry rocky woodlands, and rock outcrops (especially granitic flatrocks and domes); rare (NC Watch List). April-June. W. NC and w. SC southwest to n. GA and n. AL; disjunct in AR and e. OK (its core range). There is some question about the validity of this species. [= RAB, FNA, K, W, Y, Z]

Tradescantia hirsutiflora Bush. Cp (GA, SC): sandhills; rare. C. SC (Richlands County), s. and e. GA and FL panhandle, west to TX. Reported for SC (Richland Co.) (P. McMillan 2003). [= FNA, K, Y, Z; >< *T. hirsuticaulis* – S, misapplied]

Tradescantia ohiensis Rafinesque, Smooth Spiderwort. Mt, Pd, Cp (GA, NC, SC, VA): woodlands and forests, alluvial bottoms, disturbed areas; common. April-July. MA west to MN, south to FL and TX, some of that range the result of naturalization from cultivation. [= RAB, C, F, FNA, G, K, W, Z; ? *T. reflexa* Rafinesque – S; ? *T. canaliculata* Rafinesque – Y]

Tradescantia roseolens Small, Sandhill Spiderwort. Cp, Pd (GA, SC): dry sandy woodlands; rare (GA Rare). May-June. SC south through GA to c. peninsular FL. [= RAB, FNA, K, Y, Z; = *T. longifolia* Small – S]

Tradescantia subaspera Ker-Gawler, Wide-leaved Spiderwort. Mt (GA, NC, SC, VA), Pd (GA, NC, SC), Cp (GA): dry to mesic woodlands and forests; common (VA Watch List). June-July. Nc. NC, w. VA, WV, OH, IN, IL, and MO, south to NC, SC, sw. GA, Panhandle FL, and AL. Two questionable varieties are sometimes recognized. Var. *subaspera* may be distinguished by the stem conspicuously zigzag above, except on depauperate or juvenile plants (vs. the stems straight or only slightly zigzag), uppermost lateral cymes sessile or short-pedunculate (vs. pedunculate throughout), uppermost internodes very reduced, crowding the upper leaves (vs. internodes less reduced), leaves much broader than the sheath (vs. only slightly broader), and its generally greater size than var. *montana*. *T. subaspera* var. *montana* ranges from sw. VA and c. WV south to nw. SC, n. GA, and se. TN, with disjunct occurrences in c. AL and panhandle FL. Var. *subaspera* ranges from WV west to n. IL, south to se. TN, ne. AR, and s. MO, with disjunct occurrences in NC. [= RAB, FNA, W; > *T. subaspera* Ker-Gawler var. *montana* (Shuttleworth ex Britton) E.S. Anderson & Woodson – C, F, G, K, Y, Z; > *T. subaspera* var. *subaspera* – C, F, G, K, Y, Z; < *T. pilosa* J.G.C. Lemaire – S]

Tradescantia virginiana Linnaeus, Virginia Spiderwort. Pd (GA, NC, SC, VA), Mt (GA, VA), Cp (VA): nutrient-rich forests and woodlands; common (rare south of VA) (NC Rare, SC Rare). April-July. ME west to MI and WI, south to n. GA, MO, and AR. [= RAB, C, F, FNA, G, K, S, W, Y, Z; ? *T. brevicaulis* Rafinesque – S]

Tradescantia paludosa E.S. Anderson & Woodson. Swamps and bottomlands. Coastal Plain of AL and FL (?) west to TX and AR. March-May. [= FNA, K, Y, Z; = *T. ohiensis* Rafinesque var. *paludosa* (E.S. Anderson & Woodson) D.T. MacRoberts]

CYMODOCEACEAE N. Taylor 1909 (Manatee-grass Family)

A family of about 5 genera and 16 species, estuarine aquatics, of tropical and subtropical (rarely temperate) waters. References: Kuo & McComb in Kubitzki (1998b); Haynes in FNA (2000); Green & Short (2003).

1 Leaves flat above the sheath; leaf tips 3-toothed; female plants with flowers with 1 pistil ..... ***Halodule***
1 Leaves terete or subterete above the sheath; leaf tips acicular; female plants with flowers with 1-2 pistils ..... ***Syringodium***

Halodule Endlicher 1841 (Shoal-grass)

A genus of about 6 species, of tropical and subtropical regions of both hemispheres. References: Haynes in FNA (2000); McRoy & Helfferich (1977); Kuo & McComb in Kubitzki (1998b); Green & Short (2003)=Z.

Halodule wrightii Ascherson, Shoal-grass. Cp (FL, NC, SC?): submerged in estuarine waters up to about 2 m deep, especially in Core and Pamlico sounds (North Carolina); common. E. NC (reported with unknown documentation from SC, not known from GA); FL west to TX, and south along shores of the Gulf of México and Caribbean; also on the Pacific coast of Panama and Nicaragua. Haynes in FNA (2000) concludes that *H. beaudettei* is not taxonomically distinct from *H. wrightii* (the older name). Seagrasses (an informal group including species such as *Halodule wrightii, Zostera marina*, and *Ruppia maritima*

in our area) are very important components of estuarine ecosystems, providing a large proportion of the primary productivity in such systems and providing shelter and nursery grounds for fish, shrimp, and other invertebrates. An estimated 80,000 hectares of seagrass beds are found in Pamlico and Core sounds, NC, most of that area having *Halodule* as the co-dominant or dominant species (Ferguson, Rivera, & Wood 1989). There is concern about the destruction of seagrass beds by pollution, dredging of waterways, and mechanical disturbance by fishing boats (Koch & Orth 2003; Green & Short 2003). [= FNA, S, WH, Z; > *H. beaudettei* (den Hartog) den Hartog – RAB, GW, K]

Syringodium F.T. Kützing in R.F. Hohenacker 1860 (Manatee-grass)

A genus of 2 species, seagrasses, of the Caribbean and Indo-West Pacific. References: Haynes in FNA (2000); Kuo & McComb in Kubitzki (1998b); Green & Short (2003)=Z.

Syringodium filiforme F.T. Kützing in R.F. Hohenacker, Manatee-grass. Cp (FL): estuarine waters; rare. Panhandle FL, peninsular FL, westward along the Gulf Coast, and in the West Indies. *Syringodium* is occasionally cast ashore in Georgia and the Carolinas following hurricanes, but there is no evidence that it grows in our area. [= FNA, WH, Z; = *Cymodocea filiformis* (F.T. Kützing in R.F. Hohenacker) Correll – GW, K; = *Cymodocea manatorum* Ascherson – S]

CYPERACEAE A.L. de Jussieu 1789 (Sedge Family)

A family of about 100 genera and 5000 species, mostly herbs, cosmopolitan. References: Ball, Reznicek, & Murray in FNA (2002b); Tucker (1987); Goetghebeur in Kubitzki (1998b).

1 Achene enclosed in a perigynium (a sac-like structure); [subfamily *Caricoideae*, tribe *Cariceae*].
  2 Leaf blades 0.5-25 (-52) mm wide, with a midrib, herbaceous, the apex acute; leaf margin various (smooth or scabrous, but not as described below) ..... ***Carex***
  2 Leaf blades 20-60 mm wide, without a midrib (with 40-100 parallel nerves all of equal prominence), leathery, the apex obtuse; leaf margin scarious, minutely crisped-ruffled (feeling scaberulous to the touch) ..... ***Cymophyllus***
1 Achene not enclosed in a perigynium.
  3 Scales distichously imbricate; spikelets aggregated into spikes or heads; [subfamily *Cyperoideae*].
    4 Inflorescence axillary; leaves predominantly cauline, conspicuously 3-ranked; perianth bristles subtending the achene 6-9; [tribe *Dulichieae*] ..... ***Dulichium***
    4 Inflorescence terminal, more-or-less scapose (though immediately subtended by leafy bracts); leaves predominantly basal, not 3-ranked; perianth bristles absent; [tribe *Cypereae*].
      5 Inflorescences branched; spikelets 1-many-flowered; rachilla elongate; scales broadly rounded ..... ***Cyperus***
      5 Inflorescences unbranched (the spikelets sessile); spikelets 1-2-flowered; rachilla not or only slightly elongate; scales conspicuously keeled ..... ***Kyllinga***
  3 Scales spirally imbricate; spikelets not usually aggregated.
    6 Achene (when ripe) bony and white; style base persistent on the summit of the achene, forming a differently-textured or differently-colored tubercle; spikelets all imperfect, the pistillate ones 1-flowered, the staminate ones several-flowered; [subfamily *Sclerioideae*, tribe *Sclerieae*] ..... ***Scleria***
    6 Achene mostly brown, black, or tan; style base persistent as a differentiated tubercle (*Bulbostylis, Eleocharis, Rhynchospora*) or not (*Cladium, Eriophorum, Fuirena, Hemicarpha, Isolepis, Lipocarpha, Schoenoplectus, Scirpus, Trichophorum*); spikelets mostly or all perfect; [subfamily *Cyperoideae*].
      7 Style base persistent as a differentiated tubercle (this small and inconspicuous in *Bulbostylis* and some spp. of *Rhynchospora*).
        8 Leaves consisting of bladeless sheaths; spikelet 1 per stem, terminal (very rarely proliferating and with > 1 spikelet); [tribe *Eleocharideae*] ..... ***Eleocharis***
        8 Leaves with well-developed blades; spikelets few to many per stem, usually subtended by foliaceous bracts.
          9 Perianth bristles absent; spikelets several-many-flowered; leaves capillary; [tribe *Abildgaardieae*] ..... ***Bulbostylis***
          9 Perianth bristles present (rarely absent in species without capillary leaves); spikelets 1-2-flowered (several-many-flowered in some species without capillary leaves); leaves capillary to broad; [tribe *Schoeneae*] ..... ***Rhynchospora***
      7 Style base not persistent as a differentiated tubercle.
        10 Achene not subtended by bristles or scales (in addition to the scales of the spikelets).
          11 Involucral bracts 1-3, the lowest erect, appearing like a continuation of the culm, the inflorescence therefore appearing lateral.
            12 Achenes 0.5-0.7 mm long, 1.8-3× as long as wide, minutely papillose in longitudinal lines; [tribe *Cypereae*] ..... ***Lipocarpha***
            12 Achenes 1.2-1.5 mm long, 1-1.4× as long as wide, minutely pitted or transversely rugose.
              13 Achenes minutely pitted in longitudinal lines; [tribe *Cypereae*] ..... ***Isolepis***
              13 Achenes transversely rugose; [tribe *Fuireneae*] ..... ***Schoenoplectus erectus***
          11 Involucral bracts 2-several, spreading, the inflorescence therefore appearing terminal.
            13 Plants diminutive, to 5 dm tall; leaves 3-15 cm long, to 1 mm wide; [tribe *Abildgaardieae*] ..... ***Bulbostylis***
            13 Plants moderate to very robust, 7-30 dm tall; leaves 30-150 cm long, 1.5-15 mm wide.
              14 Flowers 1-2 per spikelet; [tribe *Schoeneae*] ..... ***Cladium***
              14 Flowers several-many per spikelet.
                15 Style fimbriate; leaves 0.5-5 mm wide; [tribe *Abildgaardieae*] ..... ***Fimbristylis***
                15 Style smooth; leaves (2-) 5-18 mm wide; [tribe *Scirpeae*] ..... ***Scirpus georgianus***
        10 Achene subtended by either bristles, 3 stalked paddle-like scales, or 1-2 broad-based scales (in addition to the scales of the spikelets).
          16 Achene subtended by stalked paddle-like scales or broad-based scales.
            17 Achene subtended by a perianth of 3 stalked paddle-like scales; plants 2-7 dm tall; [tribe *Fuireneae*] ..... ***Fuirena***
            17 Achene lacking a perianth, but subtended by 1-2 broad-based scales; plants 0.5-3 dm tall; [tribe *Cypereae*] ..... ***Lipocarpha***

16 Achene subtended by bristles.
  18 Bristles 10-many, > 5× as long as the achene, white to tawny, straight; [tribe *Scirpeae*] ..... ***Eriophorum***
  18 Bristles 1-6, usually < 4× as long as the achene, brown, straight or conspicuously twisted (twisted if > 3× as long as the achene).
    19 Involucral bracts lacking, or consisting only of the slightly modified basal scales of the solitary and terminal spikelet; [of hillsides, upland forests, or cliffs; never (in our area) in marshes, bogs, or streambeds]; [tribe *Scirpeae*] ..... ***Trichophorum***
    19 Involucral bracts present, consisting either of a single, erect bract appearing as a continuation of the culm (the inflorescence thus appearing lateral) or of 2 or more spreading, foliaceous bracts (the inflorescence thus appearing terminal); [of marshes, bogs, streambeds, ditches, or (rarely) terrestrial or on rock outcrops].
      20 Main involucral bract 1 (rarely 2), erect, appearing as a continuation of the culm (the inflorescence thus appearing lateral, though in some species the longer inflorescence branches may overtop the bract); [tribe *Fuireneae*] ..... ***Schoenoplectus***
      20 Main involucral bracts 2-8, spreading and foliaceous (the inflorescence thus appearing terminal).
        21 Spikelets 10-40 mm long, 6-12 mm in diameter, 3-50 per culm; [tribe *Fuireneae*] ..... ***Bolboschoenus***
        21 Spikelets 2.5-19 mm long, 2-4 mm in diameter, usually > 50 per culm; [tribe *Scirpeae*] ..... ***Scirpus***

Bolboschoenus Palla 1905 (Bulrush)

A genus of about 10-16 species, herbs, cosmopolitan. The distinction of this genus from *Schoenoplectus* is uncertain and controversial; it is generally accepted in the Old World, and generally not in the New World. References: Smith in FNA (2002b); Strong (1994)=Z; Goetghebeur in Kubitzki (1998b).

1 Ventral summit of leaf sheaths truncate or concave, the nerves destined for the leaf margins diverging gradually ..... ***B. maritimus*** *ssp.* ***paludosus***
1 Ventral summit of leaf sheaths convex, the nerves destined for the leaf margins diverging abruptly, making a nearly right-angle bend.
  2 Bristles mostly equalling to surpassing the distinctly trigonous achene ..... ***B. fluviatilis***
  2 Bristles shorter than to equalling the lenticular or plano-convex achene.
    3 Inflorescence relatively open, with (10-) 15-50 spikelets; bristles persistent ..... ***B. novae-angliae***
    3 Inflorescence relatively congested, mostly with 5-20 spikelets; bristles more or less caducous ..... ***B. robustus***

Bolboschoenus fluviatilis (Torrey) J. Soják, River Bulrush. Cp, Mt (VA): tidal and river marshes; rare (VA Rare). June-early July; July-August. New Brunswick west to Saskatchewan, British Columbia (Vancouver Island) and WA, south to VA, OH, IN, KS, AZ, and CA; disjunct in s. AL. [= FNA; = *Scirpus fluviatilis* (Torrey) A. Gray – C, F, G; = *Schoenoplectus fluviatilis* (Torrey) M.T. Strong – K, Z]

Bolboschoenus maritimus (Linnaeus) Palla *ssp.* ***paludosus*** (A. Nelson) T. Koyama, Alkali Bulrush, Salt-marsh Bulrush. Cp (VA): marshes; rare (VA Watch List). Interruptedly circumboreal, south in North America to VA, NY, MN, MO, OK, TX, and Mexico. [= FNA; > *Scirpus maritimus* var. *maritimus* – C; < *Scirpus maritimus* var. *fernaldii* (Bicknell) Beetle – F (also see *Bolboschoenus novae-angliae*); = *Scirpus maritimus* var. *fernaldii* (Bicknell) Beetle – G; < *Scirpus maritimus* Linnaeus; < *Schoenoplectus maritimus* (Linnaeus) Lye – K, Z]

Bolboschoenus novae-angliae (Britton) S.G. Smith, Salt-marsh Bulrush. Cp (NC, VA): fresh to brackish tidal marshes, ditches; rare (VA Watch List). Late June-July; July-September. ME to GA. Proabbaly a hybrid derivative of *Bolboschoenus fluviatilis* and *B. robustus*, but its distinctiveness and ecological behavior suggest that it should be treated as a species; see Schuyler (1975) and Cronquist (1991) for additional discussion. [= FNA; = *Scirpus cylindricus* (Torrey) Britton – C, K, Beal (1977), illegitimate name; < *Scirpus maritimus* var. *fernaldii* (Bicknell) Beetle – F; = *Scirpus robustus* Pursh var. *novae-angliae* (Britton) Beetle – G; = *Schoenoplectus novae-angliae* (Britton) M.T. Strong – K, Z]

Bolboschoenus robustus (Pursh) J. Soják, Salt-marsh Bulrush. Cp (GA, NC, SC, VA), Mt (VA): brackish marshes; common (rare in Mountains). Late May-June (-September); late June-September. Along the coasts, from Nova Scotia to FL, west to TX, and into tropical America; also in CA. [= FNA; = *Scirpus robustus* Pursh – RAB, C, F, GW, S, W; = *Scirpus robustus* var. *robustus* – G; = *Schoenoplectus robustus* (Pursh) M.T. Strong – K, Z]

Bulbostylis Kunth (Hairsedge)

A genus of about 100 species, herbs, of tropical and warm temperate areas, concentrated especially in tropical Africa and tropical South America. References: Kral (1971)=Z; Kral in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Spikelets sessile, the inflorescence therefore a capitate cluster (sometimes a few spikelets pedicellate, but the pedicels not generally longer than the spikelets, the inflorescence still appearing glomerate).
  2 Inflorescence bracts widened abruptly at its base, the widened portion prominently fimbriate-pectinate; perennial, culms 10-50 cm tall; achene 1-1.3 mm long, white or yellowish, the apex retuse (the three lobes projecting beyond and surrounding the tubercle) ..... ***B. warei***
  2 Inflorescence bracts not widened abruptly at its base, the membranous margins smooth or ciliate; annual, culms 5-35 cm tall; achene 0.5-1.2 mm long, pale brown or gray, the apex rounded or truncate (the three lobes not exceeding the tubercle).
    3 Inflorescence bracts numerous and conspicuous, several much exceeding the cluster of spikelets; achenes 0.8-1.2 mm long, transversely rugose; spikelet scales usually greenish or pale brown, dull, puberulent ..... ***B. stenophylla***
    3 Inflorescence bracts few and inconspicuous, none or sometimes one exceeding the cluster of spikelets (and then only slightly); achenes 0.5-0.6 mm long, finely reticulate; spikelet scales usually reddish-brown, lustrous, smooth or nearly so ..... ***B. barbata***
1 Spikelets mostly on slender pedicels, the inflorescence therefore open and umbel-like.
  4 Achenes finely transversely rugose, tan or brown (when ripe); spikelet scales 1.5-2.0 mm long, with truncate apices ..... ***B. capillaris***

4 Achenes very finely papillose and waxy, gray or dark greenish-brown (when ripe); spikelet scales 0.7-1.8 mm long, with obtuse to rounded apices.
  5 Annual, to 1-2 (-3) dm tall; inflorescence a simple (rarely compound) umbel of few (3-9) lance-ovoid spikelets; longest involucral bract seldom exceeding the inflorescence; leaf margins usually hispidulous ..... ***B. ciliatifolia***
  5 Perennial, to 1.5-4 dm tall; inflorescence a compound (rarely simple) umbel of many (8-30) oblong or lance-linear spikelets; longest involucral bract commonly exceeding the inflorescence; leaf margins usually distinctly tuberculate-scabrid..... ***B. coarctata***

* ***Bulbostylis barbata*** (Rottbøll) C.B. Clarke, Old World Hairsedge. Cp (GA, NC, SC), Pd (GA, NC, SC, VA): sandy fields; common, native of the Old World tropics (rare and apparently not established in VA). July-October. [= RAB, FNA, GW, K, W, Z; = *Stenophyllus barbatus* (Rottbøll) Britton – S]

Bulbostylis capillaris (Linnaeus) Kunth ex C.B. Clarke, Common Hairsedge. Mt, Pd, Cp (GA, NC, SC, VA): thin soils on rock outcrops, especially granite domes and granite flatrocks (but also on mafic rocks, such as diabase), sandy soils, fields; common. July-October. ME to MN, south to FL and TX, and west to AZ and CA, also in Mexico, Central America, the West Indies, and s. Asia. This species frequently has a mixture of long and very short culms, the short culms only a few cm long and thus nearly hidden amongst the leaves. [= RAB, C, FNA, G, GW, W, Z; > *B. capillaris* var. *crebra* Fernald – F; > *B. capillaris* var. *isopoda* Fernald – F; = *B. capillaris* ssp. *capillaris* – K; = *Stenophyllus capillaris* (Linnaeus) Britton – S]

Bulbostylis ciliatifolia (Elliott) Fernald, Savanna Hairsedge. Cp (GA, NC, SC, VA): moist to wet sands of savannas, roadsides, disturbed areas; common (VA Watch List). July-October. Se. VA south to s. FL and west to s. AL. Kral (1971) describes this plant as occurring in generally wetter habitats and being much weedier than *B. coarctata*. The sympatry of this taxon and *B. coarctata* suggests that they are best recognized as species. [= F, G; = *Bulbostylis ciliatifolia* (Elliott) Fernald *var. ciliatifolia* – C, FNA, GW, K, Z; < *B. ciliatifolia* – RAB (also see *B. coarctata*); = *Stenophyllus ciliatifolius* (Elliott) C. Mohr – S]

Bulbostylis coarctata (Elliott) Fernald, Elliott's Hairsedge. Cp (GA, NC, SC, VA): sandhills, usually associated with longleaf pine and wiregrass; uncommon (VA Watch List). July-October. Se. VA south to s. FL and west to e. TX, north in the interior to sw. TN. [= F, G; = *Bulbostylis ciliatifolia* (Elliott) Fernald *var. coarctata* (Elliott) Kral – C, FNA, GW, K, W, Z; < *B. ciliatifolia* – RAB; = *Stenophyllus coarctatus* (Elliott) Britton – S]

Bulbostylis stenophylla (Elliott) C.B. Clarke. Cp (GA, NC, SC): sandhills, dry savannas, and disturbed sandy areas; uncommon. July-October. Se. NC south to s. FL, west to w. FL, and in Cuba. [= RAB, FNA, GW, K, Z; = *Stenophyllus stenophyllus* (Elliott) Britton – S]

Bulbostylis warei (Torrey) C.B. Clarke, Ware's Hairsedge. Cp (GA, NC, SC): sandhills; rare (NC Rare). July-October. Se. NC south to s. FL and west to s. AL. [= RAB, FNA, GW, K, Z; = *Stenophyllus warei* (Torrey) Britton – S]

Carex Linnaeus 1753 (Sedge)

(by Alan S. Weakley, with assistance from Bruce A. Sorrie and Thomas F. Wieboldt)

A genus of about 2000 (or more) species, herbs, cosmopolitan, especially temperate and boreal. References: Mackenzie (1931-1935)=M; Ball & Reznicek in FNA (2002b); Goetghebeur in Kubitzki (1998b); Frye & Lea (2001). Key to sections adapted closely from FNA.

Key to the keys to the sections of *Carex*

1 Spike 1 per culm, all flowers attached to the main stem in a terminal spike ..... **Key A**
1 Spikes 2 or more per culm (some flowers in lateral spikes)
  2 All flowers staminate ..... **Key B**
  2 At least some flowers pistillate.
    3 Stigmas 2; achenes flat or biconvex in cross-section (lenticular) ..... **Key C**
    3 Stigmas (2-) 3 (-4); achenes trigonous or terete in cross-section.
      4 Body of perigynium pubescent, scabrous, hispid, or papillose (if papillose, the papillae longer than wide) ..... **Key D**
      4 Body of perigynium glabrous or papillose (if papillose the papillae shorter than wide).
        5 Bracts sheathless or with sheath < 4 mm long (rarely longer, and then the sheath shorter than the diameter of the stem) ..... **Key E**
        5 Bracts (at least the lower) with sheath > 4 mm long (and longer than the diameter of the stem) ... **Key F** {not complete at this time}

Key A

1 Spike entirely staminate
  2 Culms distinctly red or purple at the base ..... ***C. picta*** in **Section 41: *Pictae***
  2 Culms yellow to brown or black, without red or purple coloration.
    3 Culms shorter than the leaves; widest leaf blades > 2 mm wide ..... **Section 44: *Phyllostachyae***
    3 Culms longer than the leaves; widest leaf blades < 2 mm wide ..... ***C. exilis*** in **Section 11: *Stellulatae***
1 Spike pistillate or with both pistillate and stamainate flowers.
  4 Stigmas 2; achenes lenticular ..... ***C. exilis*** in **Section 11: *Stellulatae***
  4 Stigmas 3; achenes trigonous.
    5 Perigynia pubescent near the tip ..... ***C. picta*** in **Section 41: *Pictae***
    5 Perigynia glabrous.
      6 Spikes gynecandrous; beak of perigynium with apical teeth > 0.3 mm long ..... ***C. squarrosa*** in **Section 34: *Squarrosae***
      6 Spikes androgynous or entirely pistillate; beak of perigynium with apex entire, emarginate, or with teeth < 0.2 mm long.
        7 Lower pistillate scales > 10 mm long ..... **Section 44: *Phyllostachyae***

7 Lower pistillate scales < 10 mm long.
8 Perigynium beak > 2 mm long, as long as or longer than the perigynium body ..... **Section 44: *Phyllostachyae***
8 Perigynium beak < 2 mm long, or if more, thentapering to the perigynium body and shorter than the body.
9 Perigynia > 4× as long as wide ..... ***C. pauciflora* of Section 38: *Leucoglochin***
9 Perigynia < 4× as long as wide.
10 Perigynia with veins on the faces, distinct at least over the achene ..... **Section 46: *Leptocephalae***
10 Perigynia with 2 marginal veins, otherwise veinless or with faint veins at the base only ..... ***C. geyeri* in Section 45: *Firmiculmes***

Key B

1 Widest leaves 4-8 mm wide; inflorescences more-or-less capitate (occasionally with the lowermost 1 or 2 spikes separated ..... ***C. kobomugi* in Section 8: *Macrocephalae***
1 Widest leaves 1-4 mm wide; inflorescences ovoid to cylindric ..... **Section 10: *Divisae***

Key C

1 Perigynia pubescent, not papillose ..... **Section 39: *Acrocystis***
1 Perigynia glabrous, papillose or not.
2 Lateral spikes usually pedunculate; lowermost inflorescence bracts sometimes with sheath; peduncles with prophyll at base.
3 Pistillate scales (at least the lower) long-awned ..... **Section 13: *Phacocystis***
3 Pistillate scales obtuse to acuminate or cuspidate.
4 Perigynia smooth; style persistent on the achene ..... **Section 30: *Vesicariae***
4 Perigynia often papillose over most of the surface; style deciduous ..... **Section 13: *Phacocystis***
2 Lateral spikes sessile; bracts sheathless; peduncles without (or rarely with) a prophyll
5 Perigynia papillose (visible at 20× magnification).
6 Terminal spike staminate, androgynous, or gynecandrous (if gynecandrous, the staminate flowers more numerous than the pistillate); lateral spikes at least 2× as long as wide ..... **Section 13: *Phacocystis***
6 Terminal spike staminate or gynecandrous (if gynecandrous, the pistillate flowers more numerous than the pistillate); lateral spikes not much longer than wide ..... **Section 9: *Glareosae***
5 Perigynia smooth.
7 Terminal spike gynecandrous; lateral spikes gynecandrous or pistillate.
11 Margins of perigynia flat, at least in the upper ½, flat portion (measured at the tip of the achene and base of beak) > (0.1-) 0.2 mm wider
12 Achenes rounded at apex (style dehiscing at the surface of the achene); style conspicuously enlarged at the base ..... **Section 10: *Deweyanae***
12 Achenes with short apiculus formed by the persistent base of the style; style not conspicuously enlarged at base ..... **Section 12: *Ovales***
11 Margins of perigynia rounded, or with flat portion < 0.1 mm wide.
13 Margins of perigynia rounded or with a very narrow rounded edge; achenes nearly filling the perigynium bodies ..... **Section 9: *Glareosae***
13 Margins of perigynia sharply edged or narrowly winged; achenes distinctly smaller than the perigynium bodies.
14 Inflorescences in fruit 1-1.5× as long as wide ..... **Section 12: *Ovales***
14 Inflorescences in fruit 1.5-2 (or more)× as long as wide.
15 Lowermost perigynia in each spike spreading ..... **Section 11: *Stellulatae***
15 Lowermost perigynia in each spike ascending or erect.
16 Perigynium serrulate on the margins of the upper body and lower beak ..... **Section 10: *Deweyanae***
16 Perigynium entire on the margins of the upper body and the lower beak ..... **Section 12: *Ovales***
7 Terminal spike androgynous (rarely entirely staminate or entirely pistillate); lateral spikes androgynous, staminate, or pistillate.
8 Sheath fronts of lower cauline leaves transversely rugose.
9 Perigynia mostly > 2× as long as wide, widest near the base ..... **Section 1: *Vulpinae***
9 Perigynia mostly < 2× as long as wide, widest near middle.
10 Inflorescence usually branched, at least at the base, usually with > 15 spikes; pistillate scales usually yellow or brown, sometimes with hyaline margins, 3-veined ..... **Section 3: *Multiflorae***
10 Inflorescence unbranched or with 1 or 2 short branches at the base, with < 15 spikes; pistillate scales greenish hyaline, 1-veined ..... **Section 4: *Phaestoglochin***
8 Sheath fronts of lower cauline leaves smooth (or very weakly and indistinmctly transversely rugose).
17 Fronts of leaf sheaths dotted red, brown, or yellow.
18 Perigynia widest near the base; culms usually > 1 mm wide ..... **Section 1: *Vulpinae***
18 Perigynia widest near the middle; culms usually < 1 mm wide.
19 Plants densely cespitose, with short rhizomes; pistillate scales acute to acuminate ..... **Section 2: *Heleoglochin***
19 Plants loosely cespitose, sometimes with long rhizomes; pistillate scales (at least the upper) obtuse ..... **Section 3: *Multiflorae***
17 Fronts of leaf sheaths not dotted red, brown, or yellow.
20 Upper leaves of culms with front of sheaths green-veined, not differentiated from thye rest of the sheath ..... **Section 5: *Holarrhenae***
20 Upper leaves of culms with front of sheaths with at least a narrow hyaline or whitish-hyaline band extending at least ½ the length of the sheath.
21 Perigynia with flat, winglike margins > 0.1 mm wide; plants long-rhizomatous, not cespitose, sometimes forming large colonies ..... **Section 7: *Ammoglochin***

21 Perigynia without a flat margin, or with a flat margin < 0.1 mm wide; plants short-rhizomatous or inconspicuously rhizomatous, cespitose or not, sometimes forming large colonies.
22 Plants colonial from long rhizomes ..... **Section 6: *Divisae***
22 Plants cespitose.
23 Spikes not consistently androgynous, the terminal either entirely staminate or pistillate, the lateral spikes irregularly pistillate, or staminate, or mixed ..... **Section 11: *Stellulatae***
23 Spikes consistently androgynous, occasionally some of the lateral spikes entirely pistillate.
24 Perigynium widest near the base, tapering from base to beak ..... **Section 1: *Vulpinae***
24 Perigynium widest above the base, often abruptly beaked ..... **Section 4: *Phaestoglochin***

Key D

1 Pistillate spikes all from the base of the plant ..... **Section 39: *Acrocystis***
1 Pistillate spikes all or in part borne on the elongate, aboveground stem.
2 Bracts of the lowermost non-basal spike with well-developed sheath > 4 mm long.
3 Beak of perigynium with distinct teeth > 0.6 mm long ..... **Section 29: *Carex***
3 Beak of perigynium entire, notched, or with indistinct teeth < 0.6 mm long.
4 Bracts of the lowermost non-basal spike bladeless, or with a blade < 2 mm long.
5 Perigynia 2.0-2.9 mm long; leaf blades 0.9-3.3 mm wide ..... ***C. richardsonii*** in **Section 40: *Clandestinae***
5 Perigynia 4-5 mm long; leaf blades 4-8 mm wide ..... ***C. baltzellii*** in **Section 41: *Pictae***
4 Bracts of the lowermost non-basal spike with blade > 3 mm long (and often much longer).
6 Achene tip with persistent, enlarged, circular style base ..... ***C. caryophyllea*** in **Section 42: *Mitratae***
6 Achene tip with at most a short apiculus.
7 Leaves pubescent or pilose ..... **Section 23: *Hymenochlaenae***
7 Leaves usually glabrous.
8 Bases of plants brown ..... ***C. tenax*** in **Section 26: *Hallerianae***
8 Bases of plants distinctly red or purple.
9 Lowermost pistillate scales awned; leaves somewhat septate-nodulose; plants usually long-rhizomatous and forming large clonal colonies ..... **Section 28: *Paludosae***
9 Lowermost pistillate scales obtuse to acuminate; leaves not septate-nodulose; plants cespitose, short-rhizomatous ..... **Section 23: *Hymenochlaenae***
2 Bracts of the lowermost non-basal spike sheathless or with sheath < 4 mm long.
10 Perigynia > 10 mm long.
11 Pistillate spoikes globose, about as long as wide; staminate spikes usually 1 ..... **Section 31: *Lupulinae***
11 Pistillate spikes cylindric, much longer than wide; staminate spikes 1-8 ..... **Section 29: *Carex***
10 Perigynia < 10 mm long.
12 Perigynium beak with 2 teeth > 0.6 mm long ..... **Section 29: *Carex***
12 Perigynium beak entire or with teeth < 0.6 mm long.
13 Terminal spike gynecandrous or pistillate ..... **Section 24: *Porocystis***
13 Terminal spike staminate (or rarely androgynous).
14 Leaf sheaths (and usually the blades as well) pubescent.
15 Pistillate scales sometimes pubescent; pistillate spikes with 40-200 perigynia ..... **Section 28: *Paludosae***
15 Pistillate scales glabrous; pistillate spikes with < 40 (-50) perigynia.
16 Perigynia usually < 3.2 mm long, the apex rounded and beakless, or abruptly beaked ..... **Section 24: *Porocystis***
16 Perigynia > 3.5 mm long, the tip tapering or abruptly beaked.
17 Longer peduncles of pistillate spikes > 1 cm long; perigynia > 3× as long as wide, tapering gradually to the base ..... **Section 23: *Hymenochlaenae***
17 Longer peduncles of pistillate spikes 0-1 cm long; perigynia < 3× as long as wide, abruptly contracted to a short stipe at the base.
18 Perigynia distinctly 20-30-veined; beak < 0.5 mm long ..... **Section 26: *Hallerianae***
18 Perigynia veinless except for 2 marginal veins; beak > 0.7 mm long ..... **Section 27: *Hirtifoliae***
14 Leaf sheaths and blades glabrous.
19 Achene tip with persistent, enlarged, circular style base ..... ***C. caryophyllea*** in **Section 42: *Mitratae***
19 Achene tip with at most a short apiculus.
20 Leaf blades scabrous on the upper surface; beak of perigynium recurved ..... ***C. scabrata*** in **Section 25: *Anomalae***
20 Leaf blades glabrous on the upper surface, often with rough margins or tip; beak of perigynium straight.
21 Fronts of sheaths of lower leaves ladder-fibrillose; leaves and sheaths septate-nodulose (sometimes obscurely so) ..... **Section 28: *Paludosae***
21 Fronts of leaf sheaths not ladder-fibrillose, sometimes breaking into longitudinal fibers; leaves and sheaths not septate-nodulose.
22 Perigynia strongly 12-30-veined.
23 Leaf blades, at least towards the tip, M-shaped in cross-section when young, the upper surface usually with 2 marginal veins more prominent than the midvein; staminate spikes 1-4 ..... **Section 28: *Paludosae***
23 Leaf blades V-shaped in cross-section when young, the upper surface lacking 2 marginal veins more prominent than the midrib; staminate spike 1 ..... **Section 39: *Acrocystis***
22 Perigynia 0-12-veined.
24 Plants with at least some pistillate spikes basal; culms much shorter than the leaves ..... **Section 39: *Acrocystis***
24 Plants with most pistillate spikes on obvious elongated stems; culms shorter than or longer than the leaves.
25 Upper leaves with blades > 2 cm long, longer than the sheaths ..... **Section 39: *Acrocystis***
25 Upper leaves bladeless or with blades < 1 cm long and also shorter than the sheaths ..... **Section 40: *Clandestinae***

[26a] Section 1: *Vulpinae*

A section of ca. 15 species, of North America, temperate Eurasia, Africa, and Australia. References: Jones & Reznicek (1995); Standley in FNA (2002b). Key 2 adapted from Jones & Reznicek (1995).

Key 1a

1 Leaf sheath fronts yellow, thickened, and not fragile at the top; leaf blades papillose adaxially (at 25× magnification)..... ***C. laevivaginata***
1 Leaf sheath fronts green or whitish, thin, and fragile at the top; leaf blades not papillose adaxially.
  2 Leaf sheath fronts smooth.
    3 Larger perigynia 6-8 mm long; leaves to 12 mm wide..... ***C. crus-corvi***
    3 Larger perigynia 3-5 mm long; leaves to 7 mm wide.
      4 Perigynia smoothly rounded at base, not distended; perigynium veins 3-5 abaxially, 0 adaxially..... ***[C. alopecoidea]***
      4 Perigynia cordate at base, distended; perigynium veins 10-12 abaxially, 7 adaxially ..... ***C. oklahomensis***
  2 Leaf sheath fronts rugose.
    5 Perigynia broadly rounded at base, not distended; perigynium veins 3-5 abaxially, 0 adaxially..... ***C. conjuncta***
    5 Perigynia cordate or truncate at base, distended; perigynium veins 15 abaxially, 7 adaxially.
      6 Perigynia (5-) avg. 5.4 (-6) mm long, the beak > 3 mm long; larger leaves mostly 8-17 mm wide; perigynium scales cuspidate to short-awned; [mostly of the Coastal Plain and lower Piedmont]..... ***C. stipata var. maxima***
      6 Perigynia (4-) avg. 4.7 (-5) mm long, the beak < 2.5 mm long; larger leaves mostly 4-10 mm wide; perigynium scales acuminate to cuspidate; [widespread in our area] ..... ***C. stipata var. stipata***

Key 1b

1 Beak of the perigynium shorter than the body.
  2 Perigynia somewhat abruptly contracted into a beak ca. 0.5 × as long as the perigynium body; ventral surface of the perigynium with several incomplete veins basally; culms sharply triangular and narrowly winged, somewhat spongy and easily crushed; dorsal leaf sheaths green; ventral leaf sheaths with scattered red dots, and transversely rugose; [normally of shaded locations] ..... ***C. conjuncta***
  2 Perigynia tapering into a beak, much shorter than the perigynium body; ventral surface of the perigynium with several inconspicuous complete veins; culms inconspicuously triangular to roundish, not winged, neither spongy nor easily crushed; dorsal leaf sheaths dark blue-green with conspicuous white dots; ventral leaf sheaths without scattered red dots, not transversely rugose; [nomally of sunny locations]..... ***C. oklahomensis***
1 Beak of the perigynium as long as, or longer than, the body.
  3 Ventral leaf sheath margins with orange-red dots; achene ovate-lanceolate; perigynium wall adhering to achene..... ***C. crus-corvi***
  3 Ventral leaf sheath margins without orange-red dots; achene broadly ovate to ovate-orbicular; perigynium wall not adhering to the achene (or only slightly so).
    4 Ventral leaf sheaths not transversely rugose, more or less concave at the apex and not prolonged upward past the base of the blade, thickened, not friable..... ***C. laevivaginata***
    4 Ventral leaf sheaths transversely rugose, more or less convex at the apex and prolonged upward past the base of the blade, friable.
      5 Perigynia (5-) avg. 5.4 (-6) mm long, the beak > 3 mm long; larger leaves mostly 8-17 mm wide; perigynium scales cuspidate to short-awned; [mostly of the Coastal Plain and lower Piedmont]..... ***C. stipata var. maxima***
      5 Perigynia (4-) avg. 4.7 (-5) mm long, the beak < 2.5 mm long; larger leaves mostly 4-10 mm wide; perigynium scales acuminate to cuspidate; [widespread in our area] ..... ***C. stipata var. stipata***

[26b] Section 2: *Heleoglochin (Paniculatae)*

A section of 11-12 species, of temperate North America, Eurasia, n. Africa, and Australasia. References: Cochrane in FNA (2002b).

1 Inflorescence 7-15 cm long, the basal 3-9 branches well-separated from one another; perigynia broadly obovoid, 1.3-1.5× as long as wide; sheaths concave at the mouth; leaves 3-8 mm wide; [of swamps of the Coastal Plain and lower Piedmont]..... ***C. decomposita***
1 Inflorescence 2-8 cm long, the basal 1-5 branches indistinct to slightly separated; perigynia ovoid to lance-ovoid, ca. 2× as long as wide; sheaths prolonged beyond the blade; leaves 1-3 mm wide; [of Mountain wetlands in VA (and TN?) and northward].
  2 Inner band of leaf sheath whitish (and red-dotted); basal branches of inflorescence overlapping; perigynia not concealed by the scales ..... ***[C. diandra]***
  2 Inner band of leaf sheath strongly copper-colored (and also red-dotted); basal branches of inflorescence often weakly separated; perigynia nearly or completely concealed by the scales..... ***C. prairea***

[26c] Section 3 – section *Multiflorae*

A section of 7 species, of North America (including Mexico). References: Standley in FNA (2002b). Key based on FNA.

1 Perigynia red-dotted..... ***C. triangularis***
1 Perigynia not red-dotted.
  2 Perigynia golden yellow or yellowish-brown at maturity..... ***C. annectens***
  2 Perigynia dull yellow-green or pale brown at maturity.
    3 Leaves longer than the flowering stem; perigynia 2.0-3.2 mm long, 1.3-1.8 mm wide, the beak 1/3-1/2 the length of the body.....

..... ***C. vulpinoidea***

3 Leaves shorter than the flowering stem; perigynia 3.2-4.0 mm long, 2.0-2.6 mm wide, the beak ca. 1/3 as long as the body.

4 Awn of pistillate scales 1-3 mm long; adaxial surface of perigynia with 3-5 nerves; [native, of wet pine savannas of se. SC, GA southward ..... ***C. fissa** var. **aristata***

4 Awn of pistillate scales 0.5-1.5 mm long; adaxial surface of perigynia lacking nerves; [introduced in our area from sc. United States, of disturbed sites] ..... ***C. fissa** var. **fissa***

[26d] Section 4 – section *Phaestoglochin (Bracteosae)*

A section of ca. 27 species, mainly of temperate North America. References: Ball in FNA (2002b); Webber & Ball (1984). Key adapted from FNA, C, M, and Webber & Ball (1984).

1 Sheaths loose, membranaceous, and fragile on the ventral side, septate-nodulose and usually mottled or striped with green and white on the dorsal side.

2 Bodies of pistillate scales 1.5-2.5 mm long, 1.1-1.8 mm wide, mostly < ½ as long as the perigynia, apex obtuse to acuminate to shortly awned.

3 Basal intermodes of the inflorescence usually < 1 cm long, and usually < 2× as long as the spikes; bodies of perigynia with wing < 0.1 mm wide ..... ***[C. cephaloidea]***

3 Basal internodes of the inflorescence usually >2 cm long, at least 2× as long as the spikes; bodies of perigynia with wing 0.1-0.2 mm wide ..... ***C. sparganioides***

2 Bodies of pistillate scales 2.2-4.4 mm long, 1.2-2.4 mm wide, mostly > ½ as long as the perigynia, apex acuminate to awned.

4 Fronts of leaf sheaths yellow or brownish, thick, firm, the back often white-spotted ..... ***C. aggregata***

4 Fronts of leaf sheaths white, hyaline, fragile, the backs not white-spotted.

5 Perigynia 4-5 mm long, 2× as long as wide; perigynia nerveless or very obscurely nerved on the dorsal face ... ***C. gravida** var. **gravida***

5 Perigynia 3-4.5 mm long, 1.3-1.5× as long as wide; perigynia strongly few-nerved on the dorsal face ..... ***C. gravida** var. **lunelliana***

1 Sheaths tight on the ventral side, neither septate-nodulose nor mottled with green and white on the dorsal side.

6 Perigynia corky-thickened in the lower 1/3 to 1/2 (and not > 4.0 mm long); perigynia spreading or reflexed at maturity; perigynia (2-) 3-12 (-20) per spike; leaves 0.5-3 mm wide.

7 Beak of perigynium smooth; pistillate scales acuminate, early deciduous.

8 Average perigynium width ≥ 1.3 mm; average spongy portion of the perigynium ≥ 1.1 mm long; perigynium base distinctly nerved, bulging on the ventral surface, making the perigynium biconvex in cross-section; perigynium 2-2.5× as long as wide; perigynium gradually narrowed to a short beak; leaves 1-3 mm wide ..... ***C. retroflexa***

8 Average perigynium width < 1.3 mm; average spongy portion of the perigynium < 1.1 mm long; perigynium base nerveless, flattened on the ventral surface, making the perigynium planoconvex in cross-section; perigynium ca. 3× as long as wide; perigynium narrowed to a conspicuous beak; leaves 0.75-1.5 mm wide ..... ***C. texensis***

7 Beak of perigynium serrulate; pistillate scales obtuse, persistent.

9 Plants with creeping rhizomes, the culms arising scattered along the rhizome; perigynia 4-5× as long as wide ..... ***C. socialis***

9 Plants densely cespitose, the culms arising from the center of clump; perigynia 2-3× as long as wide.

10 Widest leaves 0.9-1.7 mm wide; base of fertile culm 0.7-1.4 mm wide.

11 Base of perigynium cuneate to rounded; distance from base of perigynium to base of achene 0.1-0.5 mm; [primarily of the Mountains in our area] ..... ***C. appalachica***

11 Base of perigynium rounded to truncate; distance from base of perigynium to base of achene 0.5-0.9 mm; [widespread in our area] ..... ***C. radiata***

10 Widest leaves 1.7-3.0 mm wide; base of fertile culm 1.4-2.2 mm wide.

12 Stigmas 0.03-0.06 mm thick, straight to slightly twisted; widest leaves < 2.0 mm wide; perigynia 3-7 (-8) per spike .... ***C. radiata***

12 Stigmas 0.07-0.10 mm thick, mostly coiled; widest leaves > 1.7 mm wide; perigynia (6-) 7-14 (-20) per spike ..... ***C. rosea***

6 Perigynia not conspicuously corky-thickened at base (except corky-thickened in the rare alien, *C. spicata*, which has perigynia 4.0-5.5 mm long); perigynia ascending to spreading at maturity; perigynia (3-) 8-40 per spike; leaves 1-5 mm wide.

13 Inflorescence ovoid in outline, the spikes densely aggregated, nearly indistinguishable except by the projecting setaceous bracts which subtend each spike.

14 Perigynia 1.3-1.7× as long as wide, widest near the broadly rounded, truncate, or even subcordate base ..... ***C. leavenworthii***

14 Perigynia 1.6-2.5× as long as wide, widest just below the middle, the base broadly cuneate to rounded.

15 Pistillate scales (excluding the awns) shorter than the perigynium body; culms not greatly exceeding the leaves .... ***C. cephalophora***

15 Pistillate scales (excluding the awns) as long as or exceeding the perigynium body; culms much exceeding the leaves ..... ***C. mesochorea***

13 Inflorescence spicate-racemose, the individual spikes readily distinguishable (often separated by an exposed internode of the axis).

16 Pistillate scales brown or reddish-purple; [alien, sparsely naturalized in our area].

17 Roots and basal sheaths brown to black; perigynia not corky-thickened at base; ligule blunt, wider than long ..... ***C. divulsa***

17 Roots and basal sheaths purplish-tinted; perigynia corky-thickened at base; ligule acute, longer than wide ..... ***C. spicata***

16 Pistillate scales green, hyaline, or pale tan; [native in our area (except *C. austrina* and *C. muricata* ssp. *lamprocarpa*), common and widespread in our area].

18 Spikes with 5-10 perigynia; pistillate scales brown with green-veined center ..... ***[C. muricata** ssp. **lamprocarpa]***

18 Spikes with 8-20 perigynia; pistillate scales scarious-white (rarely brown) with green-veined center.

19 Perigynia ascending, nerveless on the ventral surface; scales awned, the awns 1.5-4 mm long; lowest inflorescence bract elongate, the free portion 1-5 cm long ..... ***C. austrina***

19 Perigynia spreading, either nerved or nerveless on the upper (ventral) surface; scales acuminate or with an awn to 1.5 (-2.0) mm long; lowest inflorescence bract short, delicate, the free portion 0.5-2 cm long.

20 Perigynia 3.0-3.5 mm long, nerveless on the upper (ventral) face ..... ***C. muehlenbergii** var. **enervis***

20 Perigynia 3.5-4.0 mm long, nerved on both faces ..... ***C. muehlenbergii** var. **muehlenbergii***

[26h] Section 5 – section *Holarrhenae (Intermediae)*

A section of 2 species, of temperate Northern Hemisphere. References: Reznicek & Catling in FNA (2002b).

One species ..... *[C. sartwellii]*

[26i] Section 6 – section *Divisae*

A section of 14 species, subcosmopolitan. References: Reznicek & Catling in FNA (2002b).

1 Beak of the perigynium 1/5 to 1/3 as long as the body; spikes 2-7; [alien, naturalized primarily in brackish to salty coastal habitats] ... *C. divisa*
1 Beak of the perigynium 1/3 to 1/2 as long as the body; spikes 5-15; [alien, naturalized primarily inland along highways treated with salt] ..... *C. praegracilis*

[26j] Section 7 – section *Ammoglochin (Arenariae)*

A section of 14 species, of temperate Northern Hemishere. References: Reznicek in FNA (2002b).

One species ..... *C. arenaria*

[26k] Section 8 – section *Macrocephalae*

A section of 2 species, of maritime e. Asia and nw. North America. References: Mastrogiuseppe in FNA (2002b).

One species ..... *C. kobomugi*

[26m] Section 9 – section *Glareosae (Heleonastes)*

A section of 20-25 species, circumboreal, but extending in montane areas to South America, New Zealand, and Australia. References: Toivonen in FNA (2002b).

1 Spikes (1-) 2 (-3); perigynia 1-5 per spike, 2.5-4 mm long.
  2 Leaves 0.3-0.8 mm wide, filiform-involute; ligules 0.3-0.8 (-1.2) mm long; inflorescences 14-32 mm long; spikes 2-3 per inflorescence; terminal spike with 1-3 perigynia per spike; [south to PA and s. NJ] ..... *[C. billingsii]*
  2 Leaves 0.8-1.9 mm wide, flat or thinly M-shaped; ligules 0.5-1.9 mm long; inflorescences (14-) 23-55 mm long; spikes (2-) 3-4 per inflorescence; terminal spike with (1-) 2-6 perigynia per spike; [south to w. NC] ..... *C. trisperma*
1 Spikes 4-9; perigynia 5-30 per spike; 1.7-2.5 mm long.
  3 Perigynia (10-) 15-30 per spike; perigynium without ventral nerves (or the nerves very obscure); spike at maturity somewhat bristly appearing in silhouette because of the perigynium beaks ..... *C. brunnescens var. sphaerostachya*
  3 Perigynia 5-10 (-15) per spike; perigynium ventrally nerved; spike at maturity nearly smooth in silhouette (the perigynium beaks strongly appressed)
    4 Culms 15-60 cm tall; inflorescence 3-5 (-7) cm long, all but the lowest spikes approximate, the lowest spikes 0.5-2.5 cm apart ..... *C. canescens var. canescens*
    4 Culms 30-90 cm tall; inflorescences 6-12 (-15) cm long, the lower and middle spikes well-spaced, the lowest spikes 2-5 cm apart ..... *C. canescens var. disjuncta*

[26n] Section 10 – section *Deweyanae*

A section of 8 species, of North America and e. Asia. References: Naczi (1990); Naczi in FNA (2002b).

1 Perigynia 1.3-1.6 mm wide, 3-4× as long as wide ..... *[C. deweyana var. deweyana]*
1 Perigynia 0.8-1.2 mm wide, 4-5× as long as wide.
  2 Widest leaf (1.3-) 1.5-2.9 (-3.1) mm wide; culms (0.5-) 0.6-1.0 (-1.1) mm thick at mid-height; plant densely to loosely cespitose, the rhizome internodes 0.2-20 mm long; [of swamp forests and other wetlands, widespread in our area] ..... *C. bromoides ssp. bromoides*
  2 Widest leaf 2.8-4.4 mm wide; culms 1.0-1.6 mm thick at mid-height; plants densely cespitose, the rhizome internodes 0.2-1.0 (-8.5) mm long; [of seeps and bogs in the Blue Ridge and Blue Ridge Escarpment region] ..... *C. bromoides ssp. montana*

[26o] Section 11 – section *Stellulatae*

A section of ca. 15 species, semicosmopolitan (except Africa). References: Reznicek & Ball (1980); Reznicek in FNA (2002b). Key based on Reznicek & Ball (1980).

1 Spikes usually solitary; leaves involute; anthers 2.0-3.6 mm long; [rare disjuncts in Coastal Plain bogs] ..... *C. exilis*
1 Spikes 2-8; leaves flat or folded; anthers 0.6-2.2 (-2.4) mm long.

2 Perigynium beak smooth-margined (use at least 10× magnification) ..... ***C. seorsa***
2 Perigynium beak serrulate on margin (use at least 10× magnification).
3 Widest leaves 2.8-5.0 mm wide.
4 Lower perigynia of spikes mostly 1.1-1.6× as long as wide; perigynia mostly 2.1-3.0 mm wide ..... ***C. atlantica***
4 Lower perigynia of spikes (1.5-) 1.7-3× as long as wide; perigynia mostly 1.2-2.0 mm wide ..... ***C. ruthii***
3 Widest leaves 0.8-2.7 mm wide.
5 Terminal spikes entirely staminate; anthers (1.0-) 1.2-2.2 (-2.4) mm long ..... ***C. sterilis***
5 Terminal spikes partly or entirely pistillate; anthers 0.6-2.2 (-2.4) m long.
6 Terminal spikes without a distinct narrowed base of staminate scales, the staminate portion < 1 mm long ..... ***C. sterilis***
6 Terminal spikes with a distinct narrowed base of staminate scales 1.0-16.5 mm long.
7 Lower perigynia 2.0-3.0 mm wide ..... ***C. atlantica***
7 Lower perigynia 0.9-2.0 mm wide.
8 Lower perigynia mostly 2.8-4.8 mm long; lower perigynia (1.7-) 1.8-3.6× as long as wide; perigynia beaks 0.95-2.0 mm long, mostly 0.45-0.85× as long as the perigynium body ..... ***C. echinata ssp. echinata***
8 Lower perigynia mostly 1.9-3.0 mm long; lower perigynia 1.0-2.0 (-2.2)× as long as wide; perigynia beaks 0.4-0.95 mm long, mostly 0.2-0.5× as long as the perigynium body.
9 Perigynia mostly nerveless over the achene on the adaxial surface; beak of perigynia conspicuously setulose-serrulate; perigynia often more-or-less convexly tapered from widest point to the beak, thus forming a weak shoulder; [of calcareous sites, in our area restricted to the Mountains of VA] ..... ***C. interior***
9 Perigynia mostly 1-10-nerved over the achene on the adaxial surface; beak of perigynia more sparsely serrulate, with definite spaces between the often single teeth; perigynia more-or-less cuneate or concavely tapered from widest point to the beak, not forming a shoulder; [of a variety of situations, not generally calcareous].
10 Widest leaves 1.6-2.7 mm wide; infructescence mostly 18-45 mm long; [widespread in our area] ..... ***C. atlantica***
10 Widest leaves 0.6-1.6 mm wide; infructescence mostly 8-20 mm long; [primarily of the Coastal Plain in our area, widely scattered elsewhere] ..... ***C. howei***

[26q] Section 12 – section *Ovales*

A section of ca. 85 species, largely North American, but also occurring in Central and South America and Eurasia. References: Mastrogiuseppe et al. in FNA (2002b); Rothrock, Reznicek, & Ganion (1997). Key closely adapted from FNA.

1 Pistillate scales uniformly as long as or longer than the mature perigynia, usually concealing the beaks (though not necessarily the bodies), apex obtuse to acuminate, not awned.
2 Perigynium beak cylindric, unwinged, lacking serrations for ca. 0.4 mm below the apex ..... ***C. ovalis***
2 Perigynium beak flattened, ciliate-serrulate all the way to the apex.
3 Principal leaves stiff, more-or-less glaucous, often bearing auricles at the base, the summit of the sheaths truncate, prolonged 1-4 mm beyond the collar; flat margins of perigynia 0.5-0.8 mm wide; achenes 1.0-1.2 mm wide; [of maritime dunes and shores] ..... ***C. silicea***
3 Principal leaves pliable, green, almost always without auricles, the summit of the sheaths U-shaped, only slightly prolonged beyond the collar; flat margins of perigynia 0.2-0.6 mm wide; achenes 1.0-1.7 mm wide; [of inland, non-maritime habitats].
4 Perigynia ascending to spreading, strongly and evenly veined on the adaxial face, finely granular-papillose; spikes (3-) 7-15, the uppermost usually densely aggregated ..... ***C. argyrantha***
4 Perigynia erect-ascending, often veinless on the adaxial face or with a few veins of unequal strength, smooth; spikes 3-7 (-11), the uppermost often more-or-less separated ..... ***[C. foenea]***
1 Pistillate scales (excluding the awns, if present) shorter than the perigynia at least in the middle portions of the spikes, the apical portion of the pistillate scales narrower than the perigynia braks and not completely covering them, the apex awned in some species.
5 Pistillate scales in middle or lower portions of spikes with apex acuminate with subulate or awned tip.
6 Perigynia 2.6-4.0 × as long as wide, the bodies lanceolate, 1.2-2.0 mm wide ..... ***C. scoparia var. scoparia***
6 Perigynia < 2.5 × as long as wide, the bodies lance-ovate, ovate, broadly elliptic, orbiculate, or obovate, 1.8-3.9 mm wide.
7 Perigynium body obovate, often with conspicuous "shoulders;" leaves 2.5-6 mm at widest ..... ***C. alata***
7 Perigynium body elliptic, suborbiculate, or weakly obovate; leaves 1-3 (-4.2) mm at widest.
8 Perigynium body cuneately tapered to the base, the body of the perigynium more-or-less diamond-shaped; inflorescences dense, stiffly erect, with 3-5 spikes ..... ***C. suberecta***
8 Perigynium body convexly tapered to the base (the base rounded), the body of the perigynium ovate, elliptic, orbiculate, or weakly obovate; inflorescences dense and erect or open and nodding, with 3-11 spikes.
9 Scales with white-hyaline or pale yellowish margins; perigynia greenish to straw-colored or pale brown, (2.3-) 2.5-4.0 (-4.2) mm long, often indistinctly 0-4 (-6) veined on the outer side ..... ***C. festucacea***
9 Scales with reddish-brown margins; perigynia reddish-brown, (3.8-) 4.0-5.5 mm long, conspicuously veined on the outer side with 5 or more veins.
10 Beaks ascending, < ½ the length of the lance-ovate to weakly obovate perigynium body; lateral spikes with acute staminate bases mostly < 2 mm long; [of tidal marshes] ..... ***C. hormathodes***
10 Beaks widely spreading, > ½ the length of the suborbicular perigynium body; lateral spikes with tapered staminate bases 2-6 mm long; [of freshwater wetlands] ..... ***C. straminea***
5 Pistillate scales with apex obtuse, acute, or acuminate (but not subulate or awned).
11 Perigynia < 2 mm wide.
12 Perigynia thin, often not winged to the base; leaf sheaths somewhat expanded towards the apex, bearing narrow wings continuous with the midvein and the edges of the leaf blade; leaves 3-7.5 mm wide; vegetative shoots tall, conspicuous, with numerous leaves spaced along the upper half of the culm.
13 Lower perigynia of each spike spreading or recurved (at an angle of > 80 degrees); spikes globose; pistillate scales hidden, 1.6-2.3 mm long ..... ***C. cristatella***
13 Lower perigynia of each spike appressed-ascending to somewhat spreading (at a 30-75 degree angle); spikes subglobose to ovate-oblong; pistillate scales evident, 2.0-3.0 mm long.

14 Inflorescences usually flexible, nodding at the tip, the lower spikes usually separated; perigynia usually 15-40, spreading at a 40-75 degree angle to the spike axis; leaf sheaths firm or friable at the summit ..... ***C. projecta***

14 Inflorescences straight and stiff, the lower spikes overlapping; perigynia usually > 40, appressed-ascending at a 30-40 degree angle to the spike axis; leaf sheaths firm at the summit.

15 Perigynia 3.0-4.0 mm long, 2.2-2.8 (-3) × as long as wide ..... ***C. tribuloides*** *var.* ***sangamonensis***

15 Perigynia (3.3-) 3.6-5.4 mm long, 3-5 × as long as wide ..... ***C. tribuloides*** *var.* ***tribuloides***

12 Perigynia thick, winged to the base; leaf sheaths with more-or-less rounded edges, not distinctly expanded towards the apex; leaves 1-4.5 mm wide (except in *C. normalis*); vegetative shoots usually inconspicuous, with relatively few leaves clustered at the tip.

16 Perigynia (2.5-) 2.6-4 × as long as wide, the body lanceolate, distance from beak tip to top of achene 2.2-5 mm ..... ***C. scoparia*** *var.* ***scoparia***

16 Perigynia < 2.5 × as long as wide, the body obovate, orbiculate, or ovate; distance from beak tip to top of achene 0.8-2.2 mm.

17 Perigynium body obovate, widest toward the tip (excluding the beak).

18 Perigynium beak spreading, slender; pistillate scales acute; styles sinuous at base ..... ***C. albolutescens***

18 Perigynium beak appressed-ascending, triangular; pistillate scales obtuse; styles straight ..... ***C. longii***

17 Perigynium body ovate, elliptic, or orbiculate, widest towards the base or near the middle (excluding the beak).

19 Inflorescences on tallest culms compact, 1.5-3 × as long as wide, erect, the spikes overlapping, the lowest internode of the inflorescence 1-6 (-7.5) mm, ½ to 1/5 (-¼) the length of the inflorescence

20 Achenes 0.6-0.9 mm wide; perigynia veinless or 1-3 veined on the inner face, these faint or basal only; inflorescences < 3.0 cm long ..... ***C. bebbii***

20 Achenes 0.9-1.3 mm wide; perigynia often 3-veined on the inner face; inflorescences 12-60 mm long.

21 Perigynia broadly elliptic or nearly orbiculate, the wing margin 0.4-0.8 mm wide, 0-6 veined on the inner face ..... ***C. molesta***

21 Perigynia ovate to broadly ovate, the wing margin 0.25-0.45 mm wide, 4-7 veined on the inner face ..... ***C. normalis***

19 Inflorescences on tallest culms elongate, more-or-less open towards the base, (2.5-) 3.0-5.1 × as long as wide, often arching or nodding at the tip; spikes more-or-less separate; lowermost internode (5-) 7-19 mm long, mostly 1/5-⅓ (-½) the length of the inflorescence.

22 Perigynium orbiculate, widest at mid-body ..... ***C. festucacea***

22 Perigynium narrowly to broadly ovate, widest below mid-body.

23 Sheaths smooth, often whitish-mottled; perigynium beak spreading, exceeding the pistillate scales by 0.7-1.6 mm; beak and shoulders of perigynia greenish to yellowish or greenish brown at maturity ..... ***C. normalis***

23 Sheaths, at least some, papillose near the collar (at magnification of 30 ×), not prominently whitish-mottled; perigynium beak appressed or ascending in spikes, exceeding the pistillate scales by 0.0-0.8 mm; beak and shoulders of perigynia straw-colored to reddish-brown at maturity ..... ***C. tenera*** *var.* ***tenera***

11 Perigynia > 2 mm wide.

24 Spikes 12-28 mm long, with tapered base and acute tip; perigynium body lanceolate, 6-9 mm long; vegetative culms conspicuous ..... [***C. muskingumensis***]

24 Spikes **either** shorter than 12 mm **or** longer and with either rounded bases or tips or both; perigynium body ovate, elliptic, orbicular, or obovate, or lanceolate (if lanceolate, then shorter than 6 mm long); vegetative culms conspicuous or not.

25 Perigynium bodies obovate, widest towards the tip; leaf sheaths green-veined adaxially nearly to the summit, or with a narrow Y-shaped hyaline area.

26 Achenes 1.3-1.8 mm wide ..... ***C. opaca***

26 Achenes 0.75-1.2 (-1.3) mm wide.

27 Inflorescences erect, 1-4.5 cm long; spikes slightly separated to congested ..... ***C. albolutescens***

27 Inflorescences arching or nodding, 2.3-8.4 cm long; spikes widely separated ..... ***C. silicea***

25 Perigynium bodies lanceolate, ovate, elliptic, orbicular, or reniform, widest at the middle or towards the base; leaf sheaths various, some with prominent hyaline band near the apex adaxially.

28 Plants colonial,from creeping rhizomes; vegetative culms numerous, conspicuous, strongly 3-ranked, with 15-35 leaves when fully-developed; achenes 1.6-2 × as long as wide; larger spikes with 5-25 (-30) perigynia ..... [***C. hyalina***]

28 Plants clumping; vegetative culms few, inconspicuous, usually with fewer than 15 leaves, not strikingly 3-ranked; achenes 1-1.6 (-1.7) × as long as wide; larger spikes with 15-80 perigynia.

29 Perigynia finely granular-papillose (as seen with 30× magnification), the body reniform to orbiculate, 0.6-0.9 ×as long as wide, 3.5-4.5 (-4.9) mm wide; lowermost pistillate scale obtuse-rounded ..... ***C. reniformis***

29 Perigynia smooth, the body broadly ovate, elliptic, orbicular, or slightly obovate, (0.7-) 0.9-1.7 × as long as wide, 1.5-6.1 mm wide; lowermost pistillate scales obtuse to acuminate-awned.

30 Leaf sheaths green-veined adaxially neral to the summit; inflorescences dense to somewhat open, erect, the lowermost internode usually < 8 (-12) mm long

31 Perigynia with acute bases, 2.0-2.8 mm wide; beak appressed, > 2/5 × the length of the body; broadest leaves 1.5-2.5 mm wide; [of sw. VA northward] ..... ***C. suberecta***

31 Perigynia with rounded bases, 3.0-4.4 mm wide; beak spreading, ca. ⅓ × the length of the body; broadest leaves 2-5 mm wide; [of FL] ..... ***C. vexans***

30 Leaf sheaths with white-hyaline area adaxially; inflorescences open or dense.

32 Perigynium body narrowly to broadly ovate, greenish; pistillate scales with green midstripe, hyaline or pale margins (rarely brown tinged); leaves 2.5-6.5 mm wide, the sheaths green mottled, with mouth truncate, and prolonged to 2 mm distal to base of the leaf blades ..... ***C. normalis***

32 Perigynium body broadly ovate, broadly elliptic, or orbiculate, yellowish to tan brown; pistillate scales greenish or dark brown; leaves 1.5-4 (-5) mm wide, the sheaths usually evenly colored, with mouth concave.

33 Leaf sheaths finely papillose (at magnification of 30-40 ×), especially near the leaf base.

34 Perigynia strongly and evenly 4-8-veined over the achene adaxially, (4.5-) 5.1-5.5 mm long; pistillate scales usually (1.0-) 1.4-2.3 mm shorter than the perigynia; anthers (2.4-) 2.8-4.2 mm long ..... ***C. bicknellii***

34 Perigynia veinless or faintly and irregularly 0-4 (-6)-veined over the achene adaxially, 2.5-4.2 mm long; pistillate scales 0.2-1.3 mm shorter than the perigynia; anthers 1.0-2.1 mm long ..... ***C. festucacea***

33 Leaf sheaths smooth.

35 Spikes on larger culms (3-) 5-7 (-11), tapered at the base, the terminal spike with a conspicuous staminate base; inflorescences typically open, 2.5-4.5 (-6.5) cm long, the lowermost internode (3-) 4-13 (-23) mm long; perigynium body (0.7-) 0.9-1.3 × as long as wide.
  36 Achenes 1.2-1.8 mm long, 1.0-1.3 mm wide; perigynia 2.5-4.2 mm long, 1.5-2.3 (-2.5) mm wide, mostly 2-4 (-6)-veined adaxially ..... ***C. festucacea***
  36 Achenes (1.6-) 1.7-2.2 mm long, (1.2-) 1.4-1.8 mm wide; perigynia 3.2-5.5 mm long, 2.5-3.6 mm wide, veinless or faintly 1-5 (-7)-veined adaxially.
    37 Perigynia 3.2-4.8 (-5.2) mm long; beak 0.8-1.5 mm long; pistillate scales 3.3-4.0 (-4.3) mm long, acute; achenes 1.0-1.3 (1.4) × as long as wide ..... ***C. brevior***
    37 Perigynia (5.6-) 6.0-7.1 mm long; beak (1.2-) 1.5-2.1 (-2.3) mm long; pistillate scales (3.6-) 3.9-5.0 mm long, obtuse to acute ..... ***C. opaca***
35 Spikes on larger culms 2-4 (-5), rounded at the base, the terminal spike usually lacking a conspicuous staminate base; inflorescences compact, 1.2-3.0 (-3.6) cm long, the lowermost internode 1.5-7 (-13) mm long; perigynium body (0.7-) 0.9-1.6 × as long as wide.
  38 Achenes of larger perigynia ellipsoid to narrowly oblong, 0.9-1.3 mm wide, 1.3-1.6 × as long as wide; perigynia (25-) 30-80 per spike, squarrose-spreading at maturity, 1.8-3.0 mm wide ..... ***C. molesta***
  38 Achenes of larger perigynia broadly oblong to nearly orbicular, 1.35-1.8 mm wide, 1-1.3 × as long as wide; perigynia (10-) 15-40 (-45) per spike, appressed-ascending at maturity, (2.1-) 2.5-3.4 (-3.5) mm wide.
    39 Perigynia veinless or faintly and irregularly 1-5-veined over the achene adaxially, more-or-less orbicular, the bodies (2-) 2.3-3.2 mm long, (0.7-) 0.9-1.1 (-1.3) × as long as wide; pistillate scales mostly acute, about as long as to 0.7 (-0.9) mm shorter than the subtended perigynium (flattened and measured separately) ..... ***C. brevior***
    39 Perigynia strongly 4-6-veined over the achene adaxially, broadly ovate to broadly elliptic, (or rarely nearly orbicular), the bodies (2.7-) 3-4 mm long, (0.9-) 1.0-1.6 × as long as wide; pistillate scales mostly obtuse, 0.7-1.7 mm shorter than the subtended perigynium (flattened and measured separately) ..... ***C. molestiformis***

[26r] Section 13 – section *Phacocystis* (*Cryptocarpae* and *Acutae*)

A section of 70-90 species, cosmopolitan. References: Standley, Cayouette, & Bruederle in FNA (2002b); Standley (1983); Bruederle & Fairbrothers (1986); Bruederle, Fairbrothers, & Hanks (1989). Key based in part on C.

1 Lowest spike erect or ascending.
  2 Lower sheaths scabrous, reddish-brown, the sheath fronts (ventral faces) with prominent veins forming a persistent network; lower sheaths usually bladeless ..... ***C. stricta***
  2 Lower sheaths glabrous, the sheath fronts (ventral faces) not forming a persistent network; lower sheaths usually with leaf blades.
    3 Perigynia evidently nerved on both faces ..... ***C. emoryi***
    3 Perigynia not nerved, or very faintly nerved.
      4 Longest bracts overtopping the spikes; perigynia flattened, elliptic to obovate; pistillate scales acute to obtuse, generally shorter than the perigynia ..... ***C. aquatilis***
      4 Longest bracts shorter than the spikes; perigynia inflated, obovate; pistillate scales acuminate, longer than the perigynia ..... ***[C. haydenii]***
1 Lowest spike pendent.
  5 Pistillate scales awnless, the sides black or deep purple-brown ..... ***C. torta***
  5 Pistillate scales awned, the sides medium brown.
    6 Sheath backs glabrous [prickles 0-1 (-5) per mm^2 of sheath surface 5 cm from base]; perigynia somewhat inflated, obovoid, rounded above to an abrupt beak; lowest bract of the infructescence 1.7-6.2 dm long.
      7 Perigynia strongly obovoid, 3-4.5 mm long, 2-3 mm wide; achene symmetrical ..... ***C. crinita var. brevicrinis***
      7 Perigynia ellipsoid to slightly obovoid, 2-3 (-3.5) mm long, 1-2 mm wide; achene usually shortened on one side, therefore asymmetrical ..... ***C. crinita var. crinita***
    6 Sheath backs scabrous [prickles (1-) 5-54 per mm^2 of sheath surface 5 cm from base]; perigynia flattened, elliptic to ovoid, tapering from near or below the middle to a minute beak; lowest bract of the infructescence 0.7-3.5 dm long.
      8 Perigynia smooth to slightly papillate toward the apex, the papillae mostly < 10 μm long; lower pistillate scales usually acute or acuminate, tapering into the awn; sheaths strongly scabrous; [mainly distributed in our area in the Mountains] ..... ***C. gynandra***
      8 Perigynia densely granular-papillate throughout, the papillae mostly > 13 μm long; lower pistillate scales usually truncate or retuse, abruptly awned; sheaths finely scabrous; [mainly distributed in our area in the Coastal Plain and Piedmont] ..... ***C. mitchelliana***

[26s] Section 14 – section *Racemosae (Atratae)*

A section of ca. 60 species, of North America and Eurasia. References: Murray in FNA (2002b).

One species ..... ***C. buxbaumii***

[26u] Section 15 – section *Limosae (including Scitae)*

A section of 6 species, in cool temperate parts of North America, Eurasia, and s. South America. References: Ball in FNA (2002b).

1 Pistillate scales 2.0-3.8 mm wide, wider than the perigynia ..... ***[C. limosa]***

1 Pistillate scales 1.2-2.0 mm wide, narrower than the perigynia.
  2 Terminal spikes 20-50 mm long; pistillate scales usually shorter than the perigynia, obtuse to acute at the tip ..... ***C. barrattii***
  2 Terminal spikes 7-20 mm long; pistillate scales usually longer than the perigynia, acute to acuminate and often short-awned (up to 3 mm long) ..... ***[C. magellanica ssp. irrigua]***

[26w] Section 16 – section *Rhynchocystis*

A section of 5 species, of Europe, w. Asia, and Europe. References: Reznicek in FNA (2002b).

One species ..... ***C. pendula***

[26x] Section 17 – section *Glaucescentes (Pendulinae)*

A section of 3 species, of se. North America. References: Standley in FNA (2002b).

1 Awn of the pistillate scale tapering gradually into the scale; perigynium 2-ribbed, and also distinctly and evenly nerved between the ribs; [of swamps and marshes] ..... ***C. joorii***
1 Awn of the pistillate scale emerging from a retuse notch in the apex of the scale; perigynium 2-ribbed, obscurely nerved between the ribs; [generally of acid seepages, pocosins, and blackwater situations, often associated with *Pinus serotina*].
  2 Lowest pistillate spike drooping, on a peduncle 1-4 cm long; perigynia reddish-glaucous, lacking nerves; achenes slightly longer than wide ..... ***C. glaucescens***
  2 Lowest pistillate spike erect, sessile or with a peduncle up to 1 cm long; perigynia white-glaucous, rather distinctly 6-8 nerved; achenes as wide as long ..... ***C. verrucosa***

[26aa] Section 18 – section *Paniceae*

A section of 14 species, of temperate parts of North America and Eurasia, and montane Central America and South America. References: Rothrock & Reznicek in FNA (2002b).

1 Perigynia with a distinct beak, 1.0-2.2 mm long.
  2 Basal leaves with well-developed blades; basal sheaths brown; perigynia glabrous; [of moist, usually calcareous habitats of the Coastal Plain] ..... ***C. chapmanii***
  2 Basal leaves reduced to bladeless sheaths; basal sheaths strongly purple; [of dry, acidic habitats of the Mountains] ..... ***C. polymorpha***
1 Perigynia beakless, or with an indistinct beak < 0.5 mm long.
  3 Basal sheaths with well-developed blades; basal sheaths brown to strongly purple.
    4 Pistillate spike 5-7 mm in diameter, with ca. 6 vertical rows of perigynia; perigynia 3.3-4.2 mm long, 2.0-2.5 mm wide; leaves 3-7 mm wide, blue green ..... ***C. meadii***
    4 Pistillate spike 3-4 mm in diameter, with ca. 2-3 vertical rows of perigynia; perigynia 2.5-3.5 mm long, 1.5-2.0 mm wide; leaves 2-4.5 mm wide, pale green ..... ***C. tetanica***
  3 Basal sheaths bladeless, or with blades to 3 cm long; basal sheaths strongly purple.
    5 Culms to 10 dm tall, (2-) 3-5 mm in diameter near base; larger leaves ca. 5 mm wide; plants forming large clumps; [plants of shallow soils on sloping rock outcrops] ..... ***C. biltmoreana***
    5 Culms to 5 dm tall, ca. 1-2 mm in diameter near the base; larger leaves ca. 2-4 mm wide; plants forming small, spaced clumps, interconnected by long-creeping rhizomes; [plants of mountain slopes in more-or-less deep soils] ..... ***C. woodii***

[26bb] Section 19 – section *Laxiflorae*

A section of ca. 16 species, of North America and Central America. References: Bryson & Naczi in FNA (2002b); Naczi, Kral, & Bryson (2001). Key based in part on Naczi, Kral, & Bryson (2001).

1 Perigynium with 1 distinct and 5-6 much less distinct nerves per face, narrowly cuneate basally; perigynium beak short and usually abruptly bent; foliage dark green; bracts surpassing the staminate spike ..... ***C. leptonervia***
1 Perigynium with 6-many distinct nerves per face (the central one slightly more distinct); perigynium beak various; foliage various; bracts various.
  2 Perigynium with a short, bent beak, usually abruptly bent to one side.
    3 Spikes loosely flowered, most perigynia not overlapping.
      4 Bracts very broad, 8-20 mm wide; basal leaves very wide, up to 40 mm wide; plant glaucescent; basal sheaths purple or brown ..... ***C. albursina***
      4 Bracts narrow, 2.5-6 mm wide; basal leaves narrow, 3-8 mm wide; plant green; basal sheaths purple, often weathering to brown ..... ***C. ormostachya***
    3 Spikes densely flowered, the perigynia overlapping.
      5 Basal sheaths brown; uppermost bract overtopping the staminate spike; staminate spike sessile or short-stalked ..... ***C. blanda***
      5 Basal sheaths purple when fresh, weathering to brown; uppermost bract rarely overtopping the staminate spike; staminate spike usually long-stalked ..... ***C. gracilescens***
  2 Perigynium tapering to a straight or slightly curved beak (or a long, curved beak in *C. radfordii*) (note: some beaks may curve in pressing).
    6 Perigynium beaks long (to 1.5 mm long) and excurved; basal sheaths green, white, and brownish striped; [endemic to the escarpment gorge area near the SC-NC-GA tricorner] ..... ***C. radfordii***

6 Perigynium beaks straight or slightly curved; basal sheaths either purple, wine-red, or brownish, not prominently green-and-white striped; [collectively widespread in our area].
7 Basal sheaths purple or wine-red (may weather to brown in *C. gracilescens*).
8 Spikes densely flowered, the perigynia overlapping ..... ***C. gracilescens***
8 Spikes loosely flowered, the spikelets not overlapping.
9 Mature leaf blades of sterile shoots 4-5 (-6) mm wide, green; culms green, chalky red at base (best seen in fresh material); pistillate spikes (3-) 5-7 (-8) flowered; staminate spike on a peduncle 0-1 cm long ..... ***C. manhartii***
9 Mature leaf blades of sterile shoots (6-) 7-10 mm wide, glaucous; culms glaucous, bright red at base (best seen in fresh material); pistillate spikes (4-) 7-11 (-15) flowered; staminate spike on a peduncle 2-3 (-6) cm long ..... ***C. purpurifera***
7 Basal sheaths brown, not purple or wine-red.
10 Mature perigynia obovoid.
11 Spikes overlapping, densely flowered; staminate spike more-or-less obscured; plant green ..... ***C. crebriflora***
11 Spikes scattered, loosely flowered; staminate spike prominently exserted; plant usually glaucescent ..... ***C. laxiflora***
10 Mature perigynia fusiform.
12 Spikes overlapping, the staminate more-or-less obscured and overtopped by the uppermost bract ..... ***C. crebriflora***
12 Spikes scattered, the staminate prominent and exceeding the uppermost bract.
13 Spikes densely flowered; perigynium beaks curved; lowest spike exserted on a long, arching, peduncle ..... ***C. styloflexa***
13 Spikes loosely flowered; perigynium beaks straight; lowest spike on a short, erect or ascending, peduncle ..... ***C. striatula***

[26cc] Section 20 – section *Granulares*

A section of ca. 6 species, of temperate North America south through Mexico to Central America. References: Cochrane & Naczi in FNA (2002b).

1 Staminate peduncle elongate, overtopping the uppermost pistillate spike ..... ***C. crawei***
1 Staminate peduncle none, or shorter than the uppermost pistillate spike ..... ***C. granularis***

[26dd] Section 21 – section *Careyanae*

A section of 8 species, of tempearte e. North America. References: Bryson & Naczi in FNA (2002b).

1 Basal sheaths purplish, sometimes mixed with brown.
2 Widest leaf blade 3-6 mm wide; peduncles of lateral spikes usually drooping ..... ***C. austrocaroliniana***
2 Widest leaf blade 10-25 mm wide; peduncles of lateral spikes usually erect or spreading.
3 Bracts of middle and basal portions of culms with blades 2.1-9.2 cm long; perigynia 5.0-6.6 mm long; longest (per plant) lateral spike with 4-9 perigynia ..... ***C. careyana***
3 Bracts of middle and basal portions of culms bladeless, or with blades 0.1-1.9 cm long; perigynia 3.7-4.9 mm long; longest (per plant) lateral spike with 9-13 perigynia ..... ***C. plantaginea***
1 Basal sheaths brownish, lacking any purple coloration.
4 Widest leaf blade 11-25 mm wide; leaf blades of vegetative shoots 3.8-9.0 × as wide as bract leaves; bract blades from middle and basal portions of the culms 2.0-6.2 cm long; foliage glaucous ..... ***C. platyphylla***
4 Widest leaf blade 2-14 mm wide; leaf blades of vegetative shoots 1.0-3.5 × as wide as bract leaves; bract blades from middle and basal portions of the culms 4.5-24 cm long; foliage green or glaucous.
5 Basalmost scale of each lateral spike sterile (lacking a perigynium) or subtending a staminate flower.
6 Foliage usually bright green; longest (per plant) terminal spike 0.6-2.0 (-2.3) cm long; widest leaf blade 5.3-8.3 mm wide ..... ***C. laxiculmis*** *var.* ***copulata***
6 Foliage usually glaucous; longest (per plant) terminal spike (1.0-) 1.2-2.5 cm long; widest leaf blade 6.4-11.8 mm wide ..... ***C. laxiculmis*** *var.* ***laxiculmis***
5 Basalmost scale of each lateral spike subtending a perigynium.
7 Terminal spikes (1.0-) 1.2-2.7 mm wide; staminate scales acute, those from the the middle region of the staminate spike 3.6-5.5 mm long; vegetative shoots shorter than or slightly taller than the culms, the tallest vegetative shoot 0.5-1.3 (-1.8) × as tall as the tallest culm.
8 Terminal spike usually surpassing the bract blade of the distalmost lateral spike; longest (per plant) peduncle of terminal spike (6.3-) 8.1-15.9 cm long; widest leaf blade 2.0-2.9 (-3.5) mm wide; each perigynium face 7-10-nerved.. ***C. digitalis*** *var.* ***macropoda***
8 Terminal spike usually surpassed by the bract blade of the distalmost lateral spike; longest (per plant) peduncle of terminal spike 0.9-7.2 (-11.4) cm long; widest leaf blade 2.7-4.5 (-5.3) mm wide; each perigynium face (8-) 11-15-nerved.
9 Perigynia 2.5-3.3 mm long, the apex barely excurved ..... ***C. digitalis*** *var.* ***digitalis***
9 Perigynia 3.2-4.2 mm long, the apex noticeably excurved ..... ***C. digitalis*** *var.* ***floridana***
7 Terminal spikes 0.6-1.4 (-1.6) mm wide; staminate scales obtuse, those from the the middle region of the staminate spike 2.6-3.6 (-3.8) mm long; vegetative shoots much taller than the culms, the tallest vegetative shoot (1.4-) 1.7-3.7 (-4.9) × as tall as the tallest culm.
10 Perigynia 3.9-4.5 mm long; leaves strongly glaucous ..... ***C. magnifolia***
10 Perigynia 2.9-3.8 mm long; leaves green.
11 Perigynia spirally imbricate; longer lateral spikes with (6-) 8-13 perigynia; peduncles of proximal spikes usually erect, the longest (per plant) peduncle (7.0-) 15-42 (-49) mm long; bract blade of distalmost lateral spike 5.6-17 (-26) × as long as wide; loosely or densely cespitose; [primarily of the Coastal Plain in our area, though extending rarely into the Piedmont and Mountains] ..... ***C. abscondita***
11 Perigynia distichously imbricate; longer lateral spikes with 4-8 (-9) perigynia; peduncles of proximal spikes usually drooping or nodding, the longest (per plant) peduncle (28-) 44-84 (-91) mm long; bract blade of distalmost lateral spike (12-) 17-51 × as long as wide; densely cespitose; [primarily of the Mountains and Piedmont] ..... ***C. cumberlandensis***

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[26ee] Section 22 – section *Griseae (Oligocarpae)*

A section of ca. 21 species, of North America (including Mexico). References: Naczi & Bryson in FNA (2002b); Naczi, Bryson, & Cochrane (2002); Naczi (1989, 1993, 1997). Key based on Naczi (1997), in part.

1 Perigynia tapering toward the base, obtusely trigonous in cross-section, usually pubescent proximally, the apex constricted to a distinct beak (nearly beakless in *C. planispicata*), the perigynia closely enveloping the achene at maturity.
  2 Leaf-sheaths hispidulous; perigynia broadest well above the middle; basal sheaths brownish.
    3 Leaves glaucescent, usually papillate abaxially; pistillate scale margins entire; perigynia 3.7-5.1 mm long, 1.5-1.8 mm wide; [of the Cumberland Plateau of n. AL] ..... *[C. brysonii]*
    3 Leaves deep green, abaxially smooth or sparsely scabrous on midrib; pistillate scale margins denticulate; perigynia 4.5-6.2 mm long, 1.9-2.3 mm wide; [of ne. United States, south in our area to w. NC and w. VA] ..... ***C. hitchcockiana***
  2 Leaf-sheaths glabrous; perigynia broadest near the middle; basal sheaths purple, greenish-white, or light tan.
    4 Basal sheaths greenish-white or light tan; old leaf bases persistent as brownish fibrils; perigynium beak obscure, essentially absent ..... ***C. impressinervia***
    4 Basal sheaths purple; old leaf bases not persistent as fibrils; perigynium beak absent to well-developed, 0-1.0 mm long.
      5 Perigynia 1.6-2.6× as long as wide; widest leaf 1.8-4.0 mm wide; achene beak 0.05-0.3 (-0.5) mm long; longest pistillate spikes with 4-8 (-10) perigynia ..... ***C. oligocarpa***
      5 Perigynia (2.4-) 2.5-3.3× as long as wide; widest leaf (3.0-) 3.5-6.5 mm wide; achene beak (0.3-) 0.4-0.7 mm long; longest pistillate spikes with (5-) 7-14 perigynia ..... ***C. planispicata***
1 Perigynia convex-rounded basally, more-or-less terete in cross-section, glabrous, the apex tapered but not constricted, beakless or the beak obscure, the perigynia loosely enveloping the achene at maturity.
  6 Widest leaf (5.1-) 6.2-11.1 (-13.5) mm wide; foliage glaucous; pistillate scales awnless or short-awned, the awns 0-0.9 (-1.9) mm long.
    7 Perigynia (4.0-) 4.2-5.5 (-6.0) mm long, (2.0-) 2.1-2.7× as long as the achene bodies, spreading to ascending; achene stipes (0.2-) 0.3-0.5 (-0.6) mm long; pistillate spikes (5.0-) 5.9-8.0 (-9.6) mm wide; achene beaks vertical to slightly bent, usually bent 0-30° from the vertical ..... ***C. flaccosperma***
    7 Perigynia 3.2-4.5 (-4.7) mm long, 1.6-2.0× as long as the achene bodies, usually ascending; achene stipes 0.05-0.3 (-0.5) mm long; pistillate spikes (3.3-) 4.2-6.1 (-7.3) mm wide; achene beaks slightly bent to recurved, usually bent 30-90° from the vertical.
      8 Perigynia 3.2-4.0 (-4.1) mm long, (1.5-) 1.8-2.3 (-2.5)× as long as wide; longest pistillate spike with (14-) 19-45 (-65) flowers, densely flowered, with the ratio [mm of spike length/number of flowers] = (0.56-) 0.67-1.1 (1.3); longest peduncle of staminate spike 0.5-15 (-31) mm long ..... ***C. glaucodea***
      8 Perigynia (3.7-) 3.9-4.5 (-4.7) mm long, (1.9-) 2.1-2.6 (-2.8)× as long as wide; longest pistillate spike with 11-25 (-28) flowers, rather loosely flowered, with the ratio [mm of spike length/number of flowers] = (0.97-) 1.0-1.3 (1.6); longest peduncle of staminate spike (1.5-) 7.5-37 (-62) mm long ..... ***C. pigra***
  6 Widest leaf 2.0-6.8 (-9.1) mm wide; foliage green; pistillate scales relatively long-awned, the awns (0.2-) 1.1-8.3 (-13.7) mm long.
    9 Axis of inflorescence and pistillate spike peduncles scabrous; perigynia 2.5-4 mm long ..... ***C. conoidea***
    9 Axis of inflorescence and pistillate spike peduncles smooth; perigynia 3-6 mm long.
      10 Plants densely to loosely cespitose; culm purple-red coloration extending (3.5-) 4.0-7.3 cm up from the base; widest leaves 2.4-4.0 (-5.3) mm wide; achene stipe 0.6-0.8 (-0.9) mm long ..... ***C. godfreyi***
      10 Plants densely cespitose; culm purple-red coloration extending 0-3.6 (-3.9) cm up from the base; widest leaves 3.3-6.8 (-9.1) mm wide; achene stipe (0.2-) 0.3-0.6 mm long.
        11 Perigynia 1.5-1.9 (-2.2) mm wide, (2.2-) 2.5-3.1× as long as wide ..... ***C. amphibola***
        11 Perigynia (1.7-) 1.8-2.6 mm wide, 1.8-2.4 (-2.6)× as long as wide.
          12 Widest leaves 3.3-5.6 (-8.0) mm wide; achene stipe (0.3-) 0.4-0.6 mm long ..... ***C. corrugata***
          12 Widest leaves (4.8-) 5.0-6.8 (-9.1) mm wide; achene stipe (0.2-) 0.3-0.4 (0.5) mm long ..... ***C. grisea***

[26ff] Section 23a – section *Hymenochlaenae (the "Longirostres" group)*

1 Perigynia several-nerved, the beak much shorter than the body; basal sheath not conspicuously fibrous ..... ***C. cherokeensis***
1 Perigynia 2-ribbed (otherwise nearly nerveless), the beak about as long as the body; basal sheath conspicuously fibrous ..... *[C. sprengelii]*

[26ff] Section 23b – section *Hymenochlaenae (the "Gracillimae" group)*

A section of 50-60 species, semicosmopolitan. References: Waterway in FNA (2002b).

1 Lowest pistillate bract auriculate but not sheathing; terminal spike normally staminate (rarely with a few perigynia terminally); leaf blades 1-2 mm wide; basal sheaths purplish or red; [of cliffs and rock outcrops at moderate to high elevations in the Mountains] ..... ***C. misera***
1 Lowest pistillate bract sheathing (the sheath short in *C. prasina*); terminal spike normally gynecandrous, rarely merely staminate (often merely staminate in *C. prasina*); leaf blades 1.5-7 mm wide; basal sheaths purplish or red (brownish or greenish in *C. prasina*); [of various habitats, only rarely as above].
  2 Perigynia strongly trigonous, the lateral ribs at the angles, broadest below the middle; basal sheaths brownish or greenish; leaf sheaths glabrous on the hyaline ventral portion ..... ***C. prasina***
  2 Perigynia terete to obscurely trigonous, the lateral ribs not at the angles, broadest near the middle; basal sheaths purplish or red; leaf sheaths pubescent on the hyaline ventral portion (glabrous in *C. gracillima*).
    3 Perigynia densely white-hirsute; achenes brown with dark red spots ..... ***C. roanensis***
    3 Perigynia glabrous; achenes without dark red spots.
      4 Leaf sheaths glabrous on the hyaline ventral portion; larger leaves 3-9 mm wide ..... ***C. gracillima***
      4 Leaf sheaths pubescent on the hyaline ventral portion; larger leaves 1.5-6 mm wide.

5 Perigynia 2.5-3.0 mm long, 0.9-1.2 mm wide; perigynium beaks absent or very short, the orifice entire; leaf blades1.5-2.5 mm wide ..... ***C. aestivalis***
5 Perigynia 3.0-4.6 mm long, 1.4-2.0 mm wide; perigynium beaks very short to short, the orifice bidentate; leaf blades 2-6 mm wide.
6 Perigynia 3.0-4.0 mm long, 1.5-1.75 mm wide; leaves 2-4 mm wide ..... ***C. aestivaliformis***
6 Perigynia 3.5-6 mm long, 1.75-2.0 mm wide; leaves 3-8 mm wide.
7 Upper pistillate scales awned; perigynia 4.5-6 mm long; leaves 4-8 mm wide ..... ***C. davisii***
7 Upper pistillate scales acuminate; perigynia 3.5-4.6 mm long; leaves 3-5 mm wide ..... ***C. oxylepis***

[26ff] Section 23c – section *Hymenochlaenae (the "Sylvaticae" group)*

1 Achene sessile in the base of the perigynium; perigynia 3.2-6 mm long; sterile shoots with leaves 5-10 mm wide; [**either** alien and rarely naturalized in our area, **or** native and rare].
2 Perigynia 3.2-4.8 mm long, abruptly narrowed to a short stipe; [native, of northern hardwoods forests in the Mountains of NC and VA]..... ..... ***C. arctata***
2 Perigynia 5-6 mm long, sessile; [alien, rarely naturalized in our area] ..... ***C. sylvatica***
1 Achene on a stipe 0.5-1.5 mm long; perigynia (4.5-) 5.6-8.0 (-10) mm long; sterile shoots with leaves 2-8 mm wide; [native, collectively common and widespread in our area].
3 Internodes between the perigynia mostly 1.0-1.5 mm; sheaths of the pistillate bracts puberulent at the mouth.
4 Perigynia glabrous, (5.2-) avg. 6.2 (-7.7) mm long ..... ***C. oblita***
4 Perigynia puberulent, (6.4-) avg. 7.2 (-8.1) mm long ..... ***C. venusta***
3 Internodes between the perigynia mostly 2.0-4.0 (-6.0) mm; sheaths of the pistillate bracts glabrous at the mouth.
5 Perigynia puberulent, (5-) avg. 7 (-9) mm long; pistillate scales usually with the midrib excurrent as a short awn ..... ***C. allegheniensis***
5 Perigynia glabrous, (4.5-) avg. 5.6-7 (-10) mm long; pistillate scales usually with the midrib terminating below the apex, not excurrent.
6 Perigynia (6-) 7.0 (-10) mm long, broadest below the middle, tapering with straight or slightly convex sides to a conspicuous beak with a hyaline tip; [of swamps, bogs, and other moist to wet habitats, nearly throughout our area] ..... ***C. debilis***
6 Perigynia (4.5-) 5.6 (-7) mm long, broadest near the middle, tapering with concave sides to a short beak lacking a hyaline tip; [of dry to moist upland forests and openings in the Mountains] ..... ***C. flexuosa***

[26ii] Section 24 – section *Porocystis (Virescentes)*

A section of 10 species, of temperate North America, Central America, and South America. References: Ball in FNA (2002b).

1 Terminal spike staminate (rarely gynecandrous, with fewer than 25% of the flowers pistillate) ..... ***C. pallescens***
1 Terminal spike gynecandrous (and with > 30% of the flowers pistillate).
2 Perigynia densely pubescent; larger lateral spikes 2-4 mm wide; ligules longer than wide.
3 Terminal spikes 5-15 (-20) mm long; anthers 0.7-1.3 (-1.6) mm long ..... ***C. swanii***
3 Terminal spikes (18-) 20-35 mm long; anthers (1.0-) 1.6-2.0 (-2.8) mm long ..... ***C. virescens***
2 Perigynia glabrous, minutely papillose, or with few scattered hairs; larger lateral spikes (3.5-) 4-8 mm wide; ligules as wide as long.
4 Perigynia pubescent, minutely papillose, 2.5-4.0 mm long; pistillate scales attenuate, at least some with awns 0.5-2.0 mm long .... ***C. bushii***
4 Perigynia glabrous or sparsely pilose, non-papillose, 2.0-3.5 mm long; pistillate scales awnless, or awn to 0.5 (-1.0) mm long.
5 Mature perigynia with a minute beak about 0.1-0.2 mm long, the body terete, subterete, or subtriangular in cross-section, spreading at > 45 degrees from the rachis ..... ***C. caroliniana***
5 Mature perigynia beakless, triangular in cross-section, appressed-ascending at < 45 degrees from the rachis.
6 Leaf blades glabrous or nearly so, especially on the lower surface; sheaths glabrous to sparsely pubescent, sometimes densely pubescent at the summit; [primarily of the Coastal Plain and Piedmont] ..... ***C. complanata***
6 Leaf blades soft-pubescent; sheaths soft-pubescent; [primarily of the Mountains and Piedmont] ..... ***C. hirsutella***

[26kk] Section 25 – section *Anomalae*

A section of ca. 20 species, of North America, e. Asia, and Australia. References: Cochrane in FNA (2002b).

One species ..... ***C. scabrata***

[26ll] Section 26 – section *Hallerianae*

A section of 5 or more species, s. North America to Central America, s. Europe, sw. Asia, and n. Africa. References: Ball in FNA (2002b); Jones & Jones (1993). Key adapted from Jones & Jones (1993).

1 Perigynia densely white-villous apically, glabrous basally; achene body 2.0-2.7 mm long, long-stipitate ..... ***C. dasycarpa***
1 Perigynia puberulent throughout; achene body 3.0-3.3 mm long, sessile ..... ***C. tenax***

[26nn] Section 27 – section *Hirtifoliae*

A monotypic section, of e. North America. References: Ball in FNA (2002b); Jones & Jones (1993).

One species ..... ***C. hirtifolia***

[26oo] Section 28 – section *Paludosae*

A section of about 35 species, mostly of temperate Asia and North America. References: Reznicek & Catling in FNA (2002b); Reznicek (1993).

Identification notes: All species of this section in our area form large clonal colonies by rhizomes.

1 Perigynium body pubescent.
  2 Culms central, with the withered remains of the previous year's leaves at the base; basal sheaths of of fertile culms not at all or only slightly reddened; [of the Coastal Plain] ..... ***C. striata var. striata***
  2 Culms lateral, with bladeless sheaths at the base; basal sheaths strongly reddened; [collectively widespread in our area].
    3 Beak of the perigynium soft, translucent, the teeth obscure; peduncle of staminate spike 0.2-2 cm long; [of the Piedmont and Coastal Plain in our area] ..... ***C. vestita***
    3 Beak of the perigynium stiff, opaque, the teeth well-developed; peduncle of staminate spike (0.8-) 2-9 cm long; [of the Mountains in our area].
      4 Leaves folded along the midrib, appearing 0.7-2.0 (-2.2) mm wide; culms obtusely trigonous, usually smooth; base of pistillate bracts often auriculate, forming a V-shaped mouth; middle staminate scales narrowly acute ..... ***C. lasiocarpa var. americana***
      4 Leaves more-or-less flat or M-shaped, (1.8-) 2.2-4.5 (-6) mm wide; culms acutely trigonous, often scabrous on the angles; base of pistillate bract with a short, truncated process at mouth; middle staminate scales obtuse and short-awned, or acute ..... ***C. pellita***
1 Perigynium body glabrous.
  5 Widest leaves 1.5-5 (-6) mm wide; culms 8-90 cm tall; inflorescences 2.5-35 (45) cm long.
    6 Inflorescence rachis with rounded, smooth angles; lowermost pistillate spikes usually strongly overlapping; [introduced, in coastal sands] ..... ***C. pumila***
    6 Inflorescence rachis with sharp, scabrous angles; lowermost pistillate spikes overlapping not at all or slightly; [native, in acidic Coastal Plain wetlands] ..... ***C. striata var. brevis***
  5 Widest leaves (4-) 5.5-15 (-21) mm wide; culms 40-135 cm tall; inflorescences 15-60 cm long.
    7 Perigynia 3.0-4.5 mm long; [exotic species] ..... ***[C. acutiformis]***
    7 Perigynia 4.8-7.8 mm long; [native species].
      8 Longest ligules 2-10 (-12) mm long, < 2 × as long as wide; culms central, with the withered remains of the previous year's leaves at the base; perigynia obscurely 10-15-veined; [of the Coastal Plain] ..... ***C. hyalinolepis***
      8 Longest ligules 13-40 (-56) mm long, much longer than wide; culms lateral, with bladeless sheaths at the base; perigynia usually strongly 14-28-veined; [of the Mountains in our area] ..... ***C. lacustris***

[26pp] Section 29 – section *Carex*

A section of about 10 species, of temperate North America and Eurasia. References: Reznicek & Catling in FNA (2002b).

1 Perigynia glabrous; leaf blades finely papillose on the lower surface (and also usually long-pubescent); vegetative culms hollow, spongy (flattened when pressed) ..... ***C. atherodes***
1 Perigynia pubescent; leaf blades glabrous or pubescent abaxially, but not papillose; vegetative culms hard.
  2 Leaf blades pubescent; [rare introduction] ..... ***C. hirta***
  2 Leaf blades glabrous; [native] ..... ***C. trichocarpa***

[26qq] Section 30 – section *Vesicariae* [including 52 - *Pseudocypereae*]

A section of ca. 45 species, semicosmopolitan. Following Reznicek & Ford in FNA (2002b), this section is circumscribed to include the traditionally recognized section *Pseudocypereae*. References: Reznicek & Ford in FNA (2002b). Key adapted from Reznicek & Ford in FNA (2002b).

1 Pistillate scales with a prominent, scabrous awn (the body of the scale often ciliate as well).
  2 Plants extensively colonial from elongate, creeping rhizomes; staminate scales acute to acuminate, essentially smooth-margined except at the very tip; perigynia 7-11-nerved ..... ***C. schweinitzii***
  2 Plants densely to loosely cespitose, the rhizomes connecting individual culms in a clump < 10 cm long; staminate scales (at least some of them) with a distinct, scabrous awn; perigynia 6-25-nerved.
    3 Perigynia 6-12-nerved, the nerves separate nearly to the beak apex; perigynium bodies broadly ellipsoid to more or less globose, (1.8-) 2.0-4.2 mm wide; achenes rough-papillate.
      4 Spikes 9-14 (-15) mm thick; widest leaves 2.4-4.0 (-5) mm wide; spikes usually 2.5-3.5× as long as wide; perigynia 4.8-6.6 (-7.6) mm long, the beaks usually 0.7-1.3× as long as the body ..... ***C. baileyi***
      4 Spikes (12-) 15-22 mm thick; widest leaves (4.0-) 4.5-13 mm wide; spikes usually < 2.5× as long as wide if < 15 mm thick; perigynia (6-) 6.5 (-10.8) mm long, the beaks 0.6-0.9× as long as the body ..... ***C. lurida***
    3 Perigynia 12-25-nerved, the nerves (except for 2 prominent laterals) confluent at or below the middle of the beak; perigynium bodies ellipsoid to lance-ovoid, 1.1-2.2 mm wide; achenes smooth.
      5 Mature perigynia spreading or ascending when mature; perigynia round in cross-section; teeth of the perigynium beak 0.3-0.9 mm long, straight ..... ***C. hystericina***

5 Mature perigynia reflexed when mature; perigynia obscurely trigonous; teeth of the perigynium beak 0.7-2.3 mm long, divergent to straight.
6 Spikes 12-18 mm in diameter; teeth of the pergynium beak strongly outcurved, the longest 1.3-2.1 (-2.8) mm long..... ***C. comosa***
6 Spikes 9-12 mm in diameter; teeth of the perigynium beak straight or slightly outcurved, the longest 0.7-1.2 (-1.4) mm long ..... ***[C. pseudocyperus]***

1 Pistillate scales smooth-margined, obtuse to acuminate, awnless (rarely the lowermost scales awned in *C. utriculata*).
7 Leaves filiform-involute, wiry, (0.5-) 1-3 (-3.2) mm wide; stems round or obtusely trigonous in cross-section, smooth; [rare, in high elevation bogs in the Mountains]..... ***C. oligosperma***
7 Leaves flat, U-, V-, or W-shaped in cross-section, the widest 1.5-12 (-15) mm wide; stems round to trigonous, often scabrous-angled; [collectively widespread].
8 Achenes asymmetrical, deeply indented or invaginated on one face; widest perigynia (4.0-) 4.5-7 mm wide; beaks 2.4-4.8 mm long, smooth ..... ***[C. tuckermanii]***
8 Achenes symmetrical; widest perigynia (2-) 2.5-3.5 (-4.5) mm wide; beaks 1-4.2 (-4.8) mm long, scabrous or smooth.
9 Perigynium beaks finely scabrous (at least near the tip and on the teeth), 2.4-4.2 (-4.8) mm long; widest leaves 1.8-4.3 (-5) mm wide. ..... ***C. bullata***
9 Perigynium beaks smooth, 1-4.5 mm long; widest leaves 1:5-15 mm wide.
10 Pistillate spikes globose or short ovoid, ca. 3-20-flowered; [plants of the Coastal Plain from e. NC southward]..... ***C. elliottii***
10 Pistillate spikes cylindric, ca. 20-150-flowered; [plants collectively of the Mountains, from nw. NC northward].
11 Bract of lowest pistillate spike (excepting isolated spikes from long-sheathing bracts on the lower part of the stem) (2.5-) 3-9× as long as the inflorescence; staminate spike often 1, slightly (if at all) elevated above the summit of the crowded pistillate spikes; perigynia reflexed..... ***[C. retrorsa]***
11 Bract of lowest pistillate spike (excepting isolated spikes from long-sheathing bracts on the lower part of the stem) 0.5-2.5× as long as the inflorescence; staminate spikes 2-4 (-5), well elevated above the summit of the crowded pistillate spikes; perigynia spreading or ascending.
12 Plant colonial from long-creeping rhizomes; widest leaves (4.5-) 5-12 (-15) mm wide; ligules about as long as wide; basal sheaths usually spongy-thickened and only slightly or not red-tinged ..... ***C. utriculata***
12 Plant cespitose; widest leaves 1.8-6.5 mm wide; ligules longer than wide; basal sheaths not spongy-thickened and often tinged with reddish-purple ..... ***C. vesicaria***

[26rr] Section 31 – section *Lupulinae*

A section of 6 species, of e. North America. References: Reznicek & Ball (1974); Reznicek in FNA (2002b); Uttal (1971). Key adapted in part from Reznicek & Ball (1974) and Reznicek in FNA (2002b).

1 Sheath of uppermost leaf absent or <1.5 (-2.5) cm long; beak of perigynia 1.5-4.2 mm long; achenes with elliptic or obovate sides.
2 Perigynia rhombic-ovoid, cuneate to the base, 8-35 per spike, radiating in all directions and therefore forming a globular spike..... ***C. grayi***
2 Perigynia lanceoloid to ovoid, convex to the base, 1-12 (-20) per spike, ascending to spreading (the lowest sometimes slightly reflexed) and therefore forming an ovoid to obovoid spike.
3 Perigynia 3-5 mm wide at the widest point; achenes broadest above the middle, with a pronounced shoulder rounding abruptly to the tip; style of mature achene with a half to full coil in its lower portion; [of high elevations in our area, generally in spruce-fir or northern hardwoods forests] ..... ***C. intumescens var. fernaldii***
3 Perigynia 5-8 mm wide at the widest point; achenes broadest at the middle, smoothly rounded to the tip; style of mature achene straight or arcuate; [widespread in our area]..... ***C. intumescens var. intumescens***
1 Sheath of uppermost leaf usually >1.7 cm long; beak of perigynia 4.5-10 mm long; achenes with rhombic or nearly triangular sides.
4 Achenes distinctly wider than long, widest above the middle; perigynia stiffly spreading at right angles to the rachis..... ***C. gigantea***
4 Achenes as wide as long or longer, widest near the middle; perigynia ascending.
5 Angles of the achenes pointed, often even knobbed, with nipple-like points; achenes (2.2-) 2.4-3.4 mm wide, often nearly as wide as long ..... ***C. lupuliformis***
5 Angles of the achenes smoothly curved, not pointed or knobbed; achenes 1.7-2.6 (-2.8) mm wide, distinctly longer than wide.
6 Staminate peduncle (3-) 6-18 cm long, usually exceeding the uppermost spike by 2-12 cm; plants loosely colonial by long slender rhizomes..... ***C. louisianica***
6 Staminate peduncle 0.5-6 (-7) cm long, shorter than to exceeding the uppermost pistillate spike by < 2 cm; plants solitary or loosely cespitose in small clumps connected by stout, short rhizomes ..... ***C. lupulina***

[26ss] Section 32 – section *Rostrales (Folliculatae)*

A section of 5 species, of e. North America and e. and se. Asia. References: Reznicek in FNA (2002b). Key based on FNA.

1 Perigynia 6.4-10.7 mm long, 2.6-3.9× as long as wide ..... ***C. turgescens***
1 Perigynia (8.3-) 10.5-15.6 mm long, 4-7× as long as wide.
2 Widest leaf blades 1.6-3.5 (-4.2) mm wide; bract sheaths concave at the apex; [of MD northward]..... ***[C. michauxiana]***
2 Widest leaf blades (3.5-) 5-18 mm wide; bract sheaths truncate to convex at the apex; [collectively widespread in our area].
3 Pistillate scales usually awned (rarely merely cuspidate); pistillate scales (including the awn, if present) 0.5-1.2× as long as the perigynia; widest leaves of vegetative shoots 8-18 (-21) mm wide; pistillate spikes normally not staminate at apex (rarely with a few staminate flowers); [primarily of the Mountains and Piedmont] ..... ***C. folliculata***
3 Pistillate scales acute or long-acuminate (rarely short-awned); pistillate scales (including the awn, if present) 0.3-0.6× as long as the perigynia; larger leaves mostly 4-12 mm wide; pistillate spikes normally staminate at apex; [primarily of the Coastal Plain] ..... ***C. lonchocarpa***

[26tt] Section 33 – section *Collinsiae*

A monotypic section, of e. North America. References: Standley in FNA (2002b).

One species ..... ***C. collinsii***

[26uu] Section 34 – section *Squarrosae*

A section of 4 species, of e. and c. North America and temperate South America. References: Ford in FNA (2002b). Key based on FNA.

1 Terminal spike usually entirely staminate; pistillate scales with an awn equaling or surpassing the perigynium; achenes 1.2-2.1 mm long.
  2 Pistillate scales 0.4-0.9 (-1.1) mm wide, the body wide and translucent; staminate scales 0.9-1.6 mm wide, tightly imbricate in the spike; plants colonial, long-rhizomatous ..... ***C. aureolensis***
  2 Pistillate scales 0.1-0.4 mm wide, the body narrow and indistinct; staminate scales 0.3-0.8 mm wide, irregularly imbricate with spreading tips; plant cespitose, short-rhizomatous ..... ***C. frankii***
1 Terminal spike gynecandrous, mainly pistillate; pistillate scales awnless, or with a short awn not surpassing the perigynium; achenes 2.0-3.0 mm long.
  3 Achene 1.9-2.5× as long as wide; style persistent, strongly kinked at the base; spikes 1-2 (-3) per stem ..... ***C. squarrosa***
  3 Achene 1.2-1.9× as long as wide; style deciduous, straight or slightly curved; spikes (1-) 2-4 (-6) per stem ..... ***C. typhina***

[26vv] Section 35 – section *Shortianae*

A monotypic section, of e. North America. References: Cochrane in FNA (2002b).

One species ..... ***C. shortiana***

[26ww] Section 36 – section *Spirostachyae (Extensae)*

A section of ca. 15 species, of Eurasia. References: Crins & Reznicek in FNA (2002b).

1 Leaves of flowering stems flat, the widest 3.3-5.0 mm wide ..... ***[C. distans]***
1 Leaves of flowering stems channeled or involute, the widest 1.0-3.5 (-4.3) mm wide ..... ***C. extensa***

[26xx] Section 37 – section *Ceratocystis*

A section of 7 species, in temperate North America, Eurasia, and Australia. References: Crins in FNA (2002b).

1 Pistillate scales coppery brown; terminal (staminate) spike 6-24 mm long; pistillate spikes 2-5 per culm; culms 1-8 dm tall; [of calcareous seepages in the Mountains of VA and northward] ..... ***C. flava***
1 Pistillate scales yellowish green; terminal (staminate) spike (9-) 17-39 mm long; pistillate spikes 1-2 (-3) per culm; culms 5-12.5 dm tall; [of calcareous savannas of the Coastal Plain of NC] ..... ***C. lutea***

[26aaa] Section 38 – section *Leucoglochin (Orthocerates)*

A section of 5-6 species, of arctic, boreal, and alpine North America, Eurasia, and South America. References: Cochrane in FNA (2002b).

One species ..... ***[C. pauciflora]***

[26bbb] Section 39 – section *Acrocystis (Montanae)*

A section of ca. 35 species, subcosmopolitan in temperate and boreal regions. References: Crins & Rettig in FNA (2002b); Rettig (1988); Cusick (1992); Rettig & Crins (1996). Key based in part on Rettig (1988), C, and M.

NOTE TO USERS: This key does not accomodate two to four new species in our area; they are under study, and will likely be added in the near future. Most will key toward *C. deflexa*.

1 Spikes borne above the middle of the culm, but also with some of the pistillate spikes borne on short or elongate peduncles from the base of the culm.
  2 Terminal staminate spike 2-5 mm long, closely associated with one or more pistillate spikes, the lowest of these subtended by a foliaceous bract mostly surpassing the staminate spike ..... ***C. deflexa***
  2 Terminal staminate spike 5-15 mm long, alone or associated with a pistillate spike, the subtending bract not surpassing the staminate spike.

3 Perigynia subcoriaceous, 3.5-4.5 mm long, the body glabrous or very sparsely short-pubescent; leaf blades thick, stiff, deep green, spreading at maturity, 2-4.5 mm wide; plants loosely cespitose with short-ascending stolons; achenes brownish at maturity, shining, pitted ..... ***C. tonsa***

3 Perigynia membranaceous, 2.5-4.25 mm long, the body short-pubescent; leaf blades thinnish, not stiff, light green, erect or ascending at maturity, 1.5-3 mm wide; plants densely cespitose; achenes, brownish-black or black, at maturity, either minutely pitted or obscurely and irregularly pitted.

4 Perigynia (3.0-) 3.2-4.2 mm long, 1.2-1.5 mm wide, the beak 1.2-1.6 (-2.0) mm long, from about a half to nearly as long as the body; achenes oblong-obovoid, the outer covering dull grayish-black, appearing minutely roughened, the achenes at maturity black, very obscurely and irregularly pitted ..... ***C. rugosperma***

4 Perigynia 2.2-2.9 (-3.2) mm long, 1-1.3 mm wide, the beak 0.4-0.9 mm long, < ½ the length of the body; achenes orbicular-obovoid, the outer covering pitted, the achenes at complete maturity brownish-black, very closely and minutely pitted ..... ***C. umbellata***

1 Spikes all borne close together above the middle of the culm, the terminal one staminate, the lateral ones pistillate (rarely a few spikes borne near the base).

5 Body of the perigynium (excluding the beak and the contracted base) subglobose or spherical, about as wide as long.

6 Plants cespitose; leaves 1.8-4.7 mm wide.

7 Perigynium tooth (0.1-) 0.2-0.5 mm long; pistillate scales 3.4-4.8 mm long, (1.4-) 1.6-1.8 mm wide, conspicuously exceeding the perigynia; plants densely cespitose, the culms erect, arching at the tips; [of nw. SC, sw. NC, and adjacent GA] ..... ***C. communis var. amplisquama***

7 Perigynium tooth 0.1-0.2 (-0.3) mm long; pistillate scales 2.5-4.1 mm long, (1.2-) 1.4-1.6 (-2.0) mm wide, about as long as the perigynia; plants loosely cespitose, the culms prostrate; [widely distributed] ..... ***C. communis var. communis***

6 Plants with long rhizomes, forming clonal patches; leaves 1.0-3.0 mm wide.

8 Beak of perigynium (0.2-) 0.6-1.0 (-1.2) mm long; perigynium body 2.2-3.4 mm long, 1.0-1.8 mm wide; culm smooth; [widely distributed in our area] ..... ***C. pensylvanica***

8 Beak of perigynium (1.0-) 1.2-1.6 (-2.6) mm long; perigynium body 3.1-4.6 mm long, 1.0-1.3 (-1.5) mm wide; culm scabrous, at least near the summit; [(in our area) of the Mountains of sw. VA, w. NC, and nw. SC].

9 Beak of the perigynium averaging 1.5 mm long, the orifice oblique; leaves mostly 1.1-1.3 mm wide; perigynium pubescent only on the summit, at the base of the beak; male spikes <15 mm long; culms scabrous throughout; leaves more-or-less smooth on the lower surface ..... ***C. lucorum** var. **austrolucorum***

9 Beak of the perigynium averaging 1.3 mm long, the beak split more-or-less equally; leaves mostly 1.5-2.8 mm wide; perigynium pubescent over the body; male spikes > 15 mm long; culms scabrous only near the summit; leaves scabrous on the lower surface .. .. ***[C. lucorum** var. **lucorum]***

5 Body of the perigynium (excluding the beak and the contracted base) ellipsoid to obovoid, distinctly longer than wide or thick, often also wider than thick, and slightly trigonous.

10 Plants with long rhizomes, forming clonal patches; [collectively of the Coastal Plain and, less commonly, Piedmont).

11 Achene body (1.4-) 1.5-1.7 (-2.0) mm long, biconvex, trigonous, or both; fertile culms 7-17 cm tall, usually much shorter than the leaves; basal sheaths usually very fibrillose; pistillate scales (2.7-) 3.0-3.7 (-4.2) mm long ..... ***C. floridana***

11 Achene body (1.1-) 1.2-1.3 (-1.4) mm long, trigonous; fertile culms 20-43 cm tall, equalling or exceeding the leaves; basal sheaths usually not fibrillose; pistillate scales (2.3-) 2.6-3.0 (-3.4) mm long ..... ***C. physorhyncha***

10 Plants cespitose; [collectively widespread in our area].

12 Lowermost 2 pistillate spikes separated by > 7 mm ..... ***[C. novae-angliae]***

12 Lowermost 2 pistillate spikes overlapping, separated by < 5 mm.

13 Achene body (1.3-) 1.4-1.6 (-1.7) mm long; fertile culms mostly 10-20 cm tall; pistillate scales (2.9-) 3.1-3.4 mm long .... ***C. nigromarginata***

13 Achene body (0.9-) 1.2-1.3 (-1.5) mm long; fertile culms mostly 17-35 cm tall; pistillate scales (2.0-) 2.5-3.1 (-3.2) mm long.

14 Scales of the median portion of the staminate spike with a weak to moderately prominent midrib usually not extending to the tip, and minute teeth rarely present on the midrib (visible at 15× or greater); perigynium teeth mostly 0.2-0.3 mm long; staminate spike 8.4-11.1 mm long; culms erect to ascending, equalling or exceeding the leaves, the inflorescence typically conspicuous; pistillate scales with green midrib, hyaline margins, and usually reddish-tinged; [mostly of loamy or clayey soils of the Piedmont and Mountains] ..... ***C. albicans***

14 Scales of the median portion of the staminate spike either with a strong, prominent midrib extending to the tip (or even aristate), and with minute teeth usually present on the midrib (visible at 15× or greater); perigynium teeth mostly 0.15-0.25 mm long; staminate spike 5.0-8.5 mm long; culms lax or weakly ascending, often shorter than, curving under, and more-or-less hidden by the leaves; pistillate scales with green midrib, hyaline margins, and only rarely reddish-tinged; [mostly of acid, sandy soils of the Coastal Plain] ..... ***C. emmonsii***

[26ccc] Section 40 – *Clandestinae (Digitatae)*

A section of ca. 20 species, circumboreal. References: Crins in FNA (2002b).

1 Pistillate scales short-awned ..... ***C. pedunculata***

1 Pistillate scales acute ..... ***[C. richardsonii]***

[26ddd] Section 41 – section *Pictae*

A section of 2 species, of e. North America. References: Ball in FNA (2002b).

1 Plants monoecious, with 3-8 spikes per stem; leaf blades 4-8 mm wide, glaucous on the upper surface; [of the East Gulf Coastal Plain, east to sw. GA and panhandle FL] ..... ***C. baltzellii***

1 Plants dioecious, with a single unisexual spike per stem; leaf blades 2-4.5 mm wide, green on the upper surface; [of areas west of area, east to c. TN and nc. GA] ..... ***C. picta***

[26fff] Section 42 – section *Mitratae (Praecoces)*

A section of ca. 20 species, of Europe, e. Asia, and Australia. References: Standley in FNA (2002b).

One species ..... ***C. caryophyllea***

[26ggg] Section 43 – section *Albae*

A section of 4 species, north temperate. References: Ball in FNA (2002b).

One species ..... ***C. eburnea***

[26kkk] Section 44 – section *Phyllostachyae*

A section of ca. 10 species, of North America. References: Crins, Naczi, Reznicek, & Ford in FNA (2002b); Naczi, Reznicek, & Ford (1998); Ford et al. (1998); Naczi & Ford (2001); Ford & Naczi (2001). Key adapted in part from Naczi, Reznicek, & Ford (1998), Catling, Reznicek, & Crins (1993), and Naczi & Ford (2001).

1 Lowest pistillate scales 2.4-4.5 mm wide, much wider than the the perigynia, appressed against and essentially concealing them; staminate flowers 2-4 per spike; [northern species, south to PA] ..... ***[C. backii]***
1 Lowest pistillate scales 1.2-2.5 (-3) mm wide, < 1.5× as wide as the perigynia, spreading and not concealing them; staminate flowers 5-25 per spike.
  2 Achenes subglobose, 1-1.5× as long as wide; staminate scales more or less truncate.
    3 Tallest culm 3.2-9.1 cm high, 15-32% of plant height; terminal spike with 4-8 perigynia; wider leaves with hyaline margins 0.05-0.2 mm wide; hyaline margins of distal pistillate scales 0.05-0.3 mm wide; perigynium beak 30-38% (-43%) of perigynium length; [of calcareous glades in w. VA and north and west of our area] ..... ***C. juniperorum***
    3 Tallest culm 9.0-41 cm high, 39-86% of plant height; terminal spike with 1-4 perigynia; wider leaves with green margins; hyaline margins of distal pistillate scales 0.3-0.7 mm wide; perigynium beak 34-53% of perigynium length; [of rich forests or rocky calcareous glades and woodlands].
      4 Longest (per plant) staminate portion of terminal spike (4.9-) 5.8-13.5 mm long; proximalmost staminate scale in terminal spike 1.1-1.8 (-2.1) mm long, 13-26 (-35)% of length of staminate portion of terminal spike; perigynium beaks (1.9-) 2.3-3.9 mm long, 39-53% of perigynium length; shoot bases lacking red-purple; [of rich mesic forests widespread in our area, especially VA] ..... ***C. jamesii***
      4 Longest (per plant) staminate portion of terminal spike 3.4-5.6 (-6.2) mm long; proximalmost staminate scale in terminal spike (1.9-) 2.1-3.3 mm long, (35-) 44-77% of length of staminate portion of terminal spike; perigynium beaks 1.4-2.3 (-2.5) mm long, 34-44% of perigynium length; shoot bases tinged with reddish-purple; [of c. TN and c. KY and westward] ..... ***[C. timida]***
  2 Achenes ellipsoid, 1.5-2.0× as long as wide; staminate scales obtuse to acute.
    5 Tallest culm 0.18-0.38× as tall as plant; perigynia (7.0-) 7.5-10.8 mm long; perigynium beaks (3.6-) 4.1-6.4 mm long; culms erect; peduncles usually erect to spreading ..... ***C. superata***
    5 Tallest culm 0.41-0.87× as tall as plant; perigynia 4.5-8.0 mm long; perigynium beaks 1.7-4.3 mm long; culms erect to spreading; peduncles usually widely spreading to nodding.
      6 Longest staminate portion of terminal spikes 12.7-25.6 mm long; perigynia 5.8-8.0 mm long; perigynium beaks 2.5-4.3 mm long; achenes (2.4-) 2.6-3.4 mm long ..... ***C. basiantha***
      6 Longest staminate portion of terminal spikes 4.9-5.7 (-6.5) mm long; perigynia 4.5-5.7 (-6.5) mm long; perigynium beaks 1.7-2.6 (-2.8) mm long; achenes 1.8-2.6 mm long ..... ***C. willdenowii***

[26lll] Section 45 – section *Firmiculmes*

A section of 3 species, of western North America. References: Crins in FNA (2002b).

One species ..... ***[C. geyeri]***

[26mmm] Section 46 – section *Leptocephalae (Polytrichoidae)*

A monotypic section, of North America and the West Indies. References: Cochrane in FNA (2002b).

1 Perigynia 3.4-4.9 (-5.4) mm long; pistillate scales whitish ..... ***C. leptalea var. harperi***
1 Perigynia 2.5-3.5 mm long; pistillate scales pale brown, with green midrib ..... ***C. leptalea var. leptalea***

Carex abscondita Mackenzie. Cp (GA, NC, SC, VA): rich bottomlands and other forests; common. April-June. MA south to n. FL, west to LA. See *C. magnifolia* for discussion of the two taxa. Naczi (1999b) reports a chromosome number of n = 24. [< *C. abscondita* – RAB, K (also see *C. cumberlandensis* and *C. magnifolia*); < *C. abscondita* – C, G, M, S, W (also see *C. cumberlandensis*);< *C. abscondita* – FNA (also see *C. magnifolia*); >< *C. abscondita* var. *abscondita* – F; > *C. abscondita* var. *rostellata* Fernald – F]

Carex aestivaliformis Mackenzie. Mt (GA, VA): wet meadows (VA), upland submesic forests (GA); rare (GA Special Concern). Considered by some to be a hybrid, but with little known documentation or evidence for or against its alleged hybrid status; further study is needed. [= C, G, M; = *C.* ×*aestivaliformis* – F, FNA, K]

Carex aestivalis M.A. Curtis ex A. Gray, Summer Sedge. Mt (GA, NC, SC, VA): dry-mesic to mesic forests; common. May-June. VT south to GA and AL, in or near the Appalachians. [= RAB, C, F, FNA, G, K, M, S, W]

Carex aggregata Mackenzie. Mt (NC, VA), Pd (VA): rich forests and woodlands; uncommon. May-June. NY, Ontario, MN, and SD, south to NC, AL, and OK. Other useful characters include: culms relatively smooth; pistillate scales sharp-pointed, the tip reaching to about the base of the perynium; and perigynia nerveless. [= F, FNA, K, M; = *C. sparganioides* Muhlenberg ex Willdenow var. *aggregata* (Mackenzie) Gleason – C, G]

Carex alata Torrey. Cp (GA, NC, SC, VA), Pd (NC, VA): bottomland forests, marshes; common, rare in lower Piedmont only. May-June. NH, MI, and MO south to FL and TX. [= RAB, C, F, FNA, G, GW, K, W; < *C. alata* – S (also *C. vexans*)]

Carex albicans Willdenow ex Sprengel. Mt, Pd, Cp (NC, SC, VA), {GA}: dry woodlands and forests; common. April-May. ME west to IL, and OK, south to DE, NC, SC, n. GA (Jones & Coile 1988), TN, and MO. [= *C. artitecta* Mackenzie – RAB, M, W; = *C. albicans* var. *albicans* – C, FNA, K; > *C. artitecta* var. *artitecta* – F; > *C. artitecta* var. *subtilirostris* F.J. Hermann – F; = *C. nigro-marginata* Schweinitz var. *muhlenbergii* (A. Gray) Gleason – G; < *C. varia* Muhlenberg ex Willdenow – S]

Carex albolutescens Schweinitz. Cp, Pd, Mt (GA, VA), {NC, SC}: low fields, bottomlands. May-June. MA, NY, WI, and MO, south to FL and TX. [= C, F, FNA, K; < *C. albolutescens* – RAB, G, GW, W (also see *C. longii*); *C. straminea* misapplied]

Carex albursina Sheldon, White Bear Sedge. Mt (GA, NC, SC, VA), Pd (VA): nutrient-rich cove forests, over mafic or calcareous rocks; rare (GA Special Concern, NC Watch List). April-June. VT and s. Québec west to MN, south to SC (P. McMillan pers. comm. 2003, specimen at CLEMS), nw. GA, and AR. Naczi (1999b) reports a chromosome number of n = 22. [= RAB, C, F, FNA, K, M, S, W; = *C. laxiflora* var. *latifolia* Boott – G]

Carex allegheniensis Mackenzie. Mt (GA, NC, SC, VA), Pd, Cp (NC, SC, VA): swamps, bogs, streamhead pocosins, other moist to wet habitats, boggy pools in floodplains; uncommon. May-June. PA south to n. GA, mostly in the Appalachian Mountains. [= M, S; = *C. debilis* Michaux var. *pubera* A. Gray – RAB, C, G; < *C. debilis* var. *rudgei* L.H. Bailey – FNA; > *C. debilis* var. *pubera* – F, K; > *C. debilis* var. *intercursa* Fernald – F, K; < *C. debilis* – GW, W]

Carex arctata W. Boott, Black Sedge, Drooping Woodland Sedge. Mt (NC, VA): northern hardwood and spruce forests, bog edges; rare (VA Rare). Newfoundland west to MN, south to PA, w. VA, nw. NC, and OH. First reported for our area (in Highland County, VA) by Fleming & Ludwig (1996). [= C, F, FNA, G, K, M]

Carex amphibola Steudel. {GA, NC, SC, VA}. {distribution and abundance in our area needing additional herbarium investigation} May-June. MA, s. Ontario, MI, IL, MO, and OK, south to GA, AL, MS, LA, and TX. [= RAB, FNA, G, M, S; = *C. amphibola* var. *amphibola* – F, K; < *C. amphibola* – GW]

Carex annectens (Bicknell) Bicknell, Yellowfruit Sedge. Cp (GA, NC, SC, VA), Pd, Mt (NC, SC, VA): marshes, bottomland forests; common. July-August. S. ME west to MN, south to FL and TX. See Cusick (1996). [= RAB, FNA, K, S, W; = *C. vulpinoidea* var. *ambigua* – C; > *C. annectens* var. *annectens* – F, G; > *C. annectens* (Bicknell) Bicknell var. *xanthocarpa* (Kükenthal) Wiegand – F, G; < *C. vulpinoidea* – GW; > *C. annectens* – M; > *C. brachyglossa* Mackenzie – M]

Carex appalachica J. Webber & P.W. Ball, Appalachian Sedge. Mt (GA, NC, SC, VA): dry to mesic forests, rock outcrops; uncommon (GA Special Concern). May-June. ME and Ontario south to w. SC, n. GA, and e. TN. First reported for South Carolina by Hill & Horn (1997). [= C, FNA, K; < *C. rosea* – RAB, G, W; = *C. radiata* – F, M, S, misapplied]

Carex aquatilis Wahlenberg, Aquatic Sedge. Mt (NC, VA): mountaintop pond, with *Dulichium arundinaceum, Vaccinium macrocarpon, Juncus canadensis*, and *Utricularia sp.*, mafic fen at high elevation; rare (VA Rare). Newfoundland west to ND, south to NJ, s. PA, OH, IN, IA, and NE; disjunct in w. VA (Augusta County) and nw. NC (Ashe County). First reported for VA by Wieboldt et al. (1998). [= G; > *Carex aquatilis* Wahlenberg var. *substricta* Kükenthal – C, FNA; > *C. aquatilis* var. *altior* (Rydberg) Fernald – F; ?> *C. aquatilis* var. *aquatilis* – K; > *C. substricta* (Kükenthal) Mackenzie – M]

* ***Carex arenaria*** Linnaeus, Sand Sedge. Cp (NC, VA): moist to dry sandy hammocks; rare, probably introduced from Europe. May-June. Fernald (1950) considers this plant native in se. VA, and populations of it in Carolina Beach State Park, New Hanover County, NC, certainly appear native. In North America, known from MD south to se. NC; also on ballast in OR (Mackenzie 1931-1935). [= RAB, C, F, FNA, G, K, M]

Carex argyrantha Tuckerman, Silvery-flowered Sedge, Hay Sedge. Mt (NC, VA), Pd? (VA?): wet meadows or dry soils; common (NC Rare). New Brunswick west to Ontario, south to w. NC, e. TN (Unicoi County), and OH. June-August. [= RAB, C, F, G, K, W; *C. aenea*, misapplied]

Carex atherodes Sprengel, Awned Sedge. Mt (VA): marl fens; rare (VA Rare). Circumboreal, south in North America to NY, n. VA, WV, MO, CO, UT, and OR. [= C, F, FNA, G, K, M]

Carex atlantica Bailey. Cp, Pd, Mt (GA, NC, SC, VA): bogs and seepages; uncommon. May-June. Nova Scotia west to MI and nw. IN, south to n. FL and e. TX. Reznicek & Ball (1980) found the distinction of *C. incomperta* from *C. atlantica* to be untenable. Intermediates between *C. atlantica* and *C. howei* (often treated as *C. atlantica* ssp. *capillacea*) occur in portions of their ranges, especially in the southern Coastal Plain. In most other areas they are sharply distinct, and sometimes grow together (as in the mountains of our area and further north) with no evidence of intergradation or hybridization. I prefer to treat them at the species level. [= GW; > *C. atlantica* – RAB, F, G, M, S, W; = *C. atlantica* var. *atlantica* – C; > *C. incomperta* Bicknell – RAB, F, G, M, S, W; = *C. atlantica* ssp. *atlantica* – FNA, K]

Carex aureolensis Steudel. {separate from *C. frankii*} {Pd, Mt, Cp (NC, SC, VA): bottomland forests; common. May-July.} VA, KY, IL, and NE south to FL, TX, NM, Coahuila, and Nuevo León; South America. [= FNA; < *C. frankii* – RAB, C, F, G, GW, K, M, S, W]

* ***Carex austrina*** Mackenzie. Pd (NC, VA), Cp (VA): roadsides, apparently introduced with hay used for erosion control; rare, native of sc. United States. May. Native from KY, IA, and NE south to AL and TX. First reported for our area by Bryson

et al. (1996). [= F, FNA, K, M; = *C. muhlenbergii* var. *australis* Olney – C, G; < *C. muhlenbergii* – S; = *C. muhlenbergii* var. *austrina* Small]

Carex austrocaroliniana Bailey, South Carolina Sedge. Mt (GA, NC, SC): nutrient-rich, moist coves in the sw. mountains of NC and adjacent SC, often with some seepage; uncommon (SC Rare). April-May. Endemic to the southern end of the Southern Appalachians, in Blue Ridge of sw. NC, ne. SC, n. GA, and e. TN, extending west to the Cumberland Plateau of TN. Naczi (1999b) reports a chromosome number of n = 28-30. [= FNA, K, W; = *C. austro-caroliniana* – RAB, M, S, orthographic variant]

Carex baileyi Britton, Bailey's Sedge. Mt (NC, VA): bogs; uncommon (NC Watch List). June-July. NH south to KY, NC, and TN, primarily Appalachian. [= RAB, C, F, FNA, G, K, M, S; *C. lurida* Wahlenberg var. *gracilis* (Boott) Bailey]

Carex baltzellii Chapman, Baltzell's Sedge. Cp (GA): steepheads, beech-magnolia slopes, and mesic to dry-mesic hammocks; rare (GA Endangered). Sw. GA west to Panhandle FL. [= FNA, K, M, S]

Carex barrattii Schweinitz & Torrey, Barratt's Sedge. Cp (NC, VA), Mt (GA, NC, SC, VA): peaty bogs and marshes; rare (NC Endangered, VA Rare). April-May. CT south to NC (at least formerly), on the Coastal Plain, and disjunct inland in places with many Coastal Plain affinities, as in w. VA (Augusta County), sw. NC (Henderson County, where now extirpated), nw. SC, sc. TN (Coffee County), n. GA, and n. AL. This species flowers and fruits rarely. Reported for South Carolina by Hill & Horn (1997) and Horn (1999). [= RAB, C, F, FNA, G, K, M, S, W]

Carex basiantha Steudel, Southern Willdenow's Sedge. Cp (NC, SC): mesic forests, bottomlands, and lower slopes, over calcareous or mafic rocks; rare. April-June. Se. NC south to n. FL, west to e. TX, and north to nw. GA, c. TN, and c. AR. [= FNA, K; < *C. willdenowii* Schkuhr ex Willdenow – RAB; < *C. willdenovii* – S (also see *C. superata* and *C. willdenowii*) and orthographic variant; ? *C. willdenowii* var. *pauciflora* Olney ex L.H. Bailey in J.M. Coulter; < *C. willdenowii* Schkuhr ex Willdenow var. *megarrhyncha* Hermann, misapplied]

Carex bebbii Olney ex Fernald. Mt (VA): calcareous wetlands; rare. Newfoundland, Labrador and AK south to NJ, nw. VA (Big Meadows, VA; Townsend, pers. comm. 2004), OH, IN, IL, NE, CO, and OR. [= C, F, FNA, G, K]

Carex bicknellii Britton. Pd (SC): prairie-like openings and barrens over gabbro; rare. ME west to Saskatchewan, south to DE, OH, MO, OK, and NM; disjunct in nc. SC. First reported for South Carolina by Hill & Horn (1997). [= FNA; = *C. bicknellii* var. *bicknellii* – K; < *C. bicknellii* – C, F, G, M (also see *C. opaca*)]

Carex biltmoreana Mackenzie, Biltmore Sedge. Mt (GA, NC, SC): in thin soils on medium to high elevation granitic domes and other sloping rock outcrops, often dominant in thin-soil herbaceous mats, but also occurring in adjacent woodlands under open to nearly closed canopy of *Quercus* spp., *Fraxinus americana, Carya glabra*, and *Juniperus virginiana var. virginiana*; rare (GA Threatened, NC Rare, SC Rare). May-June. Endemic to sw. NC, nw. SC, and ne. GA (Rabun and Towns counties). This distinctive endemic sedge may be recognized by its robust size (culms to a meter tall, to 5 mm in diameter at the base), habit (large clumps on sloping rock outcrops), and restricted habitat (in periodic seepage on exfoliation domes). Once considered very rare, *C. biltmoreana* proves to be limited to a narrow range and distinctive habitat, but regularly present and even locally dominant on the 50-100 granitic domes within 100 km of Brevard, NC. It often occurs with other endemic species, such as *Houstonia longifolia var. glabra, Krigia montana, Pycnanthemum montanum,* and *Packera millefolia*. An excellent illustration appears in Massey et al. (1983). [= RAB, FNA, K, M, S, W]

Carex blanda Dewey. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): cove forests, bottomlands, and other mesic, nutrient-rich forests; common. April-June. ME and s. Québec west to ND, south to c. GA (Jones & Coile 1988), panhandle FL, and TX. Naczi (1999b) reports chromosome numbers of n = 15-18. [= RAB, C, F, FNA, K, M, S, W; = *C. laxiflora* var. *blanda* (Dewey) Boott – G]

Carex brevior (Dewey) Mackenzie ex Lunell. Mt, Pd? (VA): dry forests and margins; uncommon. May-June. MW west to British Columbia, south to GA, c. TN, MS, TX, Tamaulipas, and AZ. [= F, FNA, G, K, W; < *C. festucacea* – RAB, GW; < *C. brevior* – C (also see *C. molesta* and *C. molestiformis*); < *C. festucacea* Schkuhr ex Willdenow var. *brevior* (Dewey) Fernald]

Carex bromoides Willdenow *ssp.* ***bromoides***, Common Brome Sedge. Cp (GA, NC, SC, VA), Mt, Pd (NC, SC, VA): swamp forests, bogs, seeps, other wetlands; uncommon. May-July. Ssp. *bromoides* ranges from New Brunswick west to e. MN, south to n. FL and e. TX, and disjunct in Mexico. Naczi (1999b) reports a chromosome number of n = 32-34. [= FNA, K; < *C. bromoides* – RAB, C, F, G, GW, M, S, W]

Carex bromoides Willdenow *ssp.* ***montana*** Naczi, Blue Ridge Brome Sedge. Mt (NC, SC, VA): mountain bogs in the Blue Ridge, seepages in the Blue Ridge Escarpment; rare (NC Watch List). June-July. Ssp. *montana* is known only from sw. VA, w. NC, and nw. SC. This taxon needs further study in order to better understand its habitats and distribution. Naczi (1999b) provided additional evidence for its recognition, in the form of different chromosome numbers (n=30-31 for ssp. *montana* and n= 32-34 for ssp. *bromoides*). [= FNA, K; < *C. bromoides* – RAB, C, F, G, GW, M, S, W]

Carex brunnescens (Persoon) Poiret *var.* ***sphaerostachya*** (Tuckerman) Kükenthal, Brown Sedge. Mt (GA, NC, SC, VA): grassy balds, bogs, moist forests at moderate to high elevations; common (GA Special Concern, VA Watch List). June-July. The species is circumboreal, in North America ranging south to NJ, OH, MI, and MN, south to w. NC, nw. SC, e. TN, and n. GA. Var. *sphaerostachya* is apparently the only infraspecific taxon (of four) to reach our area. See Gaddy (1981) for the report of this species in SC. [= F; < *C. brunnescens* – RAB, C, G, M, S, W; = *C. brunnescens* ssp. *sphaerostachya* (Tuckerman) Kalela – FNA, K]

Carex bullata Schkuhr ex Willdenow. Cp (GA, NC, SC, VA), Mt (GA, NC, VA), Pd (NC): bogs; uncommon. May-June. Nova Scotia south to GA, primarily on the Coastal Plain, but with scattered occurrences inland (as in AR and the Eastern Highland Rim of sc. TN). [= RAB, C, F, FNA, GW, K, M, S; > *C. bullata* var. *bullata* – G; > *C. bullata* var. *greenii* (Böckler) Fernald – G]

Carex bushii Mackenzie. Pd (GA, NC, VA), Mt (NC, VA): meadows; uncommon (VA Watch List). May-June. MA and s. NY west to MO and KS, south to NC, GA (Jones & Coile 1988), MS, and TX; disjunct in MI. [= RAB, C, F, FNA, G, K, M, S, W; ? *C. caroliniana* Schweinitz var. *cuspidata* (Dewey) Shinners]

Carex buxbaumii Wahlenberg, Brown Bog Sedge, Buxbaum's Sedge. Mt (GA, NC, SC, VA), Cp (VA), Pd (VA): bogs, fens, and seepages (especially over calcareous or mafic rocks); rare (GA Special Concern, NC Rare, VA Rare). June-July. Circumboreal, in North America ranging from Newfoundland west to s. and w. AK, south to se. VA, w. NC, nw. SC, n. GA (Jones & Coile 1988), c. TN, KY, n. AR, CO, UT, and CA. Reported for South Carolina by Hill & Horn (1997) and Hill (1999). [= RAB, C, F, FNA, G, K, M, S, W]

Carex canescens Linnaeus *var.* ***canescens***, Silvery Sedge. Mt (VA): {habitat}; rare. Greenland and AK south to VA, IL, NM, and CA; South America, Eurasia; Australia. [= F, G; < *C. canescens* – C, M; = *C. canescens* ssp. *canescens* – FNA, K]

Carex canescens Linnaeus *var.* ***disjuncta*** Fernald, Silvery Sedge. Cp (NC, SC, VA), Mt (VA): bogs, swamps, often in disturbed areas; rare (NC Rare, VA Watch List). June. Newfoundland west to MN, south to VA, NC, SC, OH, and IN. [= RAB, F, G; < *C. canescens* – C, M; = *C. canescens* ssp. *disjuncta* (Fernald) Toivonen – FNA, K]

Carex careyana Torrey ex Dewey, Carey's Sedge. Mt (GA, NC, VA), Pd (VA): nutrient-rich moist forests, mostly over calcareous rocks; rare (GA Special Concern, NC Rare, VA Watch List). May-June. NY west to MI and IA, south to sw. NC, AL and MO. Naczi (1999b) reports a chromosome number of n = 34. [= C, F, FNA, G, K, M, W]

Carex caroliniana Schweinitz, Carolina Sedge. Cp, Pd, Mt (GA, NC, SC, VA): forests; common. May-June. NJ, PA, MO, and OK south to SC, e. GA, and TX; apparently disjunct in Panhandle FL and adjacent sw. GA. [= RAB, C, F, FNA, G, GW, K, M, S, W]

* ***Carex caryophyllea*** Latourette, Spring Sedge. Cp? (VA?): disturbed areas; rare, native of Eurasia. This species may not actually be known to occur in our area; it has been reported as naturalized south to DC and is likely to be in VA. [= C, F, FNA, G, K, M]

Carex cephalophora Muhlenberg ex Willdenow. Cp, Pd, Mt (GA), {NC, SC, VA}: ME west to MN, south to FL and TX. [= F, FNA, K, M, S; < *C. cephalophora* – RAB, W (also see *C. mesochorea*); = *C. cephalophora* var. *cephalophora* – C, G]

Carex chapmanii Steudel, Chapman's Sedge. Cp (GA, NC, SC, VA?): edges of calcareous pine savannas, calcareous slopes and bottomlands; rare (US Species of Concern, NC Rare, SC Rare). April-May. Se. NC south to FL, on the Coastal Plain; allegedly disjunct in nc. TN (Chester et al. 1993). The affinities of this species are questionable; it is usually placed in section *Paniceae*, but may actually belong to *Laxiflorae*. [= RAB, FNA, K, S; = *C. chapmannii* – M, orthographic variant; = *C. styloflexa* Buckley var. *fusiformis* (Chapman ex Dewey) Wiegand]

Carex cherokeensis Schweinitz, Cherokee Sedge. Cp (GA, NC, SC), Pd (GA, SC), Mt (GA, NC, SC, VA*?): moist, rich, calcareous forests; rare (NC Rare). May-June. Se. NC, nw. SC, sw. NC, nc. TN, se. MO, and OK, south to Panhandle FL and west to e. TX and se. OK; disjunct in the Mountains of VA, where perhaps introduced (Belden et al. 2004). This species is much more common in the sc. United States than in our area. [= RAB, FNA, G, K, M, S, W]

Carex collinsii Nuttall, Collins's Sedge. Cp (GA, NC, SC, VA), Mt (NC): white cedar (*Chamaecyparis*) bogs and pocosins in the Coastal Plain, bogs in the southwest mountains of NC (where associated with other Coastal Plain disjuncts); uncommon (GA Special Concern, NC Watch List, SC Rare, VA Watch List). June-July. RI to wc. GA on the Coastal Plain, disjunct in the mountains of nw. NJ, PA, sw. NC, and possibly TN (Chester et al. 1993). *C. collinsii* is a very distinctive species; the slender perigynia teeth are reflexed 180 degrees (thus appressed back against the perigynium). [= RAB, C, F, FNA, G, K, M, S, W; = *C. collinsiae* – GW, orthographic error]

Carex comosa Boott, Bottlebrush Sedge, Bristly Sedge. Cp (GA, NC, SC, VA), Pd (NC, VA), Mt (GA, VA): swamps, marshes; common. April-June. Québec west to MN, south to FL and LA; also in w. North America. [= RAB, C, F, FNA, G, GW, K, M, S, W]

Carex communis Bailey *var.* ***amplisquama*** (F.J. Hermann) J. Rettig. Mt (GA, NC, SC): dry, open woodlands; rare (NC Rare, SC Rare). July-August. Endemic to n. GA, nw. SC, and sw. NC (Rabun, Towns, White, Union, Lumpkin, Fannin, Murray, and Gilmer counties, GA, Oconee and Greenville counties, SC, and Polk County, NC) (Rettig 1988, Hill & Horn 1997, Gaddy, pers. comm.). Following Rettig's (1988) determination that *C. amplisquama* is better treated as a variety of *C. communis*, the combination was made by Rettig & Crins (1996). The two taxa differ in achene micromorphology, flavonoid chemistry, and minor morphological characters (Rettig 1988). [= FNA, K; = *C. amplisquama* F.J. Hermann – W]

Carex communis Bailey *var.* ***communis***. Mt (GA, NC, SC, VA), Pd (GA): dry woodlands and forests; common. May-June. Prince Edward Island west to MN, south to n. SC, c. GA (Jones & Coile 1988), and AR. [= FNA, K; = *C. communis* – RAB, C, F, G, M, S, W]

Carex complanata Torrey & Hooker. Cp, Pd (GA, NC, SC, VA), Mt (GA): forests; common. May-June. NJ and s. PA south to FL, west to TX and MO; apparently disjunct in AZ. [= F, FNA, K, M, S; = *C. complanata* var. *complanata* – C, G; < *C. complanata* – RAB, GW, W (also see *C. hirsutella*)]

Carex conjuncta Boott, Soft Fox Sedge. Cp, Pd, Mt (VA): mesic forests; rare (VA Rare). May-July. NY, NJ, MN, and SD, south to VA, sc. TN, and AR. [= C, F, FNA, G, K, M, W]

Carex conoidea Schkuhr ex Willdenow, Field Sedge. Mt (NC, VA): seepage and fen over mafic rocks (amphibolite); rare (NC Threatened, VA Rare). May-June. Newfoundland west to MN, south to nw. NC (Ashe Co.) and MO. The only known location in NC was found by a party led by Asa Gray in 1841. [= RAB, C, F, FNA, G, K, M, S]

Carex corrugata Fernald. Cp (NC, SC, VA), {GA}: wet calcareous forests (NC Rare). {distribution and abundance needing additional herbarium investigation}. May-June. Se. VA and KY south to TN and AL. See Hill (1992). [= F, FNA, K; < *C. grisea* – RAB, G, M, S; < *C. amphibola* – GW; ? *C. amphibola* Steudel var. *turgida* Fernald]

Carex crawei Dewey, Crawe's Sedge. Mt (VA): dry calcareous barrens; rare (VA Rare). Québec west to British Columbia, south to NJ, w. VA, c. TN, AL, and AR. First reported for VA by Ludwig (1999). Naczi (1999b) reports a chromosome number of n = 30. [= C, F, FNA, G, K, M, S]

Carex crebriflora Wiegand. Mt, Pd, Cp (GA, NC, SC, VA): bottomland and other nutrient-rich forests: uncommon. April-June. VA south to FL, west to TX. [= RAB, C, F, FNA, G, K, M, S, W]

Carex crinita Lamarck *var.* ***brevicrinis*** Fernald. Cp, Pd (NC, SC, VA), {GA}: swamps, wet forests; common (VA Watch List). May-June. MA south to FL, west to TX, north in the interior to KY and MO. [= C, F, FNA, K; < *C. crinita* Lamarck var. *crinita* – RAB, G, GW; < *C. crinita* – M, S; < *C. crinita* – W (also see *C. gynandra* and *C. mitchelliana*)]

Carex crinita Lamarck *var.* ***crinita***. Pd, Cp (NC, SC, VA), Mt (NC), {GA}: swamps, wet forests, bogs; common (rare in Mountains) May-June. Newfoundland west to MN and Alberta, south to GA, TN, and AR. [= C, F, FNA, K; < *C. crinita* Lamarck var. *crinita* – RAB, G, GW; < *C. crinita* – M, S; < *C. crinita* – W (also see *C. gynandra* and *C. mitchelliana*)]

Carex cristatella Britton, Crested Sedge. Mt (NC, VA), Pd (VA): grassy balds, bogs, wet meadows; rare (NC Rare, VA Rare). May-June. VT west to Saskatchewan, south to NC, KY, MO, and KS. See Fox, Godfrey, & Blomquist (1952) for the first report from NC. [= RAB, C, F, FNA, G, K, W]

Carex crus-corvi Shuttleworth ex Kunze, Crowfoot Sedge, Ravenfoot Sedge. Cp (GA, NC, SC, VA): swamp forests, especially over calcareous substrates; rare (VA Rare). May-June. Se. VA south to FL, west to TX, north in the interior to IN, s. Ontario, MI, and MN. [= RAB, C, FNA, G, GW, K, M, S; > *C. crus-corvi* var. crus-*corvi* – F; > *C. bayardii* Fernald – F; > *C. crus-corvi* var. *virginiana* Fernald]

Carex cumberlandensis Naczi, Kral, & Bryson, Cumberland Sedge. Mt, Pd (GA, NC, SC, VA), Cp (GA): rich, mesic, deciduous or mixed forests; common. May; June. Sw. PA, s. OH, s. IL south to c. NC, c. SC, c. GA, sc. AL, e. MS, and w. TN; disjunct in nw. AR. [= FNA; < *C. abscondita* – RAB, C, G, K, M, S, W; < *C. abscondita* var. *abscondita* – F]

Carex dasycarpa Muhlenberg, Velvet Sedge. Cp (GA, SC): maritime forests, other sandy forests; rare (GA Rare). May-June. E. SC south to FL, west to MS. Gaddy & Rayner (1980) report this species from a number of barrier islands in Beaufort and Charleston counties, SC; it has since been found in Georgetown County, SC, as well. [= RAB, FNA, K, M, S]

Carex davisii Schweinitz & Torrey, Davis's Sedge. Pd (VA): rich forests; rare. VT, Ontario, and MN south to VA (Fairfax County) (Steury 2004b), e. WV, nc. TN (Chester et al. 1993), AR, and TX. First reported for VA by Steury (2004b). [= C, F, FNA, G, K, M]

Carex debilis Michaux. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): swamps, bogs, other moist to wet habitats; common. May-August. MA west to s. IN, south to FL and TX. For other taxa often treated as varieties of *C. debilis*, see *C. allegheniensis* and *C. flexuosa*. [= M, S; = *C. debilis* var. *debilis* – RAB, C, F, FNA, G, K; < *C. debilis* – GW, W (also see *C. allegheniensis* and *C. flexuosa*)]

Carex decomposita Muhlenberg, Cypress-knee Sedge, Epiphytic Sedge. Cp (GA, NC, SC, VA), Pd (VA): blackwater swamp forests, often growing on cypress knees, cypress bases, or fallen logs (often at or near water level); rare (GA Special Concern, NC Rare, VA Rare). NY west to MI, south to sw. GA (Jones & Coile 1988), FL, and TX. See Gaddy & Rayner (1980). [= RAB, C, F, FNA, G, GW, K, M, S]

Carex deflexa Hornemann. Mt (NC): seepage at high elevations; rare (NC Rare). Greenland west to AK, south to MA, n. NY, n. MI, and n. MN; apparently disjunct in the high mountains of w. NC. [= C, F, G, K, M; > *C. deflexa* var. *deflexa* – FNA]

Carex digitalis Willdenow *var.* ***digitalis***. Infraspecific taxa need separating: {Mt, Pd, Cp (GA, NC, SC, VA): rich forests; common.} April-June. ME west to WI, south to FL and e. TX. Naczi (1999b) reports a chromosome number of n = 24. [= FNA, K; < *C. digitalis* – RAB, C, F, G, M, S, W]

Carex digitalis Willdenow *var.* ***floridana*** (L.H. Bailey) Naczi & Bryson. Cp (GA, NC, SC, VA): rich forests; common. April-June. MD south to FL, west to TX. Naczi (1999b) reports a chromosome number of n = 24. [= FNA; = *C. digitalis* var. *asymmetrica* Fernald – F, K; < *C. digitalis* – RAB, C, G, M, S, W]

Carex digitalis Willdenow *var.* ***macropoda*** Fernald. Infraspecific taxa need separating: {Mt, Pd, Cp (GA, NC, SC, VA): rich forests; common.} April-June. PA and IL south to FL and TX. Naczi (1999b) reports a chromosome number of n = 24. [= F, FNA, K; < *C. digitalis* – RAB, C, F, G, M, S, W]

* ***Carex divisa*** Hudson, Divided Sedge. Cp (NC, VA): brackish marshes; rare, native of the Old World. May-June. [= RAB, C, F, FNA, G, K]

* ***Carex divulsa*** Stokes. Reported for Washington, DC; its occurrence in our area is uncertain. [= C, F; ? *C. divulsa* ssp. *divulsa* – FNA, K; ? *C. virens* – G, M, misapplied]

Carex eburnea Boott, Bristle-leaf Sedge. Mt (GA, NC, SC, VA): calcareous cliffs, bluffs, and outcrops; common, rare south of VA (GA Special Concern, NC Rare). May. Newfoundland west to AK, south to w. VA, w. NC, nw. SC, c. AL, n. AR, NE, s. Alberta, and s. British Columbia; early reports of this species from TX are referrable to a recently described species, *C. mckittrickensis* P.W. Ball. Locally abundant on limestone bluffs, easily recognized vegetatively by its wiry stems and leaves (ca. 0.5 mm wide). [= RAB, C, F, FNA, G, K, M, S, W]

Carex echinata Murray *ssp.* ***echinata***, Star Sedge. Mt (NC, VA): bogs; uncommon (NC Watch List). May-June. Ssp. *echinata* is circumboreal, ranging in North America from Newfoundland west to Saskatchewan, south to DE, PA, IN, IA, and ND, and in the mountains to w. NC and e. TN; also in w. North America from AK (Aleutians) and British Columbia south to CO, UT, and s. CA. Ssp. *phyllomanica* (Boott) Reznicek occurs along the western coast of North America from s. AK south to n. CA. [= FNA, K; > *C. muricata* Linnaeus var. *angustata* (Carey) Carey ex Gleason – RAB, G, misapplied; = *C. echinata* var. *echinata* – C; > *C. muricata* var. *cephalantha* (Bailey) Wiegand & Eames – G; = *C. angustior* Mackenzie – M, S; > *C. angustior* – F; > *C. cephalantha* (Bailey) Bicknell – F; < *C. muricata* – W]

Carex elliottii Schweinitz & Torrey, Elliott's Sedge. Cp (GA, NC, SC): bogs; uncommon (NC Watch List). May-June. NC south to c. pen. FL and west to s. AL. [= RAB, FNA, GW, K, M, S]

Carex emmonsii Dewey ex Torrey, Emmons's Sedge. Cp (NC, SC, VA), Pd (GA, NC, SC, VA): dry, sandy woodlands; rare (NC Watch List). April-May. Nova Scotia west to WI, south to PA, NC, SC, and TN. [= RAB, F, W; = *C. albicans* Willdenow ex Sprengel var. *emmonsii* (Dewey ex Torrey) J. Rettig – C, FNA, K; = *C. nigro-marginata* Schweinitz var. *minor* (Boott) Gleason – G; < *C. varia* Muhlenberg ex Willdenow – S; = *C. albicans* – M, misapplied]

Carex emoryi Dewey in Torrey. Mt (VA): {habitat}; rare. May-June. NY and ND south to w. VA, s. IL, n. AR, and TX. [= C, F, FNA, K, M; = *C. stricta* Lamarck var. *elongata* (Böckeler) Gleason – G]

Carex exilis Dewey, Coastal Sedge. Cp (NC): peaty seepage bogs; rare (NC Threatened). May-June. Newfoundland and Labrador west to Ontario and n. MN, south to NJ, DE, MD, NY, and n. MI; disjunct southward in sc. NC, se. MS, and sw. AL. The southern occurrences are remarkably disjunct from the Canadian, northern Coastal Plain, and Great Lakes distribution. [= RAB, C, F, FNA, G, K, M]

* ***Carex extensa*** Goodenough, Long-bracted Sedge. Cp (VA): salt marshes, introduced around seaports; rare, native of Europe. [= C, F, FNA, G, K, M]

Carex festucacea Schkuhr ex Willdenow, Fescue Sedge. Cp (GA, NC, SC, VA), Pd, Mt (NC, SC, VA): bottomland forests; uncommon (NC Watch LIst). May-June. VT west to MN, south to GA, AL, MS, LA, and TX. [= C, F, FNA, K; < *C. festucacea* – RAB, GW, W; < *C. festucacea* – G (also see *C. straminea*)]

Carex fissa Mackenzie *var.* ***aristata*** Hermann. Cp (GA, SC): wet savannas; rare (GA Special Concern). Extreme se. SC (Jasper Co.), se. GA (Clinch County) (Sorrie 1998b) and s. MS (Bryson et al. 1996) south into n. and c. peninsular FL. The SC distribution is documented by a voucher (Crins 9848 & D. Brunton) at MICH. Probably a species distinct from *C. fissa*. [= FNA, GW, K; < *C. fissa* – M]

* ***Carex fissa*** Mackenzie *var.* ***fissa***. Cp (VA): introduced at old railroad stockyard, well-established; rare, native of sc. United States (MO and KS south to TX). [= FNA, K; < *C. fissa* – M]

Carex flaccosperma Dewey. Cp, Pd, Mt (GA), {NC, SC, VA} {distribution and abundance needing additional herbarium investigation} May-June. Se. VA south to FL, west to TX, north in the interior to s. MO. [= FNA, G, K, M, S; < *C. flaccosperma* – RAB, C, GW (also see *C. glaucodea* and/or *C. pigra*); = *C. flaccosperma* var. *flaccosperma* – F]

Carex flava Linnaeus, Yellow Sedge. Mt (VA): calcareous seeps; rare (VA Rare). June. Circumboreal, ranging south in North America to NJ, PA, IN, ID, and British Columbia; disjunct in sw. VA (Giles County). First reported for VA by Wieboldt et al. (1998). [= C, K; > *C. flava* var. *flava* – F, G; > *C. flava* var. *laxior* (Kükenthal) Gleason – G]

Carex flexuosa Muhlenberg ex Willdenow. Mt (NC, SC, VA): dry to moist upland forests, openings, granitic domes, rock outcrops; common. May-July. Newfoundland west to MN, south to VA and MO, and in the Appalachian Mountains to w. NC and e. TN. [= M, S; = *C. debilis* var. *rudgei* Bailey – RAB, C, F, G, K; < *C. debilis* var. *rudgei* L.H. Bailey – FNA; < *C. debilis* – GW, W]

Carex floridana Schweinitz, Florida Sedge. Cp (GA, NC, SC, VA), Pd (NC): dry, sandy woodlands; rare (GA Special Concern, NC Watch List, VA Watch List). March-May. E. NC south to FL, west to TX. [= FNA, K, M, S; = *C. nigromarginata* Schweinitz var. *floridana* (Schweinitz) Kükenthal – RAB, F]

Carex folliculata Linnaeus. Mt (GA, NC, SC, VA), Pd, Cp? (NC): bogs, boggy forests, high elevation forests (spruce-fir); uncommon (GA Special Concern). May-July. Newfoundland west to WI, south to NC and e. TN. [= FNA, K, M, S, W; = *C. folliculata* var. *folliculata* – RAB, C, F, G; < *C. folliculata* – GW (also see *C. lonchocarpa*)]

Carex frankii Kunth. {Pd, Mt, Cp (GA, NC, SC, VA)}: bottomland forests; common. May-July. } W. NY and s. Ontario west to MI and se. NE, south to GA, AR, and OK. [= FNA; < *C. frankii* – RAB, C, F, G, GW, K, M, S, W (also see *C. aureolensis*)]

Carex gholsonii Naczi & Cochrane, Gholson's Sedge. Cp (GA, NC, SC): moist calcareous forests, especially marl flats and bottomlands over coquina; rare. E. NC south to FL, west to AL. See Naczi, Bryson, & Cochrane (2002). [= FNA] {not yet keyed}

Carex gigantea Rudge, Giant Sedge. Cp (GA, NC, SC, VA), Pd (GA, NC), Mt (GA): swamps, bottomland forests, cypress depressions; common (rare in Piedmont). June. DE south to s. FL, west to e. TX, north in the interior to nw. GA (Jones & Coile 1988), IN and OK. [= RAB, C, F, FNA, G, GW, K, M, S]

Carex glaucescens Elliott, Blue Sedge, Southern Sedge. Cp (GA, NC, SC, VA), Mt (GA): blackwater swamps, pocosins, wet pine savannas, seepage bogs, other acid and peaty situations; common. July-September. E. MD south to c. peninsular FL, west to e. TX; disjunct in nw. GA (Jones & Coile 1988) and c. TN. [= RAB, C, F, FNA, G, GW, K, M, S]

Carex glaucodea Tuckerman ex Olney. (NC, VA): {distribution and abundance needing additional herbarium investigation} May-June. MA and Ontario west to s. IN and MO, south to NC, sc. TN, and AR. [= FNA, K; < *C. flaccosperma* – RAB, C, GW; < *C. flaccosperma* Dewey var. *glaucodea* (Tuckerman ex Olney) Kükenthal – F; < *C. glaucodea* – G, M, S]

Carex godfreyi Naczi, Godfrey's Sedge. Cp (GA, NC, SC): calcareous swamps and bottomlands; rare. May-June. Se. NC south to c. peninsular FL and west to Panhandle FL and sw. GA and s. AL. See Naczi (1993) for additional information. [= FNA, K; < *C. grisea* – RAB, M, S; < *C. amphibola* – GW]

Carex gracilescens Steudel. Pd, Mt (NC, SC, VA), Cp (GA?, VA): nutrient-rich forests; rare (SC Rare). May-June. VT and s. Québec west to WI, south to SC, AL, LA, and e. TX. The report for sw. GA in Jones & Coile (1988) needs verification. Naczi (1999b) reports a chromosome number of n = 17, 19, 20. [= RAB, F, FNA, K, M, S, W; < *C. gracilescens* – C (also see *C. ormostachya*); = *C. laxiflora* var. *gracillima* (Boott) Boott ex B.L. Robinson & Fernald – G]

Carex gracillima Schweinitz, Graceful Sedge. Mt (GA, NC, SC, VA): moist forests; common. April-June. Newfoundland west to Manitoba, south to GA, AL, and AR. [= RAB, C, FNA, G, K, M, W; > *C. gracillima* var. *gracillima* – F]

Carex granularis Muhlenberg ex Willdenow. Mt (VA), Cp (GA, NC, SC, VA), Pd (NC, VA): moist, nutrient-rich forests, especially bottomlands, mostly over calcareous rocks (limestone, dolostone, coquina limestone) or mafic rocks (diabase); common, rare south of VA (NC Watch List). May-June. ME and Québec west to Saskatchewan, south to FL, OK, and ne. TX. Here interpreted to include *C. haleana* Olney. Naczi (1999b) found little correlation between the morphological and cytological variability of *C. granularis*, and also little correlation of that variability with geography; he concluded that there was little support for recognition of infraspecific taxa. *C. haleana* Olney [= *C. granularis* var. *haleana* (Olney) Porter] is alleged to differ primarily in its more slender perigynia (1.0-1.5 mm wide vs. 1.5-2.5 mm). See F and M for more information; further study is needed. [= RAB, C, FNA, G, GW, K, S, W; > *C. granularis* var. *granularis* – F; > *C. granularis* var. *haleana* (Olney) Porter – F; > *C. granularis* – M; > *C. haleana* Olney – M]

* ***Carex gravida*** Bailey *var.* ***gravida***. Pd (VA): fields; uncommon. Ontario west to Saskatchewan, south to TN, MS, AR, OK, and CO, rarely introduced eastward. [= C, F, G, K; < *C. gravida* – FNA; = *C. gravida* – M]

* ***Carex gravida*** Bailey *var.* ***lunelliana*** (Mackenzie) F.J. Hermann. Pd (GA, NC), {SC, VA}: disturbed areas; rare (VA Watch List). IN, SD, and CO south to AR, TX, and NM; introduced eastward in MD south to GA. Reported as new to MD (Calvert County) (Steury 1999). [= RAB, C, F, G, K; < *C. gravida* – FNA; = *C. lunelliana* Mackenzie – M]

Carex grayi Carey, Asa Gray's Sedge. Cp, Pd (NC, SC, VA), Mt (GA, VA): bottomland forests; common (rare in Mountains) (GA Special Concern). May-June. Sw. Québec west to WI and IA, south to nw. GA and OK; apparently disjunct in Panhandle FL. [= RAB, C, FNA, K, W; = *C. grayii* – G, GW, M, orthographic variant; > *C. grayii* var. *grayii* – F; > *C. grayii* var. *hispidula* A. Gray – F; = *C. asa-grayi* Bailey – S]

Carex grisea Wahlenberg. (VA). {distribution and abundance in our area needing additional herbarium investigation} May-June. New Brunswick west to MN and SD, south to VA, TN, MS, LA, and TX. [= FNA, K; < *C. grisea* – RAB, G, M, S (also see *C. corrugata* and/or *C. godfreyi*); < *C. amphibola* – C, GW; ? *C. amphibola* var. *turgida*]

Carex gynandra Schweinitz. Mt (GA, NC, SC, VA), Pd (NC, VA): mountain bogs, swamp forests, seepages; common. May-June. Newfoundland west to MN, south to WI, n. VA, w. NC, n. GA, e. TN, OH, and WI. This is the most montane and northern element of the *C. crinita* complex, and the usual one encountered in the Mountains of our area. [= C, FNA, K, M, S; = *C. crinita* Lamarck var. *gynandra* (Schweinitz) Schweinitz & Torrey – RAB, F, G, GW; < *C. crinita* – W]

Carex hirsutella Mackenzie. Mt, Pd, Cp? (NC, SC, VA) {GA}: forests; common. May-June. ME, s. Ontario, and IA, south to GA and ne. TX. [= F, FNA, K, M, S; = *C. complanata* Torrey & Hooker var. *hirsuta* (Bailey) Gleason – C, G; < *C. complanata* – RAB, GW, W]

* ***Carex hirta*** Linnaeus. Cp (VA): dry sandy areas; rare, native of Europe. The report of *C. hirta* for NC (Burk 1961, RAB) is based on a misidentification of *C. pumila* (Reznicek 1993). [= C, F, FNA, G, K, M]

Carex hirtifolia Mackenzie. Mt (VA): nutrient-rich, though often rather dry, forests and woodlands; uncommon (VA Watch List). May-June. New Brunswick west to MN, south to MD, sw. VA, c. TN, KY, MO, and e. KS. [= C, F, FNA, G, K, M, W]

Carex hitchcockiana Dewey. Mt (NC, VA): rich moist forests, especially over limestone, other calcareous, or mafic rocks; uncommon (NC Rare, VA Watch List). June-July. MA west to MN, south to NC, sc. TN, and AR. [= C, F, FNA, G, K, M, W]

Carex hormathodes Fernald. Cp (NC, VA): freshwater and slightly brackish tidal marshes; rare (NC Rare). Newfoundland south to ne. NC, along the coast. [= F, FNA, K, M; = *C. straminea* Willdenow ex Schkuhr var. *invisa* W. Boott – C, G]

Carex howei Mackenzie, Howe's Sedge. Cp (GA, NC, SC, VA), Pd, Mt (NC, VA): bogs and seepages; uncommon. May-June. Nova Scotia west to MI and nw. IN, south to c. peninsular FL and e. TX, predominantly (but by no means strictly) on the Coastal Plain. See *C. atlantica* for discussion of the relationship between the two taxa. [= RAB, F, G, GW, M, S, W; = *C. atlantica* var. *capillacea* (Bailey) Cronquist – C; = *C. atlantica* Bailey ssp. *capillacea* (Bailey) Reznicek – FNA, K]

Carex hyalinolepis Steudel. Cp (GA, NC, SC, VA): marshes, swamp forests; uncommon (NC Watch List). May-June. NJ south to FL, west to TX, north in the interior to KS; disjunct around the Great Lakes in MI, IN, and s. Ontario. [= RAB, C, F, FNA, K, M, S; = *C. lacustris* Willdenow var. *laxiflora* Dewey – G; = *C. hyalinolepsis* – GW, misspelling]

Carex hystericina Muhlenberg ex Willdenow, Porcupine Sedge. Mt (GA, VA), Pd (GA): calcareous marshes and wet meadows; common (GA Special Concern). June-July. New Brunswick west to British Columbia, south to w. VA, sc. TN, w. TX, and n. CA. [= C, FNA, G, K; = *C. hystricina* – F, M, W, orthographic variant]

Carex impressinervia Bryson, Kral, & Manhart. Pd (NC): moist forests; rare (US Species of Concern, NC Rare). April-May. Sc. NC south to AL and west to MS, apparently very rare and widely scattered. See Bryson, Kral, & Manhart (1987) for additional information on this species. [= FNA, K]

Carex interior Bailey, Inland Sedge. Mt (VA): calcareous seepage areas; rare (VA Rare). May-June. Newfoundland and Labrador west to s. AK, south to w. VA, n. AR, n. AZ, and n. CA; disjunct in Mexico (Chihuahua). [= C, F, FNA, G, K, M, W]

Carex intumescens Rudge *var.* ***fernaldii*** Bailey. Mt (NC, VA): spruce-fir forests, northern hardwood forests, grassy balds; common. June-July. Newfoundland west to Manitoba, south to NY, n. PA, MI, MN, and, at higher elevations in the Appalachians, to w. VA, w. NC, and e. TN. See Uttal (1971) and Reznicek & Ball (1974) for different views on the validity of this variety. [= F; < *C. intumescens* – RAB, C, FNA, G, GW, K, M, S, W]

Carex intumescens Rudge *var.* ***intumescens***. Cp, Pd, Mt (GA, NC, SC, VA): bogs, wet forests; common. May-July. Nova Scotia west to WI, south to c. peninsular FL and e. TX. [= F; < *C. intumescens* – RAB, C, FNA, G, GW, K, M, S, W]

Carex jamesii Schweinitz, James's Sedge. Pd (NC, SC, VA), Mt, Cp (VA), {GA}: nutrient-rich bottomlands and mesic slopes over calcareous or mafic rocks; uncommon. May-June. MD and NY west to MI, MN, and e. NE, south to c. SC, GA, and LA. Naczi (1999b) reports chromosome numbers of n = 33, 35. [= FNA; < *C. jamesii* – RAB, C, F, G, K, M, W]

Carex joorii Bailey, Joor's Sedge, Hummock Sedge, Cypress-swamp Sedge. Cp (GA, NC, SC, VA), Pd (GA, NC, VA): swamps, upland depression swamps in the Piedmont, sphagnous wetlands; common, rare in the Piedmont. June-October. E. MD south to panhandle FL, west to e. TX, north in the interior to TN, MO, and OK. [= RAB, C, F, FNA, G, GW, K, M, S]

Carex juniperorum Catling, Reznicek, & Crins. Mt (VA): calcareous glades and barrens; rare. This species was recently described, and is so far known only from alvars in s. Ontario, calcareous glades and barrens in s. OH and ne. KY, and has recently been found in Montgomery Co., VA (Belden et al. 2004). [= FNA, K]

* ***Carex kobomugi*** Ohwi, Sea Isle Sedge, Japanese Sedge. Cp (NC, VA): sand dunes; uncommon, native of Japan. March-July. *C. kobomugi* is distinctive in its short stout culms, and its terminal, headlike, dioecious inflorescences. This species is planted as a stabilizer of coastal dunes. [= C, F, FNA, G, K]

Carex lacustris Willdenow, Lakeshore Sedge. Cp, Mt (VA): marshes, swamp forests; rare (VA Rare). Québec west to Saskatchewan, south to e. VA, w. VA, and NE. [= C, F, FNA, K, M; = *C. lacustris* var. *lacustris* – G]

Carex laevivaginata (Kükenthal) Mackenzie. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): marshes, swamp forests, alluvial forests; common. May-June. MA, MI, and MN, south to n. FL, AL, and MO. [= RAB, C, F, FNA, G, GW, K, M, W; = *C. laevi-vaginata* – S, orthographic variant]

Carex lasiocarpa Ehrhart *var.* ***americana*** Fernald, Slender Sedge. Mt (NC, VA): in shallow water of alkaline spring seep, on hummocks in acidic basin marsh, and in high elevation fen over amphibolite; rare (VA Rare). A circumboreal species,

ranging south in North America to NJ, WV, MD (C. Frye, pers. comm. 2000), VA, nw. NC, IA, and WA. First reported for VA by Wieboldt et al. (1998). Found for the first time in NC in the valley of Long Hope Creek (Ashe County, NC), in July 1999 by A.S. Weakley and P.D. McMillan. [= C, F, G, K; = *C. lasiocarpa* ssp. *americana* (Fernald) Hultén – FNA; < *C. lasiocarpa* – M, W]

Carex laxiculmis Schweinitz *var.* ***copulata*** (Bailey) Fernald. Mt, Pd (VA), {NC}: mesic forests; uncommon. April-June. VA, Ontario, and WI south to NC, AL, and AR. Var. *copulata* (Bailey) Fernald, has sometimes been considered the hybrid *C. digitalis* × *laxiculmis*; current evidence suggests that it is not a hybrid but is not consistently separable from *C. laxiculmis* (Manhart 1984). Naczi (1999b) reports chromosome numbers for the two varieties, n= 22, 23, 25 for var. *laxiculmis*, and n = 23-24 for var. *copulata*; normal pairing further suggests that var. *copulata* is not a hybrid. [= FNA, K; < *C. laxiculmis* – RAB, G, K, S, W; = *C.* ×*copulata* (Bailey) Mackenzie – F, M]

Carex laxiculmis Schweinitz *var.* ***laxiculmis***. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (VA): rich slope or alluvial forests; common. April-June. S. ME west to s. WI and s. IA, south to NC, nw. GA (Jones & Coile 1988), n. AL, and MO. [= FNA, K; < *C. laxiculmis* – RAB, G, S, W; = *C. laxiculmis* – F, M]

Carex laxiflora Lamarck. Mt, Pd, Cp (GA, NC, SC, VA): bottomland and other nutrient-rich forests; common. May-June. Varieties have been recognized; their appropriate disposition is uncertain. Var. *laxiflora* ranges from ME and s. Québec west to WI and IN, south to NC, TN, and AL; allegedly also in s. Mexico. Var. *serrulata* F.J. Hermann has been reported for our area by Hill & Horn (1997). Its range is stated by F to be NY and PA to MI, IN, and TN. It differs in being distinctly scabrous (vs. smooth to scaberulous), and in having the bract sheaths with serrulate angles (vs. entire or erose angles). [= RAB, C, FNA, M, W; > *C. laxiflora* var. *serrulata* F.J. Hermann – F, K; > *C. laxiflora* var. *laxiflora* – F, K; < *C. laxiflora* var. *laxiflora* – G; ? *C. heterosperma* Wahlenberg – S]

Carex leavenworthii Dewey. Cp (VA), Pd (GA, NC, SC, VA), Mt (GA, NC, VA): dry forests; uncommon. May-June. NY, Ontario, and NE south to FL and TX. [= RAB, C, F, FNA, G, K, M, S, W]

Carex leptalea Wahlenberg *var.* ***harperi*** (Fernald) Weatherby & Griscom. Cp, Pd (GA, NC, SC, VA), Mt? (NC, SC, VA): bogs, seeps, blackwater bottomlands, usually in saturated conditions with *Sphagnum spp.*; common. May-June. NJ south to Fl, west to TX, inland in the interior to IN and MO. Var. *harperi* is considered to differ from the typic variety in its larger perigynia, larger spikes, more aristate pistillate scales, and more southern range; it needs additional study. [= F, G; < *C. leptalea* – RAB, C, GW, M, S, W; *C. leptalea* ssp. *harperi* (Fernald) W. Stone – FNA, K; = *C. harperi* Fernald]

Carex leptalea Wahlenberg *var.* ***leptalea***. Mt, Pd (NC, VA): bogs, seeps, usually in saturated conditions with *Sphagnum spp.*; common. May-June. Labrador west to AK, south to NC, TN, MO, SD, NM, and CA. [= F, G; < *C. leptalea* – RAB, C, GW, M, S, W; = *C. leptalea* ssp. *leptalea* – FNA, K]

Carex leptonervia (Fernald) Fernald. Mt (NC, VA): nutrient-rich forests, such as rich, seepy northern hardwoods forests; rare (NC Rare, VA Watch List). May-June. Newfoundland west to MN, south to NJ, PA, IN, and WI, and in the Appalachians south to NC. [= RAB, C, F, FNA, G, K, M, S, W]

Carex lonchocarpa Willdenow. Cp (GA, NC, SC, VA): pocosin margins, small blackwater stream swamps; common. May-July. S. MD south to FL, west to LA; rarely inland, as in sc. TN. Recognition of *C. lonchocarpa* at the species level is supported by its distinctive achene micromorphology (Wujek & Menapace 1986). [= FNA, K, M; = *C. folliculata* Linnaeus var. *australis* Bailey – RAB, C, F, G; < *C. folliculata* – GW; = *C. smalliana* Mackenzie – S]

Carex longii Mackenzie, Long's Sedge. Cp (GA), {NC, SC, VA}: low fields, bottomlands. May-June. Nova Scotia west to WI, south to FL and TX. [= C, F, FNA, K; < *C. albolutescens* – RAB, G, GW, W]

Carex louisianica Bailey. Cp (GA, NC, SC, VA), Pd (GA, NC): calcareous forests; common (rare in Piedmont). May-July. S. NJ south to c. peninsular FL, w. to TX, north in the interior to KY, IN, and MO; disjunct in ne. OH. [= RAB, C, F, FNA, G, GW, K, M, S, W]

Carex lucorum Willdenow ex Link *var.* ***austrolucorum*** J. Rettig, Appalachian Woodland Sedge. Mt (GA, NC, SC, VA): xeric to mesic wooded slopes, usually in oak forests and northern hardwood forests; uncommon (GA Special Concern, NC Watch List, VA Rare). *C. lucorum* var. *austrolucorum* is endemic to the Southern Appalachians, ranging from sw. VA south through w. NC and e. TN to nw. SC and ne. GA. It has been reported from further north, in sc. WV (Boone County) (Cusick 1996). Var. *lucorum* differs in having the leaves broader (mostly 1.5-2.8 mm wide vs. mostly 1.1-1.3 mm), the beak averaging shorter (1.3 mm vs. 1.5 mm), chromosome number n = 20 (vs. n = 13), and various details of flavonoid chemistry and achene micromorphology (see Rettig 1988 for details). While the two taxa can be difficult to tell apart on morphological grounds, they are clearly separate taxa. *C. lucorum* var. *austrolucorum* was first reported for South Carolina by Hill & Horn (1997). [= FNA, K; < *C. pensylvanica* Lamarck var. *distans* Peck – RAB, F, G (the name misapplied as to our plants); < *C. lucorum* – C, M, S; < *C. pensylvanica* – W]

Carex lupuliformis Sartwell ex Dewey, False Hop Sedge. Cp, Pd (NC, SC, VA), {GA}: wet forests, especially around ponds; rare (NC Rare, VA Rare). June-July. VT and Québec west to se. WI, south to c. peninsular FL and e. TX. [= RAB, C, F, FNA, G, K, M; < *C. lupulina* – GW]

Carex lupulina Muhlenberg ex Willdenow, Hop Sedge. Cp, Pd (GA, NC, SC, VA), Mt (GA, NC, VA): bottomland forests; common (rare in Mountains). June-September. Nova Scotia west to MN, south to c. peninsular FL and e. TX. [= RAB, C, FNA, G, K, M, S, W; < *C. lupulina* – GW (also see *C. lupuliformis*); > *C. lupulina* var. *lupulina* – F; > *C. lupulina* var. *pedunculata* A. Gray – F]

Carex lurida Wahlenberg. Mt, Pd, Cp (GA, NC, SC, VA): bogs, marshes, ditches; common. June-September. Nova Scotia west to MN, south to FL and Mexico. [= RAB, C, F, FNA, G, GW, K, M, S]

Carex lutea LeBlond, Golden Sedge. Cp (NC): wet savannas shallowly underlain by coquina limestone, with open camopy of *Taxodium ascendens, Pinus palustris*, and *Liriodendron tulipifera*; rare (US Species of Concern, NC Rare). May. Endemic to Pender and Onslow counties, NC, where associated with other narrow endemics, such as *Thalictrum cooleyi* and *Allium species 1*, and other rare species, such as *Plantago sparsiflora*, *Parnassia caroliniana*, *Rhynchospora thornei*, and others. See LeBlond et al. (1994) for additional information. [= FNA, K]

Carex magnifolia Mackenzie. Cp (GA, NC, SC), Mt (NC): bogs, acid swamps; uncommon? (rare in Mountains). April-May. E. NC south to FL, and disjunct in mountain bogs with Coastal Plain affinities, as in Henderson County, NC. *C. magnifolia* differs morphologically from *C. abscondita* in its larger perigynia, longer leaves, and much more strongly glaucous leaves; it has a more southern distribution and occurs in wetter, boggier habitats. Manhart (1984) found that it differed chemically from *C. abscondita*. Further study is needed to verify its taxonomic status. [= M, S; < *C. abscondita* – RAB, FNA, K]

Carex manhartii Bryson, Blue Ridge Purple Sedge, Manhart's Sedge. Mt (GA, NC, SC, VA): cove forests and montane oak-hickory forests, mostly at medium to fairly high elevations, especially over mafic rocks (such as amphibolite) and calcareous rocks (such as marble), but occurring on more acidic substrates as well; uncommon (GA Threatened, NC Rare, SC Rare). April-May. Endemic to w. NC, sw. VA, nw. SC, ne. GA, and se. TN, in the Blue Ridge Mountains. Once considered very rare, this species is now known to be locally common in portions of sw. NC and adjacent ne. GA. For more information on the Virginia occurrence, see Belden et al. (2004). [= FNA, K, W; < *C. purpurifera* Mackenzie – RAB, M, S]

Carex meadii Dewey, Mead's Sedge. Pd (NC, VA), Mt (VA): on low, moist clayey soils over mafic rocks (such as diabase) or calcareous rocks; rare (NC Rare, VA Watch List). May-June. NJ west to MI and Saskatchewan, south to nc. NC, GA, AR, sw. LA, and TX. The species forms large clonal patches with a distinctive bluish cast at the time of flowering and fruiting. Naczi (1999b) reports a chromosome number of n = 28. [= RAB, C, F, FNA, G, K, M, S, W]

Carex mesochorea Mackenzie. Pd, Cp (SC, VA), {GA, NC}: dry forests and woodlands; rare (VA Watch List). MA, Ontario, and NE south to GA, AL, and TX. First reported for South Carolina by Hill & Horn (1997). [= F, FNA, K, M, S; < *C. cephalophora* – RAB, W; = *C. cephalophora* Muhlenberg ex Willdenow var. *mesochorea* (Mackenzie) Gleason – C, G]

Carex misera Buckley, Wretched Sedge. Mt (GA, NC): moderate to high elevation cliffs and rock outcrops; rare (GA Threatened). June. A Southern Blue Ridge endemic: nw. NC and w. TN south to ne. GA (Rabun County). Schell & Waterway (1992) discuss interesting geographic patterns of allozyme diversity in this narrowly endemic species. [= RAB, FNA, K, M, S, W; = *C. juncea*, apparently misapplied]

Carex mitchelliana M.A. Curtis, Mitchell's Sedge. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC, SC): swampy woodlands and forests; rare. May-June. Se. MA west to PA and KY, south to panhandle FL, n. AL, and sc. TN. This species has a scattered distribution throughout its range, and is apparently rare. Bruederle, Fairbrothers, & Hanks (1989) and Bruederle (1999) provide additional information about this species. Allozyme studies suggest that *C. mitchelliana* is less closely related to *C. gynandra*, *C. crinita* var. *crinita*, and *C. crinita* var. *brevicrinis* than they are to one another. [= C, F, FNA, K, M, S; = *C. crinita* Lamarck var. *mitchelliana* (M.A. Curtis) Gleason – RAB, G, GW; < *C. crinita* – W]

Carex molesta Mackenzie ex Bright, Troublesome Sedge. Mt (VA): calcareous soils; rare (VA Watch List). NH west to ND, south to VA, AL, MS, and OK. [= F, FNA, G, K; < *C. brevior* (Dewey) Mackenzie ex Lunell – C]

Carex muehlenbergii Schkuhr ex Willdenow *var.* ***enervis*** W. Boott. {GA, NC, SC, VA}. (VA Watch List). NH west to MN and NE, south to GA, AL, MS, and TX. [= K; < *C. muhlenbergii* – RAB, W; < *C. muhlenbergii* var. *muhlenbergii* – C; = *C. muhlenbergii* var. *enervis* – F, G, orthographic variant; = *C. plana* Mackenzie – M, S]

Carex muehlenbergii Schkuhr ex Willdenow *var.* ***muehlenbergii***. {GA, NC, SC, VA}. ME, Ontario, and MN south to FL and TX. [= K; < *C. muhlenbergii* – RAB, W; < *C. muhlenbergii* var. *muhlenbergii* – C (also see var. *enervis*); = *C. muhlenbergii* var. *muhlenbergii* – F, G, orthographic variant; = *C. muhlenbergii* – M; < *C. muhlenbergii* – S (also see *C. austrina*)]

Carex nigromarginata Schweinitz. Pd, Mt, Cp (GA, NC, SC, VA): dry woodlands and forests; common. March-May. DE and NJ west to WI, south to SC, GA, and TX. [= C, FNA, K, M, W; = *C. nigromarginata* var. *nigromarginata* – RAB, F; = *C. nigro-marginata* var. *nigro-marginata* – G, orthographic variant; = *C. nigro-marginata* – S, orthographic variant]

Carex normalis Mackenzie. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): mesic forests; May-June. ME, Québec, and Ontario south to GA and AR. [= RAB, C, F, FNA, G, GW, K, W]

Carex oblita Steudel. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC, SC): swamps and other wet habitats; common? (GA Special Concern, VA Watch List). NJ south to sc. GA, west to e. LA, mostly on the Coastal Plain, but extending much less commonly inland to the Piedmont and Mountains. [= M, S; = *C. venusta* Dewey var. *minor* Böckler – C, F, G, K; < *C. venusta* – RAB, FNA, GW, W]

*? ***Carex oklahomensis*** Mackenzie, Oklahoma Sedge. Mt (NC, VA): seepage; rare (probably adventive from farther west) (NC Watch List, VA Rare). Se. MO west to KS, south to MS, AR, and ne. TX; disjunct (and probably adventive) in w. NC (Graham County) and w. VA (Giles County). First reported for VA by Wieboldt et al. (1998). [= F, FNA, K, M; < *C. stipata* – S; = *C. stipata* Muhlenberg ex Willdenow var. *oklahomensis* (Mackenzie) Gleason]

Carex oligocarpa Schkuhr ex Willdenow, Few-fruited Sedge. Mt (GA, NC, SC, VA), Pd (VA), Cp (GA, VA): rich forests, over calcareous or mafic rocks; common (rare in GA, NC, and SC) (GA Special Concern). May-June. MA west to MN, south to FL and TX. *C. oligocarpa* sensu stricto in SC (McMillan pers. comm., specimen at CLEMS). [= RAB, C, F, FNA, G, K, M, S, W]

Carex oligosperma Michaux. Mt (NC): bogs and seeps at high elevations; rare (NC Endangered). Newfoundland west to Mackenzie, south to CT, c. PA, n. IN, WI, and MN; disjunct in ne. OH, WV (Hardy County) and NC (Ashe, Avery, Mitchell, and Watauga counties). [= C, F, FNA, G, M; > *C. oligosperma* var. *oligosperma* – K]

* ***Carex opaca*** (F.J. Hermann) P.E. Rothrock & Reznicek. Cp (VA): introduced at old railroad livestock yard, well-established; rare, native of sc. United States. Native range in prairies, IL and KS south to MS, AR, and OK. [= FNA; = *C. bicknellii* Britton var. *opaca* F.J. Hermann – K; < *C. bicknellii* – M]

Carex ormostachya Wiegand, Necklace Spike Sedge. Mt (VA): northern hardwood forest; rare (VA Rare). S. Canada south to ME, MA, PA, w. VA (Augusta County), n. OH, MI, and WI. [= F, FNA, K, M; < *C. gracilescens* – C; = *C. laxiflora* var. *ormostachya* (Wiegand) Gleason – G]

* ***Carex ovalis*** Goodenough. Mt (NC): grassy balds, disturbed areas; rare, native of Eurasia. Known to range in North America from Newfoundland and NY south to w. NC and ne. TN. The records reported in RAB and elsewhere of *C. aenea* are

actually misidentified material of this species (A.A. Reznicek, pers. comm. 2005). [= FNA, K; = *C. aenea* – RAB, misapplied (based on misidentified material); < *C. leporina* Linnaeus – C, F, G, misapplied; ? *C. tracyi* Mackenzie]

Carex oxylepis Torrey & Hooker. Cp, Pd (GA, NC, SC, VA): bottomlands, calcareous forests; common. May-June. VA, KY, IL, MO, and OK south to FL and TX. Var. *oxylepis* widespread in TN; var. *pubescens* restricted in TN to c. TN. [= RAB, C, F, FNA, G, GW, M, S, W; > *C. oxylepis* var. *oxylepis* – K; > *C. oxylepis* var. *pubescens* J.K. Underwood – K]

Carex pallescens Linnaeus, Pale Sedge. Mt (NC, VA): grassy balds at high elevations, other grassy openings; rare (VA Rare). June-July. Circumboreal (in ne. North America and n. Eurasia); in North America ranging from Newfoundland, Québec, and MN, south to w. NC, e. TN, and MI. *C. pallescens* is reported to occur on Big Bald, Unicoi County, TN, immediately adjacent to the NC line (Churchill et al. 1992). [= C, FNA, G, K, M, W; > *C. pallescens* var. *neogaea* Fernald – F]

Carex pedunculata Muhlenberg ex Willdenow *var.* ***pedunculata***, Longstalk Sedge. Mt (GA, NC, SC, VA): nutrient-rich dry to mesic forests, usually over calcareous or mafic rocks; rare (GA Special Concern, NC Rare, VA Watch List). April. Var. *pedunculata* ranges from Newfoundland, Saskatchewan, and ND, south to NJ, w. VA, sw. NC, nw. GA (Dade County) (Jones & Coile 1988), n. AL, c. IN, c. IL, and n. IA. Var. *erythrobasis* (Léveillé & Vaniot) Koyama occurs in Korea. It may well prove that these two widely disjunct taxa should be recognized at the species level. [= FNA; < *C. pedunculata* – C, F, G, K, M, W]

Carex pellita Muhlenberg. Mt (VA): wet meadows; uncommon. New Brunswick west to British Columbia, south to w. VA, w. TN, AR, and CA. McClintock & Waterway (1994) discuss the distinctiveness of *C. pellita* and *C. lasiocarpa*, as well as the misapplication of the name *C. lanuginosa* to the species now properly called *C. pellita*. [= C, FNA, K; = *C. lanuginosa* Michaux – F, M, misapplied; = *C. lasiocarpa* Ehrhart var. *latifolia* (Böckler) Gilly]

* ***Carex pendula*** Hudson, Pendulous Sedge. Cp (VA): disturbed areas; rare, native of Europe. Introduced in VA (FNA, Kartesz 1999). [= FNA, K]

Carex pensylvanica Lamarck. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): dry to moist woodlands and forests, grassy balds, shale barrens, rock outcrops; common. April-June. ME west to s, Manitoba and ND, south to SC, n. GA, TN, and AR. [= FNA, K; = *C. pensylvanica* var. *pensylvanica* – RAB, C, F, G; = *C. pennsylvanica* – M, S, orthographic variant; < *C. pensylvanica* – W (also see *C. lucorum* var. *austrolucorum*)]

Carex physorhyncha Liebmann ex Steudel, Bellow's-beak Sedge. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA): dry woodlands; rare (NC Watch List). Se. VA south to FL, west to AR, OK, TX, and Mexico. [= RAB, F, M, S, W; = *C. albicans* Willdenow ex Sprengel var. *australis* (Bailey) J. Rettig – FNA, K]

Carex picta Steudel, Painted Sedge. Mt (GA): mesic forests; uncommon. S. IN south through KY and c. TN to nc. GA (Jones & Coile 1988), c. AL, and LA. Reported (erroneously?) for VA (Kartesz 1999). Locally abundant and forming "doughnut clumps", sometimes aggregated to form a coarse turf. [= C, F, FNA, G, K, M, S]

Carex pigra Naczi, Lazy Sedge. Cp (NC, SC, VA), Pd (NC, SC), {GA}: moist forests; uncommon. May-June. Se. VA west to se. and sc. TN, south to n. FL, s. AL, and ne. MS. See Naczi (1997) for additional information. [= FNA, K; < *C. flaccosperma* – RAB, G, GW; < *C. flaccosperma* Dewey var. *glaucodea* (Tuckerman ex Olney) Kükenthal – F; < *C. glaucodea* – S]

Carex planispicata Naczi. Pd, Cp (GA, NC, SC, VA): rich to fairly acid mesic forests, on slopes and floodplains; common. C. NJ west to s. IN, se. MO, and se. OK, south to c. GA, s. MS, and se. TX. See Naczi (1999a) for additional information. [= FNA; = *C. grisea* Wahlenberg var. *rigida* L.H. Bailey; = *C. amphibola* var. *rigida* (L.H. Bailey) Fernald – F, K]

Carex plantaginea Lamarck, Plantainleaf Sedge. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): rich cove forests, mostly over mafic or calcareous rocks, montane alluvial forests; uncommon (SC Rare, VA Watch List). April-May. New Brunswick west to MN, south to MD, NJ, VA, NC, ne. GA (Jones & Coile 1988), e. TN, c. TN, KY, and s. IN. [= RAB, C, F, FNA, G, K, M, S, W]

Carex platyphylla Carey, Broadleaf Sedge. Mt (GA, NC, VA), Pd (NC, VA), Cp (VA): rich cove forests, mostly over mafic or calcareous rock; uncommon (GA Special Concern). April-June. ME and s. Québec west to WI, south to NC, e. TN, and MO. Naczi (1999b) reports a chromosome number of n = 35. [= RAB, C, F, FNA, G, K, M, S, W]

Carex polymorpha Muhlenberg, Variable Sedge. Mt (VA): dry, acidic ridgetop forests; rare (US Species of Concern, VA Endangered). May-June. ME south to MD, VA, and WV. Standley, Dudley, & Bruederle (1991) studied genetic variability in this species. [= C, F, FNA, G, K, M, W]

* ***Carex praegracilis*** W. Boott, Freeway Sedge. Mt (VA): median of interstate highway; rare, native of w. North America. May-June. This species is apparently spreading through ne. North America as the result of the winter salting of highways. [= C, F, FNA, G, K, M]

Carex prairea Dewey ex Wood, Prairie Sedge. Mt (VA): calcareous wetlands; rare (VA Rare). Québec west to Yukon, south to NJ, w. VA, OH, NE, MT, and British Columbia. [= C, F, FNA, G, K, M]

Carex prasina Wahlenberg. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (VA): rich forests, especially in seepage; common. May-June. ME, Ontario, and WI south to GA, MS, and AR; in nearly all TN counties adjacent to NC and VA. [= RAB, C, F, FNA, G, GW, K, M, S, W]

Carex projecta Mackenzie. Mt, Pd, Cp (NC, SC, VA), {GA?}: moist forests; rare (NC Rare). May-June. Newfoundland, Labrador, and Saskatchewan south to NC, IN, IL, and IA. [= RAB, C, F, FNA, G, K, M]

* ***Carex pumila*** Thunberg. Cp (NC): open disturbed sand flats; rare, native of Asia. May. See Reznicek (1993) for additional information. [= FNA, K; >< *C. hirta* – RAB, misidentification]

Carex purpurifera Mackenzie, Limestone Purple Sedge. Mt (GA, NC, VA): moist, rich cove forests, at low elevations, over calcareous or mafic rocks; rare (GA Threatened, VA Rare). May-June. W. VA and KY south to n. GA and n. AL, mostly west of the Blue Ridge Mountains, but with scattered disjunct populations on calcareous or mafic sites in the Blue Ridge. Naczi (1999b) reports a chromosome number of n = 17-19. [= C, FNA, K, W; < *C. purpurifera* – RAB, M, S (also see *C. manhartii*); = *C. laxiflora* var. *purpurifera* (Mackenzie) Gleason – G]

Carex radfordii Gaddy, Radford's Sedge. Mt (GA, NC, SC): very nutrient-rich, moist cove forests in the Blue Ridge Escarpment region, over calcareous or mafic rocks; rare (GA Special Concern, NC Rare). May-June. Endemic to the Blue Ridge

Escarpment of sw. NC, nw. SC, and ne. GA. See Gaddy (1995) for additional information. Naczi (1999b) reports a different chromosome number for *C. radfordii* (n = 23) than for the related *C. purpurifera* (n = 17, 18, 19). [= FNA, K]

Carex radiata (Wahlenberg) Small. Cp, Pd, Mt (NC, SC, VA), {GA}: mesic to wet-mesic forests; common. May-June. Nova Scotia west to Manitoba, south to SC, AL, LA, and OK. [= C, FNA, K; < *C. rosea* – RAB, G, W; = *C. rosea* – F, M, S, misapplied]

Carex reniformis (Bailey) Small, Kidney Sedge. Cp (GA, NC, SC, VA), Pd (NC): floodplain forests, marshes, ditches, other wet areas; rare (GA Special Concern, NC Rare). VA, IL, and OK south to FL and TX. [= RAB, C, F, FNA, G, GW, K, S]

Carex retroflexa Muhlenberg ex Willdenow. {GA, NC, SC, VA}: dry to mesic forests; uncommon. ME, MI and IA, south to FL and TX. See Downer & Hyatt (2003). [= F, FNA, K, M, S; < *C. retroflexa* – RAB, W (also see *C. texensis*); = *C. retroflexa* var. *retroflexa* – C, G]

Carex roanensis F.J. Hermann, Roan Mountain Sedge. Mt (GA, NC, VA): cove forests, moderate toi high elevation oak forests, northern hardwood forests; rare (GA Special Concern, VA Watch List). May-June. Sw. PA, w. VA, and e. WV south through e. KY, e. TN, w. NC to se. TN and nw. GA (Smith et al. 2006). See Smith et al. (2006) and Hermann (1947) for additional information; closely related to *C. virescens*. First reported for VA by Wieboldt et al. (1998). [= FNA, K, W]

Carex rosea Schkuhr ex Willdenow, Rosy Sedge. Pd (GA), {GA, NC, SC, VA}: dry to dry-mesic hardwood forests; uncommon (GA Special Concern). May-June. Nova Scotia west to Manitoba, south to FL and TX. [= C, FNA, K; < *C. rosea* – RAB, G, W (also see *C. appalachica* and *C. radiata*); = *C. convoluta* Mackenzie – F, M, S; ? *C. flaccidula* Steudel]

Carex rugosperma Mackenzie. Mt (SC, VA): distribution and habitats in our area obscure. Prince Edward Island west to MN, south to MD, VA, IN, IL, and MO. See *C. umbellata* for discussion. Reported for South Carolina by Hill & Horn (1997). [= G, M; < *C. umbellata* – RAB, C, W; = *C. umbellata* – F, misapplied; = *C. tonsa* (Fernald) Bicknell var. *rugosperma* (Mackenzie) Crins – FNA, K]

Carex ruthii Mackenzie, Ruth's Sedge. Mt (GA, NC, SC, VA): seepage areas, in forest or open areas; uncommon (NC Watch List, VA Watch List). May-June. A Southern Appalachian endemic: sw. VA south through w. NC and e. TN to nw. SC and n. GA. [= C, F, FNA, K, M, S; = *C. muricata* Linnaeus var. *ruthii* (Mackenzie) Gleason – RAB, G; < *C. muricata* – W]

Carex scabrata Schweinitz. Mt (GA, NC, SC, VA), Pd (VA): seepage slopes, brook-banks, often in shade; common (GA Special Concern). May-July. Nova Scotia west to MI, south to NJ, n. GA, OH, and MO. [= RAB, C, F, FNA, G, GW, K, M, S, W]

Carex schweinitzii Dewey ex Schweinitz, Schweinitz's Sedge. Mt (VA): bogs; rare (VA Rare). June. VT west to n. MI, south to NJ (and MO?); disjunct in Newfoundland. The distribution of this species is local and fragmented. The alleged occurrences of *C. schweinitzii* in w. NC are based on misidentification of *C. utriculata*. [= C, F, FNA, G, K, M, S]

Carex scoparia Sckuhr ex Willdenow *var.* ***scoparia***. Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (NC, VA): bogs, swamp forests, marshes, seepy ledges, ditches; common (GA Special Concern). May-June. Newfoundland west to British Columbia, south to GA, MS, and CA. [= F, FNA, K; < *C. scoparia* – RAB, C, G, GW, W]

Carex seorsa Howe. Cp (GA, NC, SC, VA), Pd (NC, SC, VA), Mt (VA): acidic swamp forests; common (GA Special Concern). May-June. MA south to GA in the Coastal Plain, scattered inland westward to NY, OH, MI, IN, AR, and TN. [= RAB, C, FNA, G, GW, K, M, S, W]

Carex shortiana Dewey, Short's Sedge. Mt (VA): calcareous bottomlands and meadows; rare (VA Watch List). May-June. PA, s. Ontario, IL, and IA, south to w. VA, e. TN, AR, and OK. [= C, F, FNA, G, K, M, W]

Carex silicea Olney, Seabeach Sedge. Cp (VA): beaches and shores; rare (VA Rare). Newfoundland south to VA, along the coast. [= C, F, FNA, G, K]

Carex socialis Mohlenbrock & Schwegman. Cp (GA, NC, SC): blackwater and brownwater swamp forests and bottomlands; rare (GA Special Concern). Se. and sc. NC south to e. GA, west to e. TX, and north in the interior to s. IN, s. IL, and se. MO. [= C, FNA, K]

Carex sparganioides Muhlenberg ex Willdenow. Pd (GA), {NC, SC, VA}: rich forests; uncommon. May-June. ME, Ontario, MN, and SD south to GA, AR, and KS. Records entangled with *C. aggregata*. [= RAB, F, FNA, K, M, W; = *C. sparganioides* var. *sparganioides* – C, G]

Carex squarrosa Linnaeus. Pd (GA, NC, SC, VA), Cp (NC, VA), Mt (VA): bottomland forests; common. June-July. CT west to se. ME and NE, south to NC, n. SC, and AR. [= RAB, C, F, FNA, G, GW, K, M, S, W]

Carex sterilis Willdenow, Sterile Sedge. Mt (VA): mafic fens; rare (VA Rare). Newfoundland west to Saskatchewan, south to sw. VA (Grayson County), ne. TN, IL, and MO. Outside of our area, *C. sterilis* is primarily a species of calcareous fens or seepages. First reported for VA by Wieboldt et al. (1998). [= C, F, FNA, G, K, M]

Carex stipata Muhlenberg ex Willdenow *var.* ***maxima*** Chapman. Cp (GA, NC, SC, VA), Pd (NC, SC, VA): marshes, ditches, alluvial forests; common. May-June. NJ south to FL, west to TX, north in the interior to s. MO, s. IN, and w. KY, primarily on the Coastal Plain. The validity of this variety needs additional study. [= RAB, C, F, FNA, G, K; < *C. stipata* – GW, W; = *C. uberior* (C. Mohr) Mackenzie – M, S]

Carex stipata Muhlenberg ex Willdenow *var.* ***stipata***. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): marshes, ditches, alluvial forests; common. May-June. Newfoundland west to AK, south to SC, TN, KS, NM, and Mexico. [= RAB, C, F, FNA, G, K; < *C. stipata* – GW, W; = *C. stipata* – M; < *C. stipata* – S]

Carex straminea Willdenow ex Schkuhr, Straw Sedge. Pd (VA), {NC}: wetlands; rare (VA Rare). MA west to WI, south to NC, KY, and MO. [= F, FNA, K; = *C. straminea* var. *straminea* – C, G; ? *C. richii* (Fernald) Mackenzie – M]

Carex striata Michaux *var.* ***brevis*** Bailey. Cp (NC, SC, VA): pocosins, limesink ponds, small depression ponds, clay-based Carolina bays, acid peaty swamps, wet savannas (dominated by *Pinus serotina* and/or *Taxodium ascendens*); common, rare in VA (VA Watch List). May-June. E. MA south to SC. See Reznicek & Catling (1986) for discussion of the nomenclatural change. [= C, FNA, K; < *C. walteriana* – RAB, GW, M, S; = *C. walteriana* Bailey var. *brevis* (Bailey) Bailey – F, G]

Carex striata Michaux *var.* ***striata***, Pocosin Sedge. Cp (GA, SC): pocosins, limesink ponds, small depression ponds, clay-based Carolina bays, acid peaty swamps, wet savannas (dominated by *Pinus serotina* and/or *Taxodium ascendens*); uncommon.

May-June. SC south to n. FL and e. panhandle FL. [= C, FNA, K; < *C. walteriana* Bailey – RAB, GW, M, S; = *C. walteriana* var. *walteriana* – F, G]

Carex striatula Michaux. Mt, Pd (NC, SC, VA), Cp (GA, NC, SC, VA): bottomland and other nutrient-rich forests; common. May-June. Se. NY and PA west to TN, south to FL and TX. The distinction of this species as separate from *C. laxiflora* is problematic and requires additional study. Naczi (1999b) reports chromosome numbers of n = 18, 20. [= RAB, C, F, FNA, K, M, W; = *C. laxiflora* var. *angustifolia* Dewey – G; ? *C. laxiflora* – S, misapplied]

Carex stricta Lamarck. Mt (GA, NC, VA), Pd, Cp (NC, VA), {SC?}: bogs, sedge meadows, depression ponds, old beaver ponds; common. May-June. Québec and Nova Scotia west to Manitoba, south to n. NC and TX. [= RAB, C, FNA, GW, K, W; > *C. stricta* var. *stricta* – F; > *C. stricta* var. *strictior* (Dewey) Carey – F; = *C. stricta* var. *stricta* – G; > *C. stricta* – M, S; > *C. strictior* Dewey – M, S]

Carex styloflexa Buckley. Mt, Pd, Cp (GA, NC, SC, VA): bogs, wet forests; common. May-June. CT west to s. OH, south to FL and se. TX. [= RAB, C, F, FNA, G, K, M, S, W]

Carex suberecta (Olney) Britton, Prairie Straw Sedge. Mt (VA): calcareous wetlands; uncommon (VA Watch List). Ontario and MN south to VA, WV, OH, IN, IL, AR, and TX. [= C, F, FNA, G, K]

Carex superata Naczi, Reznicek, & B.A. Ford. Mt (VA), Pd (SC), {GA}: rich forests; uncommon. April-June. Nc. SC, sw. VA, sc. KY, and ne. MS, south to Panhandle FL and s. AL. Reported for sw. VA (as *C. willdenowii* var. *megarrhyncha*) by Wieboldt et al. (1998). [= FNA, K; < *C. willdenowii* – RAB, F; < *C. willdenovii* – C, G, M, S (also see *C. basiantha* and *C. willdenowii*) and orthographic variant; < *C. willdenowii* Schkuhr ex Willdenow var. *megarrhyncha* Hermann]

Carex swanii (Fernald) Mackenzie. Mt (GA, NC, SC, VA), Cp (NC, VA), Pd (VA): nutrient-rich forests, woodlands, and openings; common. May-June. Nova Scotia, s. MI, s. WI, south to nw. SC and ne. AR. [= RAB, C, F, FNA, G, K, M, S, W; = *C. virescens* Muhlenberg ex Willdenow var. *swanii* Fernald]

* ***Carex sylvatica*** Hudson. Mt, Pd (NC): pastures, lawns; rare, native of Europe. [= C, F, FNA, G, K, M]

Carex tenax Chapman. Cp (GA, NC, SC), Pd (GA): sandhills; rare. May-June. Sc. NC south to FL, west to MS; also in sw. LA and se. TX. [= RAB, FNA, K, M; ? *C. validior* Mackenzie – S]

Carex tenera Dewey *var.* ***tenera***, Slender Sedge. Pd (NC, VA), Mt (GA, VA), Cp (VA), {SC}: low forests; rare (NC Watch List, VA Rare). Nova Scotia west to British Columbia, south to VA, NC, n. GA, ne. TN, MO, KS, WY, and OR. [= F, FNA; < *C. tenera* – RAB, C, G, K]

Carex tetanica Schkuhr, Rigid Sedge. Mt, Cp (NC, VA), Pd (NC): moist forests; rare (NC Rare, VA Watch List). May-June. MA west to MN, NE, and Alberta, south to NJ, VA, and NC. [= RAB, C, F, FNA, K, M; = *C. tetanica* var. *tetanica* – G]

Carex texensis (Torrey) Bailey. {GA, NC, SC, VA}: dry to mesic forests;uncommon. NY, OH, and KS south to FL and TX. See Downer & Hyatt (2003). [= F, FNA, K, M, S; < *C. retroflexa* Muhlenberg ex Willdenow – RAB; = *C. retroflexa* var. *texensis* (Torrey) Fernald – C, G]

Carex tonsa (Fernald) Bicknell. Mt (GA), {SC, VA} {Distribution and habitats in our area obscure}; common. Québec west to Alberta, south to VA, IN, and WI. See *C. umbellata* for discussion. [= F, G, K, M; < *C. umbellata* – RAB, C, W; = *C. tonsa* var. *tonsa* – FNA, K]

Carex torta F. Boott, Streambed Sedge, Twisted Sedge. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): rocky streambeds, often dominant in patches in mountain streams; common (GA Special Concern). April-May. Nova Scotia west to Ontario, south to sc. NC, SC, nc. GA (Jones & Coile 1988), AL, TN, and OH. See Gaddy (1981) for the first report of this species in SC. [= RAB, C, F, FNA, G, K, M, S, W]

Carex triangularis Böckler. Cp (SC), {GA}: moist forests, ditches, other wet sites; rare. April-June. SC and GA west to KS and TX. [= RAB, F, FNA, G, K, M, S; < *C. vulpinoidea* var. *vulpinoidea* – C; < *C. vulpinoidea* – GW]

Carex tribuloides Wahlenberg *var.* ***sangamonensis*** Clokey. {GA, NC, SC, VA}: bottomland forests. May-June. OH, IL, and KS, south to SC, AL, LA, and TX. [= FNA, G, K; < *C. tribuloides* – RAB, C, F, GW, W]

Carex tribuloides Wahlenberg *var.* ***tribuloides***. {GA, NC, SC, VA}. bottomland forests. May-June. New Brunswick west to MN and NE, south to FL, GA, TN, MO, and KS. [= FNA, G, K; < *C. tribuloides* – RAB, C, F, GW, W]

Carex trichocarpa Muhlenberg ex Willdenow. Mt (NC, VA), Pd (VA): wet meadows, marshes; uncommon (NC Watch List). May-July. Québec west to MN, south to DE, nw. NC, WV, IN, and MO. [= RAB, C, F, FNA, G, K, M, W]

Carex trisperma Dewey, Three-seeded Sedge. Mt (NC, VA): bogs and swamps at high elevations, usually growing in living *Sphagnum*, in shaded situations under shrubs or trees in montane wetlands; rare (NC Rare, VA Watch List). June. Labrador west to Saskatchewan, south to NJ, MD, OH, n. IN, IL, and MN; and in the mountains to w. NC and WV. See Kirschbaum (2007) for additional information about *C. trisperma* and *C. billingsii*. [= *C. trisperma* var. *trisperma* – C, F, FNA, G, K, M; < *C. trisperma* – RAB, W]

Carex turgescens Torrey, Pinebarren Sedge. Cp (GA, NC, SC): sandhill seepage bogs, streamhead pocosins, pocosin-sandhill ecotones, canebrakes, in highly acidic, sandy-peaty soils; rare (NC Watch List). May-June. Sc. NC south to Panhandle FL, west to se. LA, a Southeastern Coastal Plain endemic. [= RAB, FNA, GW, K, M, S]

Carex typhina Michaux. Cp (GA, NC, SC, VA), Pd, Mt (NC, SC, VA): bottomland forests; common (uncommon in Mountains). June-July. ME and Québec west to WI and se. MN, south to GA and LA. [= RAB, C, F, FNA, G, GW, K, M, S, W]

Carex umbellata Schkuhr ex Willdenow. Pd, Mt (GA), {NC, SC, VA}. Distribution and habitats in our area obscure. Newfoundland west to Saskatchewan, south to VA, TN, IL, and MN. It seems very possible that southern members of the *C. umbellata* complex may not correspond to any of the taxa "distinguished" in the northeastern United States. *C. tonsa, C. rugosperma,* and *C. umbellata* are circumscribed by various authors in different ways. This group needs critical study. [= FNA, G, K, M; < *C. umbellata* – RAB, C, W (also see *C. rugosperma* and *C. tonsa*); = *C. abdita* Bicknell – F]

Carex utriculata Boott, Beaked Sedge. Mt (NC, VA): wet meadows; rare (VA Rare). Boreal American, ranging south to DE, w. VA, nw. and sw. NC, ne. TN (Johnson County), IN, NE, NM, and CA. Recently verified for NC. [= C, FNA, K; = *C.*

rostrata Stokes var. *utriculata* (Boott) Bailey – F, G; < *C. rostrata* – M, misapplied as to our material; = *C. schweinitzii* – RAB, by misidentification]

Carex venusta Dewey. Cp (GA, NC, SC, VA): swamps, peat bogs, mossy wetlands, and other wet habitats; common? (GA Special Concern, VA Watch List). Se. VA south to panhandle FL, on the Coastal Plain. [= M, S; = *C. venusta* var. *venusta* – C, F, G, K; < *C. venusta* – RAB, FNA, GW, W (also see *C. oblita*)]

Carex verrucosa Muhlenberg. Cp (GA, NC, SC): pocosins, wet pinelands, pond cypress wetlands; uncommon. July-September. Se. NC south to s. to FL, west to w. LA. [= RAB, FNA, GW, K, M, S; = *C. glaucescens* Elliott var. *androgyna* M.A. Curtis]

Carex vesicaria Linnaeus, Inflated Sedge. Mt (NC, VA): bogs, rare (VA Rare). Circumboreal, ranging south in North America to DE, w. VA, nw. NC, KY, IN, MO, NM, and CA. [= FNA, G; > *C. vesicaria* var. *vesicaria* – C, F, K; > *C. vesicaria* var. *monile* (Tuckerman) Fernald – F, K; ? *C. vesicaria* – M; > *C. monile* Tuckerman]

Carex vestita Willdenow. Pd (NC, VA), Cp (VA): low forests; rare (NC Watch List, VA Rare). April-May. S. ME south to se. VA and nc. NC. [= RAB, C, F, FNA, G, K, M]

Carex virescens Muhlenberg ex Willdenow. Mt (GA, NC, SC, VA), Pd, Cp (VA): nutrient-rich forests, woodlands, and openings; common. May-June. S. ME, NY, and s. MI, south to e. VA, w. NC, nw. SC, and MO. [= RAB, C, F, FNA, G, K, M, S, W]

Carex vulpinoidea Michaux. Mt, Pd, Cp (GA, NC, SC, VA): wet sites; common. Labrador west to British Columbia, south to FL, TX, Sonora, and CA. [= RAB, F, FNA, G, M, S, W; < *C. vulpinoidea* var. *vulpinoidea* – C, K; < *C. vulpinoidea* – GW (also see *C. annectens* and *C. triangularis*)]

Carex willdenowii Schkuhr ex Willdenow. Pd (NC, SC, VA), Mt, Cp (NC, VA): dry-mesic upland oak forests; common. May-June. MA, VT, NY, s. Ontario, and c. IN, south to nc. SC, n. AL, and s. IL; disjunct in c. AR. Naczi (1999b) reports chromosome numbers of n = 31, 39. [= FNA, K; < *C. willdenowii* – RAB, F, W (also see *C. basiantha* and *C. superata*); < *C. willdenovii* – C, G, M, S (also see *C. basiantha* and *C. superata*) and orthographic variant]

Carex woodii Dewey, Wood's Sedge. Mt (GA, NC, SC, VA): moist slopes and cove forests over mafic rocks (such as amphibolite), ultramafic rocks (such as olivine), or felsic rocks; uncommon (GA Special Concern, NC Rare, SC Rare). May-June. NY west to Manitoba, south to NC, nw. SC, n. GA, and MO. This species forms clonal patches reminiscent of *C. pensylvanica*, but has perigynia glabrous and filled by the achene at maturity; the foliage also has a paler green cast. It has probably been much overlooked in the past. Naczi (1999b) reports chromosome numbers of n = 22, 26. [= RAB, C, F, FNA, K, M, W; = *C. tetanica* var. *woodii* (Dewey) Wood – G]

Carex acidicola Naczi (section *Griseae*). Mesic forests. GA and AL (Naczi, Bryson, & Cochrane 2002). [= FNA] {not yet keyed}

Carex acutiformis Ehrhart. Introduced in MD, native of Eurasia (FNA, Kartesz 1999). [= FNA, K]

Carex alopecoidea Tuckerman. Seasonally saturated situations, typically over calcareous substrates. Nova Scotia west to Saskatchewan, south to DC, MD, WV, KY, TN, and IA (Standley in FNA 2002b). [= FNA, K] {synonymy incomplete; not yet keyed}

Carex backii Boott. Dry forests and woodlands. South to ne. PA and NJ. [= C, F, FNA, G, K, M]

Carex billingsii (O.W. Knight) C.D. Kirschbaum. Wet, boggy areas. Newfoundland and Ontario south to s. NJ (Ocean County), PA, and MI. See Kirschbaum (2007). [= *C. trisperma* Dewey var. *billingsii* O.W. Knight – C, F, FNA, G, K, M]

Carex brunnescens (Persoon) Poiret var. *brunnescens*. Reported for our area by FNA. {Resolve.} [= F; < *C. brunnescens* – RAB, C, G, M, S, W; = *C. brunnescens* ssp. *brunnescens* – FNA, K] {not yet keyed}

Carex brysonii (section *Griseae*). Mesic forests. Endemic to the Cumberland Plateau of n. AL. See Naczi (1993) for additional information. [= FNA, K]

Carex bulbostylis Mackenzie. MS west to TX and OK; disjunct in TN. Reports for GA in Jones & Coile (1988) are probably based on misidentifications. [= FNA, K; = *Carex amphibola* Steudel var. *globosa* (Bailey) Bailey]

Carex calcifugens Naczi. Cp (GA, NC, SC): rich bluff forests, evergreen maritime forests; rare. Se. NC south to FL. See Naczi, Bryson, & Cochrane (2002). [= FNA] {not yet keyed; synonymy incomplete}

Carex castanea Wahlenberg, Chestnut Sedge. Calcareous sites. Newfoundland west to Manitoba, south to NY, WI, MI, and MN. The alleged disjunct occurrence in TN cited in FNA is in error. [= C, F, FNA, G, K, M] {not keyed}

Carex cephaloidea (Dewey) Dewey. Basic forests. New Brunswick, Ontario, and MN south to MD, OH, IN, IL, and IA. [= F, FNA, K, M; *C. sparganioides* Muhlenberg ex Willdenow var. *cephaloidea* (Dewey) Carey – C, G]

Carex deweyana Schweinitz var. *deweyana*. Rich forests and openings. Newfoundland and Labrador west to AK, south to ec. PA, OH, IL, CO, and WA. Naczi (1999b) reports a chromosome number of n = 27. [= C, F, G, FNA, K, M]

Carex diandra Schrank. Swamps, bogs, especially over limestone. Circumboreal, south in North America to w. MD, PA, TN, OH, IL, CO, CA; reported from TN on the basis of a destroyed specimen. [= C, F, FNA, G, K, M]

* *Carex distans* Linnaeus. Disturbed areas. Introduced in MD and PA; native of Eurasia. [= FNA, K]

Carex foenea Willdenow, Hay Sedge. Labrador and Newfoundland west to Yukon, south to CT, NY, PA, MI, and ID. [= C, FNA; > *C. aenea* Fernald – F, M; < *C. siccata* – G, K, misapplied; > *C. foenea* – M]

*? *Carex geyeri* Boott, Elk Sedge (section *Firmiculmes*), occurs as a disjunct (introduced?) from w. North America in Centre County, PA (Rhoads & Klein 1993). [= C, FNA, K, M]

Carex haydenii Dewey. Wet meadows, wet prairies. Newfoundland and Québec west to SD, south to s. PA, MD (C. Frye, pers. comm. 2000), IL, and IA. [= C, F, FNA, G, K, M]

Carex hyalina Boott. Bottomland forests. TN, AR, and OK, south to MS, LA, and TX. [= FNA, K, M] {not yet keyed; synonymy incomplete}

Carex kraliana Naczi & Bryson, Kral's Sedge. Pd (NC, SC, VA), Mt, Cp (SC, VA), {GA}: mesic forests, slightly acidic to circumneutral: common. MD, OH, and IN south to FL and TX. See Naczi, Bryson, & Cochrane (2002). [= FNA] {not yet keyed; synonymy incomplete}

Carex limosa Linnaeus. Bogs, wet meadows. Circumboreal, south in North America to se. PA (Rhoads & Klein 1993), NJ, DE, OH, IN, NE, UT, and CA. [= C, FNA, K, M]

Carex lucorum Willdenow ex Link var. *lucorum*, Northern Woodland Sedge. New Brunswick west to MN, south to MD (Cecil County; C. Frye, pers. comm. based on specimen at DOV) and PA. [= FNA, K; < *C. pensylvanica* Lamarck var. *distans* Peck – F, G; < *C. lucorum* – C, M, S; < *C. pensylvanica* – W]

Carex michauxiana Böckeler, Michaux's Sedge. Bogs, seeps, usually in *Sphagnum*. Labrador and Manitoba south to MD, MI, and MN. Closely related to an e. Asian species. [= C, F, FNA, G, K, M] {not yet keyed; add to synonymy}

Carex microdonta Torrey & Hooker. Calcareous prairies, limestone glades. AL and FL west to MO, KS, OK, TX, NM, and AZ. [= FNA, K] {not yet keyed}

Carex molestiformis Reznicek & P.E. Rothrock. Mt (VA): {habitat}. Known distribution is w. VA, KY, TN, MO, AR, and OK. [= FNA, K; < *C. brevior* (Dewey) Mackenzie ex Lunell – C] {not yet keyed; synonymy incomplete}

* *Carex muricata* Linnaeus ssp. *lamprocarpa* Čelakovský. A European alien, with known occurrences south to e. PA (Rhoads & Klein 1993). [= FNA; < *C. muricata* – C, K]

Carex muskingumensis Schweinitz. Floodplain forests. Ontario and MN south to KY, TN, AR, and OK. [= C, F, FNA, G, K, M]

Carex novae-angliae Schweinitz. South to e. PA and WV (Kartesz 1999), occurring in moist forests. It will key most closely to *C. nigromarginata*, from which it differs in having the lowest pistillate spike remote from the next lowest and not overlapping it. [= C, F, G, K, M; < *C. novae-angliae* – FNA]

Carex ouachitana Kral, Manhart, & Bryson. Dry to dry-mesic slope and ridge forests. Disjunct in nc. TN and KY from the Ouachita Mountain of AR and OK. [= FNA, K] {not yet keyed; synonymy incomplete}

Carex pauciflora Lightfoot, Few-flowered Sedge. Bogs. Circumboreal, south in North America to NY, WV (Grant, Randolph, and Tucker counties), WI, MN, and WA. [= C, F, FNA, G, K, M]

Carex paupercula Michaux. Bogs, fens, marshes. Circumboreal, south in North America to NJ, PA, OH, MN, CO, UT, and OR. Closely related to and sometimes teated as a subspecies of the s. South American *C. magellanica*. [= C, G, M; > *C. paupercula* var. *irrigua* (Wahlenberg) Fernald – F; > *C. paupercula* var. *pallens* Fernald – F; = *C. magellanica* Lamarck ssp. *irrigua* (Wahlenberg) Hultén – FNA, K]

Carex pseudocyperus Linnaeus. Swamps, bogs, wet meadows. Newfoundland to Saskatchewan, south to NJ, PA, OH, and MN. [= C, FNA, K; = *Carex pseudo-cyperus* – F, G, M, orthographic variant]

Carex retrorsa Schweinitz. Swampy forests and wet meadows. New Brunswick and British Columbia, south to DE, MD, sc. PA, IL, UT. [= C, F, FNA, G, K, M]

Carex richardsonii R. Brown. Pd? (VA?): dry, rocky forests; rare if present. VT west to Alberta, south to DC, OH, IN, IA, and SD. This species ranges south to DC (according to C); it is likely to be present in our area, in n. VA. [= C, F, FNA, G, K, M]

Carex sartwellii Dewey. Wetlands. Québec west to British Columbia, MD, PA, OH, IN, IL, MO, CO, and ID. [= FNA, C, F, G, M; > *C. sartwellii* var. *sartwellii* – K]

Carex siccata Dewey, Bronze Sedge. Dry upland habitats. ME and Mackenzie south to NJ, OH, IL, MN, and AZ. [= C, FNA, G, M; < *C. siccata* – K (also see *C. foenea*); = *C. foenea* Willdenow – F, misapplied] {not yet keyed}

Carex species 1, Canebrake Sedge. Cp (GA, NC, SC, VA): canebrakes and acid swamps; uncommon. [Section *Acrocystis*] [< *C. novae-angliae* Schweinitz – FNA] {not yet keyed}

Carex species 2. Mt (NC, VA): ultramafic seepages; rare. [Section *Acrocystis*] {not yet keyed}

* *Carex spicata* Hudson. (VA?). VA reports said to erroneous in FNA. [= C, F, FNA, G, K, M]

Carex sprengelii Dewey ex Sprengel, Sprengel's Sedge, Long-beaked Sedge, south to NJ, e. PA (Rhoads & Klein 1993), and DE (FNA). [= C, FNA, K, M]

Carex thornei Naczi (section *Griseae*). Cp (GA): mesic deciduous forests, often in the upper floodplain. Endemic to the drainage of the Apalachicola/Chattahoochee and Flint in s. GA and s. AL south to nw. FL. See Naczi, Bryson, & Cochrane (2002). [= FNA]

Carex timida Naczi & B.A. Ford. Calcareous, dry to mesic woodlands and forests. East to AL, TN, and KY. Related to *C. jamesii* and *C. juniperorum*, from which it was separated by Naczi & Ford (2001). [= FNA; < *C. jamesii* – C, F, G, K, M]

Carex tuckermanii F. Boott. Calcareous swampy forests and wet meadows. New Brunswick and MN south to WV, sc. PA, NJ, MD, and IL. [= C, F, FNA, K; = *C. tuckermani* – G, M, orthographic variant]

Carex vexans F.J. Hermann, Florida Hammock Sedge. Peninsular FL and eastern Panhandle FL. [= FNA, K; < *C. alata* – S]

Carex wiegandii Mackenzie, south to c. PA (Rhoads & Klein 1993). [= C, F, FNA, G, K, M] {not yet keyed}

Cladium P. Browne (Sawgrass, Twig-rush)

A genus of 3-4 species, herbs, subcosmopolitan. References: Bridges, Orzell, & Burkhalter (1993); Tucker in FNA (2002b); Goetghebeur in Kubitzki (1998b). Key based closely on Bridges, Orzell, & Burkhalter (1993).

1 Plants 1-3 m tall, coarse, from short rhizomes, forming dense tussocks; leaves 3-15 dm long, 5-12 mm wide, stiff and flat (or broadly V-shaped), the margins and midrib (beneath) harshly serrate (saw-toothed); inflorescence a narrow panicle 3-9 dm long, the branches bearing several fascicles of spikelets; achene base broadly rounded to truncate; [of tidal freshwater to brackish marshes or outer coastal plain calcareous savannas] ..... ***C. jamaicense***

1 Plants 0.4-1 m tall, relatively delicate, from creeping rhizomes, forming loosely tufted colonies; leaves 1-3 dm long, 1-3 mm wide, flat to channeled (terete apically), margins only slightly scabrous; inflorescence 0.5-3 dm long, of 2-4 umbelliform cymes, the branches rigidly ascending and bearing simple glomerules of spikelets; achene base squarely truncate to slightly flaring; [of Coastal Plain acidic seepages and tidal freshwater to slightly brackish marshes, Mountain fens or bogs] ..... ***C. mariscoides***

Cladium jamaicense Crantz, Sawgrass. Cp (FL, GA, NC, SC, VA): in circumneutral to alkaline situations, including brackish marshes, and rarely somewhat inland in savannas underlain by coquina limestone; common (rare in VA). July-October. Se. VA south to s. FL, west to e. TX, and in the West Indies. This is, of course, the famous sawgrass which dominates many square miles in the Everglades of s. FL (where underlain by oolite). The leaves can cut flesh or clothing. *C. jamaicense* is sometimes treated as one component (ssp. *jamaicense*) of a multi-continental *C. mariscus* complex. [= RAB, C, F, FNA, G, GW; = *C. mariscus* (Linnaeus) Pohl ssp. *jamaicense* (Crantz) Kükenthal – K; = *Mariscus jamaicensis* (Crantz) Britton – S]

Cladium mariscoides (Muhlenberg) Torrey, Twig-rush, Fen-sedge, Smooth Sawgrass. Cp (FL, GA, NC, SC, VA), Mt (NC, VA): in strongly acidic to circumneutral situations, including acidic seepage at the margins of brackish marshes, in wet flats under *Pinus serotina* and *Taxodium ascendens* (Gaddy & Rayner 1980), in mucky seepage bogs in the fall-line sandhills, in peaty fens and bogs in the Mountains (especially over mafic or ultramafic rocks, such as amphibolite); uncommon (rare in FL, NC, and SC). July-September. Newfoundland west to Saskatchewan Widespread and rather common north of the glacial boundary, with scattered and disjunct occurrences southward in VA, NC, SC, GA, panhandle FL, n. KY (Clark et al. 2005), s. AL, se. MS (Sorrie

& Leonard 1999), and e. TX. Bridges, Orzell, & Burkhalter (1993) discuss in detail the phytogeography of this plant, particularly in reference to its southern occurrences, which are curiously fragmented and disjunct. [= RAB, C, F, FNA, G, K, W; = *Mariscus mariscoides* (Muhlenberg) Kuntze – S]

Cymophyllus Mackenzie ex Britton (Fraser's Sedge)

A monotypic genus, endemic to the Appalachians. *Cymophyllus* is a peculiar plant, often considered a relict species most closely (but not very) related to *Carex*, but recent molecular evidence suggests that it may be best re-merged into *Carex*. References: Reznicek in FNA (2002b); Goetghebeur in Kubitzki (1998b).

Identification notes: The foliage slightly resembles some of the broader-leaved species of *Carex* (such as *C. platyphylla* or *C. plantaginea*) or genera of the Liliaceae. Immediately distinctive, however, are the minutely undulate-scaberulous leaf margins.

Cymophyllus fraserianus (Ker-Gawler) Kartesz & Gandhi, Fraser's Sedge, Lily-leaf Sedge. Mt (GA, NC, SC, VA): cove forests, mostly rather acidic and associated with *Rhododendron maximum*, at moderate elevations; uncommon (GA Threatened, NC Watch List, VA Watch List). May-June. A Southern and Central Appalachian endemic: w. MD and s. PA south through w. VA and WV to w. NC, e. TN, nw. SC, and n. GA (Jones & Coile 1988). Kartesz & Gandhi (1991) have shown that the Ker-Gawler's epithet *fraserianus* has priority over Andrews's *fraseri*. [= FNA, K; = *Cymophyllus fraseri* (Andrews) Mackenzie – RAB, C, F, G, S, W; = *Carex fraseriana* Ker-Gawler; = *Carex fraseri* Andrews]

Cyperus Linnaeus 1753 (Umbrella Sedge)

A genus of about 500-550 species, herbs, of tropical and warm temperate areas. References: Goetghebeur in Kubitzki (1998b); Tucker, Marcks, & Carter in FNA (2002b). [also see *Kyllinga*]

This treatment is adapted from Tucker, Marcks, & Carter in FNA (2002b) and other sources. It needs substantial customization and revision prior to publication. Key lead 4 in the main key is problematic.

1 Inflorescences unbranched (the spikelets sessile); spikelets 1-2-flowered; rachilla not or only slightly elongate; scales conspicuously keeled; lowest 2 scales of spikelet greatly reduced ..... *[see Kyllinga]*
1 Inflorescences branched (the spikes pedunculate); spikelets 1-many-flowered; rachilla elongate; scales generally broadly rounded; lowest 2 scales of spikelet not greatly reduced.
  2 Stigmas 2; achenes lenticular.
    3 Achenes dorsiventrally flattened, borne with a flattened face toward the rachillas; [subgenus *Juncellus*] ..... **Key A**
    3 Achenes laterally flattened, borne with an edge toward the rachilla; [subgenus *Pycreus*] ..... **Key B**
  2 Stigmas 3; achenes trigonous.
    4 Spikelets borne in digitate clusters (rarely singly), or in umbellate or glomerulate heads; [subgenus *Pycnostachys*] ..... **Key C**
    4 Spikelets borne in spikes on a conspicuous rachis.
      5 Rachilla articulate at the base of each scale, the mature spike therefore disarticulating into segments consisting of a scale, an achene, and a cartilaginously thickened section of the rachilla (and its wings); [subgenus *Diclidium*] ..... **Key D**
      5 Rachilla continuous, or articulate only at the base; [subgenus *Cyperus*] ..... **Key E**

Key A – subgenus *Juncellus* – stigmas 2; achenes lenticular; achenes dorsiventrally flattened, borne with a flattened face toward the rachillas

1 Plants 1-3 (-6) dm tall; leaf blades 0-7 cm long ..... ***C. laevigatus***
1 Plants to 10 dm tall; leaf blades 20-40 cm long ..... ***[C. serotinus]***

Key B – subgenus *Pycreus* – stigmas 2; achenes lenticular; achenes laterally flattened, borne with an edge toward the rachilla

1 Scales with excurved awn 0.3-0.5 mm long; stamens 1-2; achenes ca. 0.6 mm long ..... ***C. pumilus***
1 Scales entire or minutely mucronate; stamens 2-3; achenes (0.7-) 1.0-1.6 mm long.
  2 Achenes oblong with a truncate apex, subcylindric, only slightly compressed laterally.
    3 Scales 2.7-3.6 mm long, 1.6-1.8 mm wide; achenes 1.2-1.6 mm long, 0.6-0.9 mm wide ..... ***C. filicinus***
    3 Scales 1.5-2.4 mm long, 1.0-1.4 mm wide; achenes 0.8-1.2 mm long, 0.4-0.6 mm wide ..... ***C. polystachyos***
  2 Achenes ovoid, obovoid, or ellipsoid, with a rounded or subacute apex, biconvex or strongly laterally flattened.
    4 Scales membranous, ovate, loosely imbricate, each barely overlapping the next scale on the same side of the rachilla, the spikelets thus appearing serrate-margined to the unaided eye; annual, 30-75 cm tall ..... ***C. flavicomus***
    4 Scales firm, oblong, closely imbricate, thus the spikelets appearing smooth-margined to the unaided eye; perennial or annual, 5-75 cm tall.
      5 Achene reticulations rectangular, elongate; achenes broadly obovoid, black; stamens 3 ..... ***C. flavescens***
      5 Achene reticulations isodiametric or square; achenes ellipsoid or obovoid, brown or black; stamens 2-3.
        6 Scales yellow or yellowish brown; culms 15-75 cm tall ..... ***C. lanceolatus***
        6 Scales brown or clear; culms 3-25 (-30) cm tall.

7 Plants perennial from slender rhizomes ..... *C. sanguinolentus*
7 Plants annual from fibrous roots.
8 Scales 1.9-2.7 mm long, 1.8-2.3 mm wide; styles 0.6-1.0 mm long; stigmas 1.0-1.5 mm long ..... *C. bipartitus*
8 Scales 2.5-3.0 mm long, 1.6-1.9 mm wide; styles 0.3-0.5 mm long; stigmas 2.2-3.1 mm long ..... *C. diandrus*

Key C – subgenus *Pycnostachys* – stigmas 3; achenes trigonous; spikelets borne in digitate clusters (rarely singly), or in umbellate or glomerulate heads

1 Scales folded in half their entire length (conduplicate).
2 Perennial.
3 Achenes with a granular or papillose surface; leaves often bladeless; bracts 2 (-3) ..... *C. haspan*
3 Achenes with a smooth surface; leaves with blades; bracts 3-5.
4 Plants with tubers and stolons; spikelets commonly proliferous ..... *C. dentatus*
4 Plants with stolons only; spikelets not proliferous ..... *C. lecontei*
2 Annual.
5 Scales cuspidate, with a cusp 0.6-1.2 mm long ..... *C. cuspidatus*
5 Scales blunt or slightly mucronate.
6 Spikelets 30-20 per head; styles ca. 0.1 mm long ..... *C. difformis*
6 Spikelets 3-12 per head; styles 0.3-0.4 mm long ..... *C. fuscus*
1 Scales 2-keeled in the lower third to half (bicarinate).
7 Leaves bladeless; inflorescence bracts ca. 20, borne horizontally; stamens 3 ..... *[C. involucratus]*
7 Leaves with leaf blades; inflorescence bracts 2-10, borne variously; stamens 1 (-2).
8 Stems sharply 3-angled, the faces concave, the angles harshly scabrous; leaf blades and inflorescence bracts with conspicuous cross-veins ..... *C. virens*
8 Stems rounded, obscurely 3-faced, or 3-angled, the faces flat or convex, smooth or slightly scabrous; leaf blades and involucral bracts lacking conspicuous cross-veins.
9 Stems slightly scabrous, the prickles pointing downward (retrorse) ..... *C. surinamensis*
9 Stems smooth or if rough, the prickles pointing upward (antrorse) or outward (extrorse).
10 Achene bases swollen, spongey ..... *C. distinctus*
10 Achene bases not swollen and spongey.
11 Achenes narrowly ellipsoid to linear, about 3-6× as long as wide.
12 Achenes ellipsoid to narrowly ellipsoid, 0.9-1.1 mm long, 0.3-0.4 mm wide, about 3× as long as wide; style 0.2-0.4 mm long; stigmas 0.4-0.6 mm long ..... *C. entrerianus*
12 Achenes linear, 1.2-1.4 mm long, 0.2 (-0.3) mm wide, about 5-6× as long as wide; style 0.5-0.8 mm long; stigmas 0.6-1.0 mm long ..... *C. pseudovegetus*
11 Achenes broadly ellipsoid, about 2-2.5× as long as wide (the stipe or cuneate base typically conspicuous).
13 Annual; longest inflorescence bract erect or strongly ascending; anther ca. 0.5 mm long ..... *C. acuminatus*
13 Perennial; longest inflorescence bract horizontal or slightly ascending (< 30 degrees); anther 0.8-1.2 mm long.
14 Scales declined 3-45 degrees from the rachilla; achenes with a stipe ..... *C. eragrostis*
14 Scales declined (45-) 60-90 degrees from the rachilla; achenes cuneate at the base ..... *C. ochraceus*

Key D – subgenus *Diclidium* – stigmas 3; achenes trigonous; spikelets borne in spikes on a conspicuous rachis; rachilla articulate at the base of each scale, the mature spike therefore disarticulating into segments consisting of a scale, an achene, and a section of the rachilla (including its wings)

1 Tip of each scale not reaching above the base of the next distal scale on the same side of the rachilla, and usually ending short of it; achene linear oblong, 1.5-2 mm long, about 3× as long as wide ..... *C. odoratus var. engelmannii*
1 Tip of each scale reaching above the base of the next distal scale on the same side of the rachilla; achene ellipsoid, obovoid-oblong, or slenderly obovoid, 1-1.5 mm long, about 2× as long as wide ..... *C. odoratus var. odoratus*

Key E – subgenus *Cyperus* – stigmas 3; achenes trigonous; spikelets borne in spikes on a conspicuous rachis; rachilla continuous, or articulate only at the base

1 Upper scales of the spikelet with a straight or excurved mucronate or cuspidate apex 0.4-1.2 mm long.
2 Plant a rhizomatous perennial, culms single ..... *[C. schweinitzii]*
2 Plant an annual, culms several, cespitose.
3 Achenes 0.2-0.6 mm wide; stamen 1; culms 2-16 cm tall.
4 Achenes 0.5-0.6 mm wide, < 2× as long as wide, cuneate to the base; scales 1.0-2.0 mm wide, 9-13-nerved; filaments ca. 2.5 mm long; anthers 0.4-0.8 mm long ..... *C. granitophilus*
4 Achenes (0.2-) 0.3-0.4 (-0.5) mm wide, > 2× as long as wide, with a minute stipe at the base; scales 0.5-1.0 mm wide, (5-) 7-9 (-11)-nerved; filaments ca. 1.5 mm long; anthers 0.3-0.4 mm long ..... *C. squarrosus*
3 Achenes 0.5-1.1 mm wide; stamens 3; culms (2-) 6-50 cm tall.
5 Achenes obovoid, truncate at the apex; leaves flat to V-shaped; live plants not viscous to the touch ..... *C. compressus*
5 Achenes elipsoid, with a beak 0.5-1.2 mm long; leaves involute; live plants viscous to the touch ..... *C. oxylepis*
1 Upper scales blunt, or with a mucro <0.3 mm long.
6 Spikelets linear, 0.8-1.6 (-1.9) mm wide.
7 Spikelet 1.2-1.6 mm wide; scales deciduous; rachilla persistent, wingless or very narrowly winged, not clasping achene ..... *C. distans*

7 Spikelet 0.8-1.3 (-1.9) mm wide; scales persistent; rachilla breaking into segments with a scale and achene attached, the wing prominent and clasping the achene
8 Tip of each scale not reaching above the base of the next distal scale on the same side of the rachilla, and usually ending short of it; achene linear oblong, 1.5-2 mm long, about 3× as long as wide ..... ***C. odoratus** var. **engelmannii***
8 Tip of each scale reaching above the base of the next distal scale on the same side of the rachilla; achene ellipsoid, obovoid-oblong, or slenderly obovoid, 1-1.5 mm long, about 2× as long as wide ..... ***C. odoratus** var. **odoratus***
6 Spikelets oblong-ovate to linear-oblong, (1.5-) 2.0-3.0 (-4.0) mm wide.
9 Spikelets strongly compressed, >2×as wide as thick (in cross-section); scales spreading or appressed.
10 Scales obovate-orbiculate, notched at the tip; styles < 0.1 mm long.
11 Rachilla wingless; scales scarcely mucronate ..... ***C. iria***
11 Rachilla narrowly winged; scales distinctly mucronate ..... ***[C. amuricus]***
10 Scales elliptic to oblong or ovate, acute to obtuse, not notched at the tip; styles 0.3-1.3 mm long.
12 Rachilla with hyaline, whitish, or straw-colored wings 0.2-0.5 mm wide.
13 Culms terete (at least toward the base), nodose-septate; inflorescence bracts 2 (-4), all erect; leaf blades generally absent ..... ***C. articulatus***
13 Culms trigonous, not nodose-septate; inflorescence bracts 3-7, horizontal, ascending, or reflexed; leaf blades present.
14 Scales persistent; rachilla persistent; elongate stolons up to 15 cm long present, bearing tubers.
15 Scales purplish red to reddish brown, with green midveins; base of culm indurate; stolons wiry, springy when dried ..... ***C. rotundus***
15 Scales yellowish brown to brown; base of culm soft; stolons spongy, flexible when dried.
16 Style and stigma combined < 4.2 mm long ..... ***C. esculentus** var. **leptostachyus***
16 Style and stigma combined > 4.2 mm long ..... ***[C. esculentus** var. **macrostachyus]***
14 Scales deciduous; rachilla deciduous; rhizomes up to 5 cm long present, not bearing tubers.
17 Scales 3.2-4.5 (-6) mm long; anthers 0.3-0.5 mm long; stigmas 3-4 mm long; achenes narrowly oblong ..... ***C. strigosus***
17 Scales 1.5-2.5 (-3.1) mm long; anthers 0.7-1.8 mm long; stigmas 1-2 (-3) mm long.
18 Achenes coarsely punctate ..... ***C. planifolius***
18 Achenes smooth ..... ***C. grayi***
12 Rachilla wingless, or with wings 0-0.2 mm wide.
19 Longest inflorescence bract erect or strongly ascending ..... ***[C. schweinitzii]***
19 Longest inflorescence bract horizontal, weakly ascending, or reflexed.
20 Longest inflorescence bract weakly ascending.
21 Rachis (to which the spikelets are attached) glabrous; achenes 1.5-2.0 mm long; spikes subglobose to broadly ovoid; [of upland sites, of NC northward] ..... ***C. houghtonii***
21 Rachis hispidulous; achenes 1.0-1.2 mm long; spikes loosely oblong-ovoid; [of wetland sites, of SC southward] ..... ***C. pilosus***
20 Longest inflorescence bract horizontal to reflexed.
22 Anthers 0.8-1.0 mm long ..... ***C. filiculmis***
22 Anthers 0.3-0.6 mm long.
23 Scales 2.5-3.8 mm long, usually fitting loosely over the mature achene, the margins spreading or loosely clasping it; spikelet with 5-22 scales ..... ***C. lupulinus** ssp. **lupulinus***
23 Scales 1.8-2.5 mm long, usually fitting tightly over the achene, the margins tightly clasping it; spikelets with 3-7 scales ..... ***C. lupulinus** ssp. **macilentus***
9 Spikelets subterete or quadrangular, 1-1.5×as wide as thick (in cross-section); scales appressed.
24 Scales deciduous; rachillas persistent; rachilla wings deciduous, but remaining firmly attached at the base even after the achenes fall; spikelets with (6-) 12-20 (-40) scales ..... ***C. erythrorhizos***
24 Scales persistent; rachillas **either** deciduous (the mature spikelets generaly falling as a single unit from the rachis) **or** persistent; rachilla wings persistent; spikelets with 2-8 scales.
25 Spikelets reflexed (some of the uppermost spreading to ascending).
26 Culms glabrous; leaves and inflorescence bracts nearly glabrous ..... ***C. hystricinus***
26 Culms (at least the upper portion) scaberulous or puberulent; leaves and inflorescence bracts puberulent on the upper surface.
27 Inflorescence rays scaberulous; leaves and inflorescence bracts pubescent on the upper and lower surfaces; culm obtusely trigonous to nearly terete ..... ***C. plukenetii***
27 Inflorescence rays smooth (or with a very few hairs); leaves and inflorescence bracts pubescent on the upper surface and on the midvein only on the lower surface; culm sharply 3-angled ..... ***C. retrofractus***
25 Spikelets ascending to spreading (some of the lowermost reflexed).
28 Spikes cylindrical, 2-5× as long as wide.
29 Spikelets ellipsoid, 2-3×as long as wide; spikelets with 1-2 (-3) fertile scales ..... ***[C. aggregatus]***
29 Spikelets lanceolate to linear, 4-10×as long as wide; spikelets with 3-8 fertile scales.
30 Scales greenish to light brown, the tips overlapping the lower 1/4 to 1/3 of the next scale ..... ***C. strigosus***
30 Scales reddish brown or tawny, the tips barely reaching the base of the next scale ..... ***C. thyrsiflorus***
28 Spikes ovoid, globose, or obovoid, 1-2× as long as wide.
31 Scales >4 mm long; achenes >2 mm long.
32 Spikes tightly globose ..... ***C. echinatus***
32 Spikes ellipsoid to obovoid.
33 Spikelets subquadrangular, the terminal scale elongate, forming a subulate tip to the spikelet; leaves and inflorescence bracts 3-6 mm wide, smooth ..... ***C. hystricinus***
33 Spikelets subterete, the terminal scale not elongate, the spikelet therefore acute; leaves and inflorescence bracts mostly >10 mm wide, scabrous on the upper surfaces.
34 Spikes dense, with 50-90 spikelets, each with 3-6 (-7) fertile scales; achenes conspicuously falcate-curved, 3-4× as long as wide ..... ***C. lancastriensis***
34 Spikes loose, of 13-75 spikelets, each with 4-8 (-11) fertile scales; achenes straight, 5-6× as long as wide ..... ***C. refractus***
31 Scales <4 mm long; achenes <2 mm long.
35 Spikes with parallel sides, mostly > 25 mm long; spikelets quadrate.

36 Spikelets narrowly ellipsoid, 1.5-2.0 mm wide ..... ***C. tetragonus***
36 Spikelets linear, 0.5-1.0 mm wide ..... ***C. thyrsiflorus***
35 Spikes with curved (convex) sides, mostly < 20 mm long; spikelets somewhat compressed.
37 Scales ascending; achenes oblong-fusiform, gradually narrowed to both ends ..... ***C. ovatus***
37 Scales appressed; achenes elongate, abruptly constricted at the tip.
38 Spikes loose, globose to hemispheric; spikelets angular in cross-section, with 3-8 fertile scales; scales yellow-greenish ..... ***C. croceus***
38 Spikes tight, globose, oblong, or oblong-cylindric; spikelets subterete in cross-section, with 1-3 (-4) fertile scales; scales straw-colored or brown on the sides.
39 Spikes globose; spikelets (3.5-) 4.0-7.0 mm long; scales membranous, straw-colored, 3.5-4.5 mm long; achenes 1.7-2.3 mm long ..... ***C. echinatus***
39 Spikes oblong to oblong-cylindrical; spikelets 2.2-4.0 (-4.5) mm long; scales firm, brown or straw-colored, 1.8-2.6 mm long; achenes 1.2-2.0 mm long ..... ***C. retrorsus***

Cyperus acuminatus Torrey & Hooker ex Torrey. Mt (NC, VA), Cp (GA): wetlands, especially over limestone; rare (VA Rare). IL west to ND, south to w. LA, TX, and n. Mexico; disjunct from WA to s. CA; disjunct eastward at scattered localities in VA, NC, GA (Echols 2007), TN, KY, and OH (where probably native), and NY and NH (where probably introduced). [= C, F, FNA, G, GW, K, W]

Cyperus articulatus Linnaeus. Cp (GA, SC): marshes, especially tidal; rare. July-September. Se. SC south to s. FL west to e. TX, and south into tropical America. [= RAB, FNA, GW, K, S]

Cyperus bipartitus Torrey. Cp, Pd (NC, VA), Mt (GA, NC, VA), {SC}: low fields, ditches, marshes; uncommon. July-September. ME and Québec west to MN and WA, south to GA, LA, TX, NM, AZ, and CA. [= C, FNA, GW, K, W; ? *C. rivularis* Kunth – RAB, F, G, S, WV]

Cyperus compressus Linnaeus. Cp, Pd (GA, NC, SC, VA): sandy fields, disturbed areas; common (uncommon in Piedmont). July-September. Pantropical and warm temperate, north in North America to s. NY, s. OH, s. IL, and e. TX. [= RAB, C, F, FNA, G, GW, K, S, W]

Cyperus croceus Vahl. Cp (GA, NC, SC, VA), Pd (GA), Mt (VA): savannas, pine flatwoods, disturbed areas; common. July-October. NJ and MO south through the New World tropics. {problems in circumscription; check specimens} [= C, FNA; = *C. globulosus* Aublet – F, G, GW, W, misapplied; > *C. croceus* – K; > *C. globosus* – S?; > *C. multiflorus* (Britton) Small – S; > *C. globosus* – RAB; > *C. retrorsus* Chapman var. *robustus* (Böckler) Kükenthal – RAB, K; > *C. plankii* Britton – S?]

Cyperus cuspidatus Kunth. Cp (GA, SC): sandy fields, disturbed areas; rare. July. S. SC south to FL, west to AL; and in New World tropics. [= RAB, FNA, GW, K, S]

Cyperus dentatus Torrey, Toothed Flatsedge. Cp (NC, SC), Mt (VA): low sandy areas; rare (NC Rare, VA Rare). July-October. Nova Scotia and Québec south to e. SC; disjunct inland in WV, s. TN, and nw. IN. [= RAB, C, F, FNA, G, GW, K, S, W]

Cyperus diandrus Torrey. Cp, Pd (VA), Mt (GA, VA): {habitat}; rare (VA Rare). ME west to ND, south to VA, c. TN, n. AL, IL, MO, and IA. [= C, F, FNA, G, GW, K, S, W]

* ***Cyperus difformis*** Linnaeus, Smallflower Umbrella Sedge. Cp (GA, NC, SC, VA): disturbed areas; rare, native of Old World tropics. See Bryson et al. (1996). [= C, F, FNA, G, GW, K]

* ***Cyperus distans*** Linnaeus f. Cp (NC): marshes; rare, probably introduced from tropical America (NC Watch List). July-September. [= RAB, FNA, K, S]

Cyperus distinctus Steudel. Cp (GA, SC): marshes; rare (SC Rare). July-September. E. SC south to s. FL, west to e. LA. [= RAB, FNA, GW, K]

Cyperus echinatus (Linnaeus) Wood. Pd, Cp (GA, NC, SC, VA), Mt (GA, VA): sandy woodlands, forests, and fields; common. July-September. CT and NY west to s. OH, IL, and se. KS, south to n. FL, TX, and ne. Mexico. [= C, FNA, K; = *C. ovularis* (Michaux) Torrey – RAB, G, GW, S, W; > *C. ovularis* var. *ovularis* – F; > *C. ovularis* var. *sphaericus* Böckler – F]

* ***Cyperus entrerianus*** Böckler. Cp (AL, FL, GA, LA, MS): bottomland hardwood forests, coastal grasslands, marshes, disturbed areas; common, native of temperate South America. Established from E. GA south to s. FL and west to e. and s. TX. Rosen, Carter, & Bryson (2006) discuss the spread of this noxious weed in the Southeastern United States. [= FNA, K]

* ***Cyperus eragrostis*** Lamarck. Cp (SC): disturbed wetlands; rare, native of tropical America. See Bryson et al. (1996), Brown & Marcus (1998). [= FNA, K]

Cyperus erythrorhizos Muhlenberg, Redroot Flatsedge. Cp, Pd (GA, NC, SC, VA), Mt (VA): marshes, ditches; uncommon. July-September. MA west to ND and WA, south to n. FL, LA, TX, AZ, and CA. [= RAB, C, F, FNA, G, GW, K, W; > *C. erythrorhizos* – S; > *C. halei* Torrey ex Britton – S]

Cyperus esculentus Linnaeus *var. leptostachyus* Böckler, Yellow Nutsedge, Yellow Nutgrass, Wild Chufa, Earth-almond. Cp, Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common. July-October. The species is pantropical and warm temperate. [= FNA; > *C. esculentus* var. *leptostachyus* – K; > *C. esculentus* var. *sativus* Böckler– K; < *C. esculentus* – RAB, C, F, G, GW, W, WV; > *C. esculentus* – S; > *C. lutescens* Torrey & Hooker – S]

Cyperus esculentus Linnaeus *var. macrostachyus* Böckler, Yellow Nutsedge, Yellow Nutgrass, Wild Chufa, Earth-almond. {GA, NC, SC} July-October. The species is pantropical and warm temperate. [= FNA; < *C. esculentus* var. *esculentus* – K; < *C. esculentus* – RAB, C, F, G, GW, S, W, WV; < *C. lutescens* Torrey & Hooker – S]

Cyperus filicinus Vahl. Cp (GA, NC, SC, VA): brackish marshes; common. July-September. ME to s. FL, west to LA; West Indies. [= RAB, C, F, FNA, G, K, S; = *C. polystachyos* Rottböll var. *filicinus* (Vahl) C.B. Clarke; < *C. polystachyos* – GW]

Cyperus filiculmis Vahl. Cp (GA, NC, SC, VA), Pd? (NC, SC, VA): sandy or rocky woodlands, forests, and fields; common. July-October. Se. MD south to s. peninsular FL, west to e. TX. [= FNA, RAB; < *C. lupulinus* ssp. *lupulinus* – K (also see *C. lupulinus*]

Cyperus flavescens Linnaeus. Mt, Pd, Cp (GA, NC, SC, VA): low fields, ditches, marshes; common. July-September. Pantropical and warm temperate, north in North America to MA, MI, MO, and KS. [= RAB, C, FNA, G, GW, K, S, W, WV; > *C. flavescens* var. *poiformis* (Pursh) Fernald – F]

Cyperus flavicomus Michaux. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): ditches, marshes; common (GA Special Concern). July-October. Se. VA and KY south through the New World tropics. [= C, FNA, K, W; = *C. albomarginatus* (Martius & Schrader ex Nees) Steudel – RAB, F, G, GW; ? *C. sabulosus* (Martius & Schrader ex Nees) Steudel – S]

* ***Cyperus fuscus*** Linnaeus, Black Galingale, Brown Galingale. Cp (VA): {habitat}; rare, native of Eurasia. See McKenzie et al. (1998). [= C, F, FNA, G, K]

Cyperus granitophilus McVaugh, Granite Flatsedge. Pd (GA, NC, SC, VA), Cp, Mt (GA): granitic flatrocks, rarely on diabase flatrocks and Altamaha Grit glades; rare (NC Rare, VA Rare). Sc. VA south to ec. AL in the Piedmont; disjunct in se. and c. TN on sandstone and limestone and in sc. GA on Altamaha Grit. [= FNA, GW, K; included in concept of *C. squarrosus* by some earlier authors]

Cyperus grayi Torrey. Cp (GA, NC, SC, VA), Pd (NC, VA): dry soils; uncommon. July-September. NH south to GA. [= RAB, C, FNA, K, W; *C. grayii* – G, orthographic variant; > *C. grayii* – F; > *C. filiculmis* var. *oblitus* Fernald & Griscom – F?]

Cyperus haspan Linnaeus. Cp (GA, NC, SC, VA), Pd (GA): marshes, low fields, ditches; common (VA Watch List). July-September. Pantropical in distribution, north in North America to se. VA. [= RAB, C, FNA, G, GW, K, S; > *C. haspan* var. *americanus* Böckler – F]

Cyperus houghtonii Torrey, Houghton's Flatsedge. Pd (NC), Mt (VA): dry upland sites; rare (NC Rare, VA Rare). July. MA, VT, and Québec west to MN, south to w. VA, WV, nc. NC, and nw. IN. [= RAB, C, F, FNA, G, K, W]

Cyperus hystricinus Fernald. Cp, Pd (GA, NC, SC, VA), Mt? (GA, NC, SC): dry woodlands and forests; rare. July-September. NJ south to n. FL, west to e. TX, mostly on the Coastal Plain. {check specimens of this and relatives – discrepancy between mapped and stated ranges} [= C, FNA, K, S; < *C. retrofractus* – RAB, W, misapplied; = *C. retrofractus* (Linnaeus) Torrey var. *hystricinus* (Fernald) Kükenthal – F, G]

* ***Cyperus iria*** Linnaeus. Cp, Pd (GA, NC, SC, VA): marshes, ditches, disturbed wet areas; common, native of Old World. July-October. [= RAB, C, F, FNA, G, GW, K, S]

* ***Cyperus laevigatus*** Linnaeus. Cp (NC): brackish marshes; rare, native of sw. North America and New World tropics. [= RAB, FNA, K, S; ? *C. careyi* Britton – S]

Cyperus lancastriensis Porter ex A. Gray. Pd (GA, NC, SC, VA), Cp, Mt (NC, SC, VA): dry woodlands, forests, and fields; common. July-September. NJ west to WV, OH, and MO, south to GA and AR. [= RAB, C, F, FNA, G, K, S, W]

Cyperus lanceolatus Poiret. Cp (GA): wet places; rare. Se. GA and ne. FL west to LA and c. TX (?). [= FNA, GW, K; ? *C. densus* Link – S]

Cyperus lecontei Torrey ex Steudel. Cp (GA, NC, SC?): limesink ponds, low pinelands; rare (NC Rare). July-September. Se. NC south to s. FL, west to LA. Sorrie (1998b) reports it for e. GA (Glynn County). [= RAB, FNA, GW, K, S]

Cyperus lupulinus (Sprengel) Marcks *ssp.* ***lupulinus***. Cp (GA, NC, SC, VA), Mt, Pd (NC, SC, VA): {additional herbarium check} MA and VT west to MN, south to NC, n. SC, TX; disjunct in ID, WA, and OR. [= FNA, K; < *C. filiculmis* Vahl – RAB, W; < *C. lupulinus* – C; = *C. filiculmis* Vahl var. *filiculmis* – F, G; >< *C. filiculmis* – S; > *C. martindalei* Britton – S]

Cyperus lupulinus (Sprengel) Marcks *ssp.* ***macilentus*** (Fernald) Marcks. Mt (GA, NC, VA), Cp (VA), {SC}: rare (GA Special Concern). {additional herbarium check} ME, Québec, and MN south to w. VA, w. NC, nw. GA, and MO. [= FNA, K; < *C. filiculmis* Vahl – RAB, S, W; = *C. filiculmis* Vahl var. *macilentus* Fernald – F, G; < *C. lupulinus* – C]

Cyperus ochraceus Vahl. Cp (GA): wet areas; rare. Se. GA (Jones & Coile 1988), FL, LA, TX, West Indies, Central America. [= FNA, GW, K, S]

Cyperus odoratus Linnaeus *var.* ***engelmannii*** (Steudel) R. Carter, S.D. Jones, & J. Wipff. Cp (NC, VA): alluvial and other damp to wet soils; uncommon to rare. July-October. North-central and northeastern North America, MA west to s. Ontario, MN and NE, south to se. NC and MO. Distribution in our region is poorly known. [= *C. engelmannii* Steudel – RAB, F, G, GW, S; < *C. odoratus* – C, FNA, K, W]

Cyperus odoratus Linnaeus *var.* ***odoratus***. Cp (GA, NC, SC, VA), Pd (GA, NC, VA), Mt (VA): low fields, marshes, ditches; uncommon. July-September. Pantropical, north in North America to MA, se. ME, Ontario, MN, KS, NM, AZ, and CA. [= *C. odoratus* – RAB, F, G, GW; < *C. odoratus* – C, FNA, K, W; > *C. ferruginescens* Böckler – RAB, F; > *C. ferax* L.C. Richard – S; > *C. longispicatus* J.B.S. Norton – S; > *C. speciosus* Vahl – S]

Cyperus ovatus Baldwin. Cp (GA, NC, SC): sandy beaches, maritime forests, and pinelands; rare. July-October. Se. NC south to s. FL, west to s. AL. [= FNA, K; ? *C. retrorsus* Chapman var. *cylindricus* (Elliott) Fernald & Griscom; > *C. retrorsus* var. *deeringianus* (Britton ex Small) Fernald ex Griscom – RAB; < *C. retrorsus* – C, G, GW, W; > *C. deeringianus* Britton ex Small – S]

* ***Cyperus oxylepis*** Nees ex Steudel. Cp (GA, SC) {habitat}; rare, native of South America. See Bryson et al. (1996). [= FNA, GW, K]

* ***Cyperus pilosus*** Vahl. Cp (SC): rice fields; rare, native of e. Asia. [= FNA, K]

Cyperus planifolius L.C. Richard. Cp (GA): brackish marshes; rare. Se. GA (Jones & Coile 1988) south to s. FL; West Indies; Central and South America. [= FNA, GW, K; ? *C. brunneus* Swartz – S]

Cyperus plukenetii Fernald. Cp (GA, NC, SC, VA), Pd (NC, SC): sandhills, sandy woodlands, and dry, disturbed areas; common (rare in Piedmont) (VA Rare). July-October. NJ, KY, MO, and se. OK, south to c. peninsular FL and e. TX. [= RAB, C, F, FNA, K, W; = *C. retrofractus* var. *retrofractus* – G, misapplied; = *C. retrofractus* – S, misapplied]

Cyperus polystachyos Rottböll. Cp, Pd (GA, NC, SC, VA): low fields, ditches, and marshes; common. July-October. Pantropical and warm temperate, north in North America to ME, MA, KY, MO, and OK. [= FNA, GW; > *C. polystachyos* Rottböll var. *texensis* (Torrey) Fernald – RAB, C, F, G, K, W; *C. polystachyos* var. *paniculatus* (Rottböll) C.B. Clarke; > *C. microdontus* Torrey – S; > *C. odoratus* – S, misapplied; > *C. paniculatus* Rottböll – S]

Cyperus pseudovegetus Steudel. Cp, Pd (GA, NC, SC, VA), Mt (GA, VA): marshes, ditches, depressions; common. July-October. NJ and MA, west to s. IL, s. MO, and OK, south to FL and TX. [= RAB, C, FNA, G, GW, K, S, W; = *C. virens* – F, misapplied]

* ***Cyperus pumilus*** Linnaeus. Cp (GA): disturbed wet areas; rare, native of the Old World, occurring in n. FL and se. GA. [= FNA, GW, K]

Cyperus refractus Engelmann ex Böckler. Pd (GA, NC, SC, VA), Mt, Cp (NC, SC, VA): dry sandy or rocky woodlands and forests; rare (VA Watch List). July-September. NJ west to OH and MO, south to SC, GA, AL, and AR. [= RAB, C, F, FNA, G, K, S, W]

Cyperus retrofractus (Linnaeus) Torrey. Pd, Cp, Mt (GA, NC, SC, VA): dry sandy or rocky woodlands and fields; common. July-September. NJ west to s. OH, and se. MO, south to GA. AL, and AR. [= C, FNA, K; = *C. dipsaciformis* Fernald – RAB, F, S, W; = *C. retrofractus* (Linnaeus) Torrey var. *dipsaciformis* (Fernald) Kükenthal – G]

Cyperus retrorsus Chapman. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC): dry woodlands, forests, and rock outcrops; common. July-October. S. NY south to FL, west to TX, mostly on the Coastal Plain, but north in the interior to KY and se. OK. [= C, G, GW, W; = *C. retrorsus* Chapman var. *retrorsus* – RAB, K; > *C. retrorsus* var. *retrorsus* – F; > *C. retrorsus* var. *nashii* (Britton) Fernald – F; > *C. retrorsus* – S; > *C. nashii* Britton — S; > *C. torreyi* Britton – S]

*? ***Cyperus rotundus*** Linnaeus, Purple Nutsedge, Nutgrass, Cocograss. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (SC): gardens, fields, disturbed areas; common. June-October. Pantropical and warm temperate in distribution (though extending less far north than *C. esculentus*). [= RAB, C, F, FNA, G, GW, K, S]

* ***Cyperus sanguinolentus*** Vahl. Cp (GA): ditches, disturbed wet areas; rare, native of Asia, known in North America from e. GA west to LA. See Carter & Bryson (2000) for detailed information. [= FNA; > *Cyperus louisianensis* Thieret – K]

Cyperus squarrosus Linnaeus. Pd (GA, NC, SC, VA), Mt (VA), Cp (GA): moist depressions and seepages on granitic and other rocks, drawdown riverbanks, moist disturbed sites; rare (NC Watch List). July-September. Nearly cosmopolitan in distribution, in Old World and New World. Similar to the closely related *C. granitophilus*. [= C, FNA, K; > *C. aristatus* Rottböll – RAB, G, GW, W; > *C. inflexus* Muhlenberg – F, S, WV]

Cyperus strigosus Linnaeus, False Nutsedge. Mt, Pd, Cp (GA, NC, SC, VA): marshes, ditches, wet disturbed areas; common. July-October. Québec west to SD, south to FL and TX; also in w. North America. [= RAB, C, FNA, GW, K, W; > *C. strigosus* var. *strigosus* – F, G; > *C. strigosus* var. *robustior* Britton – F; > *C. strigosus* var. *stenolepis* (Torrey) Kükenthal – G; > *C. strigosus* – S; > *C. praelongatus* Steudel – S; > *C. stenolepis* Torrey – S]

Cyperus surinamensis Rottböll. Cp (GA, SC): "disturbed clay-sand beds" (RAB); rare. September-October. Se. SC south to s. FL, west to KS, OK, TX, and south into Mexico and tropical America. [= RAB, FNA, GW, K, S]

Cyperus tetragonus Elliott, Four-angled Flatsedge. Cp (GA, NC, SC): maritime forests and dunes; rare (NC Rare, SC Rare). July-September. E. NC south to FL; also reported for AZ and NM. [= RAB, FNA, K, S]

Cyperus thyrsiflorus Junghuhn. Cp (GA): swamps and streambanks; rare (GA Special Concern). Se. GA and FL peninsula west to se. TX. [= FNA, K; = *C. hermaphroditus* (Jacquin) Standley – S, misapplied]

Cyperus virens Michaux. Cp (GA, NC), Pd (GA, NC?): marshes and ditches; rare. July-September. Se. NC south to c. peninsular FL, west to TX; West Indies, Mexico to Argentina. [= RAB, FNA, GW, K, S]

* *Cyperus aggregatus* (Willdenow) Endlicher, native of tropical America, has been collected as a waif in NJ, PA, AL, and FL. [= FNA, K; ? *C. cayennensis* (Lamarck) Britton – S; ? *C. flavus* (Vahl) Nees]

* *Cyperus amuricus* Maximowicz, native of e. Asia, is naturalized in DE, PA, NJ, and NY. [= FNA, G, K; ? *C. microiria* Steudel – F]

* *Cyperus involucratus* Rottböll, native of Africa, naturalized north at least to FL. [= FNA, K; ? *C. alternifolius* Linnaeus, misapplied]

Cyperus retroflexus Buckley. AL west to NM, south to Mexico. [= FNA, K] {not yet keyed}

Cyperus schweinitzii Torrey occurs in sandy soils from VT, MA, MN, and Albert, south to NJ, e. PA, n. KY, OH, MO, TX, NM, UT, and Mexico. It occurs in se. PA (Rhoads & Klein 1993) and NJ. [= FNA, K]

* *Cyperus serotinus* Rottböll, naturalized in s. NJ, DE, and PA (Kartesz 1999). [= FNA, K]

Dulichium Persoon (Threeway Sedge)

A monotypic genus, an herb, North American (known as fossils from Europe). References: Goetghebeur in Kubitzki (1998b); Mastrogiuseppe in FNA (2002b).

Identification notes: The combination of the distichous *Cyperus*-like spikelets and numerous, distinctly 3-ranked, cauline leaves makes *Dulichium* distinctive.

Dulichium arundinaceum (Linnaeus) Britton *var.* ***arundinaceum***, Threeway Sedge. Cp, Pd, Mt (GA, NC, SC, VA): streambanks, marshes, bogs, ditches; common. July-September. Var. *arundinaceum* ranges from Newfoundland west to MN, south to FL and TX; also from MT and British Columbia south to CA. A second variety, var. *boreale* Lepage, is endemic in Québec. [= FNA; < *D. arundinaceum* – RAB, C, F, G, GW, K, S, W]

Eleocharis R. Brown 1810 (Spikerush)
by Bruce A. Sorrie and Alan S. Weakley

A genus of about 120-200 species, herbs, cosmopolitan. A molecular study supported the monophyly of subgenus *Limnochloa* (Roalson & Friar 2000). References: Smith et al. in FNA (2002b); Socorro González-Elizondo & Peterson (1997); Roalson & Friar (2000); Goetghebeur in Kubitzki (1998b).

Identification notes: "Scale" refers to the flower scales. "Sheath" refers to leaf sheaths. "Bristle" refers to perianth bristles.

1 Culms producing vegetative proliferations rather than normal fertile spikelets ..... **Key A**
1 Culms producing at least some fertile spikelets (vegetative proliferations may or may not also be present).
  2 Spike 1-2 (-2.5)× as thick as the culm immediately below the spike, gradually expanded from the culm, the base of the spike narrowly cuneate; spike (3-) 4-8× as long as wide; [subgenus *Limnochloa*] ..... **Key B**
  2 Spike > 2× as thick as the culm immediately below the spike, abruptly expanded from the culm, the base of the spike broadly cuneate, rounded, or truncate; spike 1-3 (-4)× as long as wide.
    3 Achenes with several distinct longitudinal ribs or low ridges, the intervening spaces with abundant, very narrow, horizontally elongate cells ..... **Key C**
    3 Achenes without longitudinal ribs, the surface smooth, granular, or honeycomb-like (*E. tortilis* and *E. tuberculosa* have indistinct ribs, but intervening cells are honeycomb-like, not thin horizontally; *E. tricostata* has 3 keel-like ribs, but achene surface appears granular).
      4 Achenes lenticular or biconvex; styles 2-branched ..... **Key D**
      4 Achenes trigonous or nearly terete; styles 3-branched ..... **Key E**

Key A – spikerushes proliferating vegetatively, with no fertile spikelets present

{key provisional and needing additional testing}

1 Each culm producing secondary or tertiary whorls.
  2 Base of whorl abruptly widened from culm, forming a distinct shoulder; whorl divisions many per whorl (commonly 20 or more); whorl divisions usually 0.2 mm or less wide, finely capillary (often < 0.1 mm, but same may apperoach 0.3 mm); surface texture of divisions obviously beaded (under dissecting microscope) ..... ***E. confervoides***
  2 Base of whorl gradually widened from culm, vase-shaped, not forming a istinct shoulder; whorl divisions fewer per whorl (commonly 15 or less); whorl divisions usually 0.3 mm or more wide (0.5 mm or more, but the finest secondary or tertiary divisions as slender as 0.15 mm); surface texture of divisions not beaded (under dissecting microscope) ..... ***E. vivipara***
1 Each culm producing a single whorl of proliferations.
  3 Upper portion of sheath firm, the edge closely red-dotted; sheath tip < 1 mm long ..... ***E. vivipara***
  3 Upper portion of sheath thin and scarious, the edge not differently colored; sheath tip 1-2 mm long; plants usually more filiform and capillary than *E. vivipara*.
    4 Spikelet proliferations distichous; lowest scale much shorter than the others ..... ***E. baldwinii***
    4 Spikelet proliferations polystichous or spirally disposed; lowest scale longer than others ..... ***E. brittonii*** or ***E. microcarpa***

Key B – spikerushes with the spike about as thick as the culm (subgenus *Limnochloa*)

1 Culm transversely nodose-septate (appearing jointed), about 5-9.5 mm in diameter.
  2 Achene with longitudinal rows of enlarged linear cells separated by obscure longitudinal lines; perianth bristles narrow and weak, rudimentary to equaling achene; [widespread in our area] ..... ***E. equisetoides***
  2 Achene with longitudinal rows of enlarged rectangular cells separated by distinct longitudinal lines; perianth bristles broad and stout, exceeding achene; [of Panhandle FL] ..... ***[E. interstincta]***
1 Culm not transversely nodose-septate, 1-5.5 mm in diameter.
  3 Spike 3-5 mm in diameter, to 5 cm long, rounded to obtuse at the tip, densely flowered, the flowers (scales) 50-100 per spike, arranged in obvious spiral rows; culm 2-5 mm in diameter; [of estuarine and riverine marshes, or brackish interdune swale ponds on barrier islands].
    4 Culms 3-5 mm in diameter, live culms terete when fresh; tubercle base confluent with the summit of the achene ..... ***E. cellulosa***
    4 Culms 2-4 mm in diameter, sharply 3-4-angled when fresh; tubercle base distinctly constricted, forming a "waist" ..... ***E. quadrangulata***
  3 Spike 1-2 mm in diamater, to 2.5 cm long, sharply pointed at the tip, loosely flowered, the flowers (scales) 10-25, few enough that the spiral arrangement is not readily apparent; culm 0.5-1.5 (-2) mm in diameter; [of limesink (doline) ponds and Carolina bay lakes of the mainland].
    5 Achene body 0.8-1.5 mm long; scales mostly ca. 3.5 mm long; culms terete when fresh ..... ***E. elongata***
    5 Achene body 1.5-2.5 mm long; scales mostly ca. 5 mm long; culms 3-angled when fresh ..... ***E. robbinsii***

Key C – spikerushes with achenes with several distinct longitudinal ribs with very narrow horizontal cells between

1 Culms about 0.5 mm thick, firm, not wrinkling in drying; spikes 3-6 mm long; [widespread] ..... ***E. acicularis***
1 Culms 0.6-1.0 mm thick, becoming wrinkled in drying; spikes 2-4 mm long; [of the Coastal Plain, known from Virginia Beach in 1934] ..... ***E. radicans***

Key D – spikerushes with achenes lenticular or biconvex and styles 2-branched

1 Apex of sheath thin, membranous, hyaline, often with a torn edge.
  2 Achenes rufous-brown to reddish-purple to black, (0.3-) 0.4-0.6 mm wide; longer bristles retrorsely barbed, shorter than to equaling achene body ..... ***E. flavescens var. flavescens***
  2 Achenes olivaceous-brown to black, 0.5-0.7 (-0.8) mm wide; longer bristles either retrorsely barbed and equaling to exceeding the tubercle, or smooth and shorter than the tubercle.
    3 Bristles retrorsely barbed, the longer equaling to exceeding the tubercle; wide-ranging plants of wet sandy or peaty habitats .....

.....*E. olivacea var. olivacea*
3 Bristles smooth, the longer shorter than the tubercle; plants of tidal rivers in southern New Jersey .....*[E. olivacea var. reductiseta]*
1 Apex of sheath firm, somewhat thickened, opaque, with a definite edge.
4 Rhizomatous perennials growing from thick horizontal rhizomes.
5 Basal (sterile) scales 2-3, the lowest not encircling the base of the spike; [of the Mountains, rarely the Piedmont]..... *E. palustris*
5 Basal (sterile) scale solitary and spathiform, encircling the base of the spike; [of either the Mountains, upper Piedmont, or outer Coastal Plain].
6 Achenes prominently reticulate-pitted; [of the outer Coastal Plain]..... *E. fallax {ambigens* **phase***}*
6 Achenes smooth to faintly reticulate; [of the Mountains, rarely Piedmont, or outer Coastal Plain].
7 Culms slender to filiform; scales obtuse, 30-40 per spike; [of basic soils, of the Mountains and rarely Piedmont] .... *E. erythropoda*
7 Culms thicker, somewhat inflated; scales acute, 5-30 per spike; [of brackish habitats of the outer Coastal Plain].....*E. halophila*
4 Tufted or cespitose annuals without thick horizontal rhizomes.
8 Tubercle nearly or actually as broad as the achene, and appearing confluent with it, broader than high.
9 Tubercle flat-deltoid, 1/4 as high as the the achene; bristles shorter than the achene body; [plants of clay soils only]....*E. engelmannii*
9 Tubercle short-conic, 1/3-1/2 as high as the achene; bristles much exceeding the tubercle; [plants of a variety of soils].....*E. obtusa*
8 Tubercle < 2/3 as broad as the achene, conic, taller than broad.
10 Achene body pale brown, about 1 mm long.....*[E. ovata]*
10 Achene body black, 0.5-1.0 mm long.
11 Spikes lance-ovoid to subcylindric; achene body -.5-0.6 mm long ..... *E. atropurpurea*
11 Spikes ovoid to subglobose; achene body 0.7-1.0 mm long ..... *E. geniculata*

Key E – spikerushes with achenes trigonous or nearly terete and styles 3-branched

1 Achenes roughly and coarsely honeycomb-reticulate; plants usually forming dense, broad tussocks.
2 Tubercle much narrower than the achene; culms 'lazy', often reclining, distinctly 3-angled, twisted .....*E. tortilis*
2 Tubercle as broad or broader than the achene; culms ascending to erect, subterete, not twisted.....*E. tuberculosa*
1 Achenes smooth to finely honeycomb-reticulate.
3 Tubercle confluent with the achene summit, not constricted at the base.
4 Achenes bicolored, body black, tubercle whitish, depressed; [plant of freshwater ponds and Carolina bays] .....*E. melanocarpa*
4 Achenes unicolored, body and tubercle light brown or olive brown; [plants of brackish to saline marshes].
5 Plants diminutive, culms slender, rounded, 1-7 cm long, not arching and rooting .....*E. parvula*
5 Plants robust, culms broad, flattened, 20-80 (or more) long, at least some arching and rooting at tips .....*E. rostellata*
3 Tubercle not confluent with the achene summit, constricted at the base.
6 Achenes with prominenet keel-like angles or ribs.....*E. tricostata*
6 Achenes with rounded angles.
7 Scales 2-ranked; spikes usually 2-4-flowered.....*E. baldwinii*
7 Scales spirally imbricate; spikes many-flowered.
8 Achenes white or very pale gray.
9 Bristles present.
10 Tubercle depressed-deltoid; scales rounded, appressed .....*E. brittonii*
10 Tubercle conic or deltoid; scales acute to attenuate, the tips free ..... *E. microcarpa*
9 Bristles none.
11 Sheath base pinkish to straw-colored; spikes lane-ovate to oblong, 1.5-5 mm long .....*E. brittonii*
11 Sheath base purple-red; spikes ovoid, 2-3 mm long; [plant very rare, Santee Canal, SC, late 1800's].....*E. nigrescens*
8 Achenes yellowish, brown, or olive.
12 Horizontal rhizomes absent.
13 Achene body 1.2-1.5 mm long; tubercle slender-conic with narrow base; [of basic soils inland].....*E. intermedia*
13 Achene body 0.6-0.8 mm long; tubercle braod-conic with wide base; [of the Coastal Plain] .....*E. vivipara*
12 Horizontal rhizomes present.
14 Achenes not honeycomb-reticulate.
15 Bristles present; culms rounded; [of coastal, brackish soils].....*E. albida*
15 Bristles absent; culms strongly flattened; [of inland basic soils].....*E. compressa*
14 Achenes honeycomb-reticulate.
16 Achenes 1.2-1.7 mm long, at maturity normally with bristles.....*E. fallax {fallax* **phase***}*
16 Achenes 0.7-1.2 mm long, with or without bristles.
17 Mature achenes with bristles; achenes yellow or brown; culms 0.6-1.0 mm thick; [rare, on outer Coastal Plain of NC and SC].....*E. montevidensis*
17 Mature achenes without bristles (present when immature, but drop off); achenes olive (yellow in *E. elliptica*); culms slender-wiry, 0.2-0.4 mm wide (0.4-0.8 in *E. tenuis* var. *pseudoptera*); [collectively widespread].
18 Culms 6-8-angled; mature achenes yellow to orange, with prominent transverse bands ..... *E. elliptica*
18 Culms 4 (-5) angled; mature achenes olive, without transverse bands.
19 Culms 0.4-0.8 mm wide, prominently wing-angled; tubercle depressed.....*E. tenuis var. pseodoptera*
19 Culms 0.2-0.4 mm wide, angles not wing-like; tubercle broadly conic or depressed.
20 Tubercle broadly conic, about 1/4-1/5 as high as the achene body.....*E. tenuis var. tenuis*
20 Tubercle depressed, about 1/8 as high as the achene body.....*E. tenuis var. verrucosa*

Eleocharis acicularis (Linnaeus) Roemer & J.A. Schultes. Cp, Pd (GA, NC, SC, VA), Mt (NC, VA): marshes, ditches; uncommon. July-September. Greenland, Newfoundland, Nunavut, and AK south to GA, TX, CA; Mexico, Central America, n. South America, Eurasia. [= RAB, C, FNA, G, GW, K, S; > *E. acicularis* var. *acicularis* – F]

Eleocharis albida Torrey, White Spikerush. Cp (GA, NC, SC, VA): brackish pools; uncommon (GA Special Concern, VA Watch List). July-September. MD south to FL, west to TX and Mexico. [= RAB, C, F, FNA, G, GW, K, S]

Eleocharis atropurpurea (Retz.) J. & K. Presl. Cp (GA, NC, SC, VA*): clay-based Carolina bays, other pineland ponds, disturbed wetlands; rare (GA Special Concern, NC Watch List). Widely scattered in North America; Mexico, West Indies, Central America, South America, Asia, Africa. Reported for South Carolina by Hill & Horn (1997). [= C, F, FNA, G, GW, K, S]

Eleocharis baldwinii (Torrey) Chapman, Baldwin Spikerush. Cp (GA, NC, SC, VA), Pd (GA): bogs, pools, acid shores; uncommon (VA Rare). July-September. VA south to FL, west to AR and TX. [= RAB, C, FNA, GW, K; > *E. capillacea* Kunth – S, misapplied; > *E. prolifera* Torrey – S; > *E. baldwinii* – S]

Eleocharis brittonii Svenson ex Small. Cp (GA, NC, SC): bogs, pine savannas; common. NC south to FL, west to TX, north in the interior to TN and MO. [= F, FNA, K, S; < *E. microcarpa* Torrey – RAB, C, G, GW]

Eleocharis cellulosa Torrey. Cp (GA, NC, SC): fresh to brackish interdune swale ponds on barrier islands; rare (NC Rare). July-September. E. NC south to s. FL, west to TX and Mexico; also in the West Indies, Bermuda, and Central America (Nicaragua). See Gaddy & Rayner (1980) for the report of this species in SC. [= RAB, FNA, GW, K, S]

Eleocharis compressa Sullivant *var.* ***compressa***, Flattened Spikerush. Mt (GA, VA), Pd (VA): limestone glades and barrens; rare (GA Special Concern, VA Rare). Québec, MN, SD, and CO south to VA, nw. GA, AL, MS, AR, and KS. Var. *acutisquamata* (Buckley) S.G. Smith is midwestern. See Brown & Marcus (1998). In nw. GA (Jones & Coile 1988). [= F, FNA; < *E. compressa* – C, G, GW, K; *E. elliptica* – Harvill, misapplied]

Eleocharis confervoides (Poiret) G. Tucker. Cp (GA): submersed in lakes and ponds; rare. GA and FL; West Indies; Central and South America; Asia; Africa; n. Australia. This taxon, often segregated into the monotypic genus *Websteria*, is widely distributed in tropical and subtropical regions of both hemispheres. Its retention in *Eleocharis* is supported by a molecular phylogenetic study (Roalson & Friar 2000). [= *Websteria confervoides* (Poiret) S. Hooper – FNA, GW, K; = *Websteria submersa* (C. Wright) Britton – S; = *Scirpus confervoides* Poiret]

Eleocharis elongata Chapman. Cp (GA, NC): quiet waters of limesink (doline) ponds; rare (NC Rare). July-August. Se. NC south to FL, west to s. AL, s. MS, and TX (Sorrie & Leonard 1999); Jamaica, Mexico, Central America, South America. [= FNA, GW, K, S]

Eleocharis engelmannii Steudel, Engelmann Spikerush. Cp (NC, SC, VA), Pd (GA, NC, VA), Mt (VA): freshwater shores, marshes, disturbed wet places; (NC Watch List). July-September. MA, Ontario, and British Clumbia south to GA, TX, and CA. [= RAB, F, FNA, G, K, S]

Eleocharis equisetoides (Elliott) Torrey, Horsetail Spikerush. Cp (GA, NC, SC, VA): quiet waters of limesink (doline) ponds, natural lakes, borrow pits, ditches, artificial millponds; uncommon (NC Watch List, VA Rare). June-September. MA south to c. peninsular FL, west to se. TX; also near the Great Lakes from NY west to MI and MO. [= RAB, C, F, FNA, G, GW, K; < *E. equisetoides* – S]

Eleocharis erythropoda Steudel, Bald Spikerush. Mt (GA, NC, VA), Cp (NC, VA), Pd (VA): streambanks, marshes; rare (GA Special Concern, NC Watch List). July-September. Nova Scotia and AK south to NC, MS, TX, AZ, and OR. [= RAB, FNA, GW, K; < *E. palustris* – C; > *E. calva* Torrey – F, G, S, invalid name]

Eleocharis fallax Weatherby. Cp (GA, NC, SC, VA): fresh to brackish tidal marshes; rare (GA Special Concern). July-September. MA south to FL, west to TX. [= RAB, C, GW, K; > *E. fallax* – F, FNA, G; > *E. ambigens* Fernald – F, FNA, G]

Eleocharis flavescens (Poiret) Urban *var.* ***flavescens***. Cp (FL, GA, NC?, SC?, VA?): Coastal Plain ponds, pools; rare. June-September. VA (?) south to FL, west to se. OK and TX; also scattered in the Rocky Mountain states; West Indies; South America. [= K; < *E. flavescens* var. *flavescens* – C, FNA, G; < *E. flavescens* – RAB, F, GW]

Eleocharis geniculata (Linnaeus) Roemer & J.A. Schultes. Cp (SC), [GA?, NC?]: marshes; rare. July. Widespread but scattered across much of the United States; West Indies, Central America, South America, Asia, Africa. [= F, FNA, G, GW, K; > *E. caribaea* (Rottböll) S.F.Blake – RAB, C, S]

Eleocharis halophila (Fernald & Brackett) Fernald. Cp (NC, VA): brackish marshes; rare (NC Threatened, VA Rare). July. Newfoundland to NC, along the coast. [= RAB, F, G, K; < *E. palustris* – C; < *E. uniglumis* (Link) Schultes – FNA; = *E. uniglumis* var. *halophila* Fernald & Brackett]

Eleocharis intermedia J.A. Schultes, Matted Spikerush. Mt (VA): muddy calcareous seepage areas; rare (VA Rare). Nova Scotia west to MN, south to VA, TN, and IL. The fruiting culms are of widely different lengths, the lowermost sprawling and much shorter than the longer. [= C, F, FNA, G, K]

Eleocharis melanocarpa Torrey, Black-fruited Spikerush. Cp (GA, NC, SC, VA), Mt (VA): Coastal Plain ponds, cypress meadows, sinkhole ponds in the Shenandoah Valley; uncommon (NC Watch List, VA Rare). July-September. MA south to FL, west to s. MS; disjunct in e. TX, s. MI, and n. IN (Sorrie & Leonard 1999). [= RAB, C, F, FNA, G, GW, K, S]

Eleocharis microcarpa Torrey *var.* ***filiculmis*** Torrey. Cp (NC, SC, VA): bogs, wet pine savannas; common. June-September. MA and MI south to FL west to TX. [= F, FNA; < *E. microcarpa* – RAB, C, G, GW, K; = *E. torreyana* Boeckeler – S]

Eleocharis microcarpa Torrey *var.* ***microcarpa***. Cp (SC): wet pine savannas, Coastal Plain bogs; rare. June-September. SC south to FL, west to LA; West Indies. [= F, FNA; < *E. microcarpa* – RAB, C, G, GW, K; = *E. microcarpa* – S S]

Eleocharis montevidensis Kunth, Sand Spikerush. Cp (GA, NC, SC): maritime wet grasslands; rare (GA Special Concern, NC Rare). July-September. E. NC south to FL, west to TX and CA; Mexico, South America. Reported for SC by Nelson & Kelly (1997). [= RAB, FNA, GW, K]

Eleocharis nigrescens (Nees) Steudel. Cp (SC): pond margins, flatwoods; rare. SC to FL; West Indies, Mexico; South America; Africa. [= FNA, GW, K; ? *E. setifolia* (A. Richard) Raynal; < *E. microcarpa* – RAB; ? *E. carolina* Small – S]

Eleocharis obtusa (Willdenow) J.A. Schultes. Cp, Pd, Mt (GA, NC, SC, VA): ditches, marshes, disturbed wet areas; common. June-October. Nova Scotia west to British Columbia, south to FL, TX, and CA. [= FNA, G, GW, K, S; < *E. ovata* – RAB, C; > *E. obtusa* var. *obtusa* – F; > *E. obtusa* var. *ellipsoidalis* Fernald – F; > *E. obtusa* var. *jejuna* Fernald – F]

Eleocharis olivacea Torrey *var.* ***olivacea***. Cp (GA, NC, SC, VA): Coastal Plain ponds, pools; uncommon. June-September. Nova Scotia west to MN, south to FL and TX. [= K; < *E. flavescens* – RAB; < *E. flavescens* (Poiret) Urban var. *olivacea* (Torrey) Gleason – C, FNA, G; < *E. olivacea* – F, GW, S; ? *E. flaccida* (Reichenbach) Urban – S]

Eleocharis palustris (Linnaeus) Roemer & J.A. Schultes, Small's Spikerush. Mt (NC), Pd, Cp (VA), {SC}: marshes; rare (NC Watch List, VA Watch List). July. Labrador west to AK, south to FL, TX, CA, and Mexico; Eurasia. As discussed by Smith et al. in FNA (2002b), variable in geographically correlated ways and probably warranting recognition of varieties or segregate species. *E. smallii* is sometimes separated as the eastern North American member of the north temperate *E. palustris* complex. [= FNA, G, K; < *E. palustris* – RAB, C; > *E. smallii* Britton – F; > *E. palustris* var. *palustris* – F; > *E. palustris* var. *major* Sonder – F]

Eleocharis parvula (Roemer & J.A. Schultes) Link ex Bluff, Nees, & Schauer, Little-spike Spikerush. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (VA): tidal brackish and freshwater marshes, shallow waters of managed impoundments; rare (NC Watch List). July-September. Nova Scotia, Newfoundland, and MI south to FL and LA; British Columbia south to CA; Mexico, Central America, South America, Eurasia, Africa. [= RAB, FNA, G, GW, K; = *E. parvula* var. *parvula* – C, F]

Eleocharis quadrangulata (Michaux) Roemer & J.A. Schultes. Cp, Mt, Pd (GA, NC, SC, VA): pools, marshes; uncommon. June-September. MA west to Ontario and MI, south to n. FL and TX. [= RAB, C, FNA, GW, K, S; > *E. quadrangulata* var. *quadrangulata* – F, G; > *E. quadrangulata* var. *crassior* Fernald – F, G]

Eleocharis radicans (A. Dietrich) Kunth, Rooting Spikerush. Cp (VA): {habitat}; rare (VA Rare). Widely scattered in North America; n. Mexico, West Indies, Central America, South America. [= C, F, FNA, G, GW, K]

Eleocharis robbinsii Oakes, Robbins Spikerush. Cp (GA, NC, SC, VA), Mt (VA): quiet waters of limesink (doline) ponds, natural lakes; rare (NC Rare, VA Rare). July-August. Nova Scotia and New Brunswick west to Ontario, south to s. MS (Sorrie & Leonard 1999); also near the Great Lakes, from NY west to IN, WI, and MN. [= RAB, C, F, FNA, G, GW, K, S]

Eleocharis rostellata (Torrey) Torrey, Beaked Spikerush. Cp (NC, VA), {GA?, SC}: brackish and freshwater tidal marshes; rare (NC Rare, VA Watch List). July-September. ME, Ontario, and British Columbia south to FL, TX, CA and Mexico; West Indies. [= RAB, C, F, FNA, G, GW, K]

Eleocharis tenuis (Willdenow) J.A. Schultes *var.* ***pseudoptera*** (Weatherby ex Svenson) Svenson. {NC, VA}: bogs; rare. June-September. Nova Scotia, Québec and IN south to NC, GA, and LA. [= C, F, FNA, G, K; < *E. tenuis* – RAB; = *E. elliptica* Kunth var. *pseudoptera* (Weatherby ex Svenson) L. Harms; < *E. capitata* (Linnaeus) R. Brown – S]

Eleocharis tenuis (Willdenow) J.A. Schultes *var.* ***tenuis***. {GA, NC, SC, VA}: bogs; uncommon. June-September. Nova Scotia and Québec south to SC and LA. [= C, F, FNA, G, K; < *E. tenuis* – RAB; < *E. capitata* (Linnaeus) R. Brown – S]

Eleocharis tenuis (Willdenow) J.A. Schultes *var.* ***verrucosa*** (Svenson) Svenson. Cp, Pd (GA, SC, VA): bogs; uncommon, rare in Piedmont (GA Special Concern, VA Watch List). June-September. PA, WI, and SD south to GA, LA, TX. [= C, F, FNA, G, K; = *E. verrucosa* (Svenson) E. Harms – GW; < *E. capitata* (Linnaeus) R. Brown – S]

Eleocharis tortilis (Link) J.A. Schultes, Twisted Spikerush. Cp (GA, NC, SC, VA): wet pine savannas, Coastal Plain seepage bogs, seeps, pocosin ecotones; common. July-September. NJ south to FL, west to TX, inland to TN and AR. [= RAB, C, F, FNA, G, GW, K]

Eleocharis tricostata Torrey, Three-angle Spikerush. Cp (GA, NC, SC, VA), Pd (NC): wet pine savannas, bogs; uncommon (NC Watch List, VA Rare). July-September. MA, NY, and MI south to FL and AL. [= RAB, C, F, FNA, G, GW, K, S]

Eleocharis tuberculosa (Michaux) Roemer & J.A. Schultes. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC, VA): bogs, savannas, ditches; common (rare in Piedmont and Mountains). June-September. Nova Scotia south to FL, west to TX. [= RAB, C, F, FNA, G, GW, K; > *E. simplex* (Elliott) A. Dietrich – S; > *E. tuberculosa* – S]

Eleocharis vivipara Link, Viviparous Spikerush. Cp (GA, NC, SC, VA): Coastal Plain ponds; rare (NC Watch List, VA Rare). July-September. NC south to FL, west to LA. [= RAB, C, F, FNA, GW, K, S; > *E. vivipara* – S; > *E. curtisii* Small]

Eleocharis aestuum Hines ex A. Haines. Freshwater tidal rivers. ME south to DE, PA, and NJ. [= FNA]

Eleocharis bicolor Chapman. GA west to LA; West Indies; Nicaragua. [= FNA, K, S]

Eleocharis bifida S.G. Smith, Cedar Glade Spikerush. Mt (GA): seasonally wet seepage in limestone cedar glades; rare. KY south through TN to nw. GA and n. AL. [= FNA; < *E. compressa* of many earlier authors] {not yet keyed; synonymy incomplete}

Eleocharis elliptica Kunth. Calcareous prairies, fens, shores. Labrador west to British Columbia, south to PA, NJ, WV, TN, IA, and ID. [= F, FNA, K; = *E. tenuis* (Willdenow) J.A. Schultes var. *borealis* (Svenson) Gleason – C, G]

Eleocharis interstincta (Vahl) Roemer & J.A. Schultes. ponds. AL and FL west interruptedly to OK and TX; Mexico, Central America, e. South America. [= FNA, GW, K; < *E. equisetoides* – S]

Eleocharis lanceolata Fernald. MO and KS south to LA and TX; disjunct in nc. TN. [= FNA, K]

Eleocharis macrostachya Britton. Québec to AK south to AL, MS, TX, CA, and Mexico; South America. [= FNA, K] {not yet keyed; add to synonymy}

Eleocharis minima Kunth. {GA}. MD, FL, TX; West Indies, Central America, South America, Asia, Australia (FNA). Reported from specimens from sc. GA (Sorrie, pers. comm.). [= FNA, K; *E. uncialis* Chapman – S]

Eleocharis montana (Kunth) Roemer & J.A. Schultes. Cp (GA): {habitat}; rare. Sw. GA west to TX, south to Mexico, Central America, and South America; West Indies. [= FNA, K; > *E. nodulosa* (Roth) Schultes – S; > *E. montana* var. *nodulosa* (Roth) Svenson] {not yet keyed}

Eleocharis olivacea Torrey var. *reductiseta* (Schuyler & Ferren) Schuyler & Ferren. Tidal rivers. Endemic to s. NJ (as far as is known). [= K; < *E. flavescens* (Poiret) Urban var. *olivacea* (Torrey) Gleason – C, FNA, G; < *E. olivacea* – F]

Eleocharis ovata (Roth) Roemer & J.A. Schultes. {VA} Labrador, Ontario, and MN south to NJ, MD, DE, PA, VA, KY, MO, and OK; scattered in w. United States. Reported for VA in FNA; documentation needing verification. [= F, FNA, G, K; < *E. ovata* – C] {keyed}

Eleocharis wolfii (A. Gray) A. Gray ex Britton. Pd (GA): shallow ephemeral pools on granitic flatrocks; rare (GA Special Concern). OH, WI, MN, and ND south to GA, AL, TN, LA, and TX. [= F, FNA, G, K]

subgenus *Eleocharis*
section *Eleochari*
series *Eleocharis*

subseries *Eleocharis*: erythropoda, fallax, halophila, palustris, smallii
subseries *Truncatae*: compressa, elliptica, intermedia, montevidensis, tenuis, tricostata, verrucosa
series *Albidae*: albida
series *Melanocarpae*: melanocarpa
series *Rostellatae*: rostellata
series *Tenuissimae*
subseries *Chaetariae*: baldwinii, brittonii, microcarpa, nigrescens, setifolia, tortilis, tuberculosa, vivipara
section *Eleogenus*
series *Ovatae*: engelmannii, obtusa, ovata
series *Maculosae*
subseries *Ocreatae*: flavescens, olivacea
subseries *Rigidae*: atropurpurea, geniculata
section *Parvulae*: parvula
subgenus *Limnochloa*
section *Limnochloa*: cellulosa, elongata, equisetoides, quadrangulata, robbinsii
subgenus *Scirpidium*
section *Scirpidium*: acicularis, radicans

Eriophorum Linnaeus (Cottongrass, Cottonsedge, Bogwool)

A genus of about 20 species, herbs, primarily north temperate, boreal, and arctic. References: Ball & Wujek in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Foliaceous bracts (subtending the head of spikelets) 2 or 3, spreading, the inflorescence therefore appearing terminal.
  2 Blade of the uppermost leaf on the stem much shorter than its sheath ..... ***[E. gracile]***
  2 Blade of the uppermost leaf on the stem as long as the sheath or longer ..... ***[E. tenellum]***
1 Foliaceous bract (subtending the head of spikelets) solitary, erect, appearing as a continuation of the culm and the inflorescence therefore appearing lateral.
  3 Scales (subtending the flower) prominently 3-7-nerved ..... ***E. virginicum***
  3 Scales (subtending the flower) 1-nerved ..... ***[E. viridicarinatum]***

Eriophorum virginicum Linnaeus, Tawny Cottongrass. Cp, Mt (GA, NC, SC, VA), Pd (NC, SC, VA): peaty sites, limited in habitat throughout the region, occurring in the Mountains in bogs and fens, in the Piedmont (formerly) in bogs, in the fall-line sandhills in burned-out pocosins, in the Coastal Plain in pocosins, acidic seeps, and peat-burn pools; rare (GA Special Concern, NC Watch List, VA Watch List). July-September. Labrador and Newfoundland west to Ontario and MN, south to se. NC, sw. NC, e. KY; disjunct in se. GA at Okefenokee Swamp. Very variable in size, from 5-15 dm tall, with heads ranging from 1-6 cm in diameter, the larger plants primarily in the Coastal Plain and the smaller in the Mountains. [= RAB, C, F, FNA, G, GW, K, S, W]

Eriophorum angustifolium Honckeny ssp. *scabriusculum* Hultén is erroneously attributed to NC and TN by Kartesz (1999). [= K] {not keyed; synonymy incomplete}

Eriophorum gracile W.D.J. Koch ex Roth, Slender Cottongrass, south to s. PA (Rhoads & Klein 1993), NJ, w. MD (C. Frye, pers comm. 2000), and DE (Kartesz 1999). [= C, FNA; *E. gracile* var. *gracile* – K] {synonymy incomplete}

Eriophorum tenellum Nuttall, Conifer Cottongrass, south to se. PA (Rhoads & Klein 1993) and NJ (Kartesz 1999). [= C, FNA, K] {synonymy incomplete}

Eriophorum vaginatum Linnaeus, south to PA and NJ (Ball & Wujek in FNA 2002b). [= FNA; > *Eriophorum vaginatum* Linnaeus var. *spissum* (Fernald) Boivin – K] {not yet keyed; synonymy incomplete}

Eriophorum viridicarinatum (Engelmann) Fernald, Darkscale Cottongrass, is seemingly indicated for our area by S; no documentation for this distribution is known. It does range south to e. and w. PA (Rhoads & Klein 1993) and NJ (Kartesz 1999). [= C, FNA, K] {synonymy incomplete}

Fimbristylis Vahl 1806 (Fimbry)

A genus of about 250-300 species, herbs, primarily warm temperate and tropical. References: Kral (1971)=Z; Kral in FNA (2002b); GW; Goetghebeur in Kubitzki (1998b). Key largely adapted from Z.

1 Style branches 3; achene trigonous or terete; plant an annual.
  2 Achene trigonous; spikelets linear-oblong to lanceolate, 3-7 mm long; ligule present, as a line of short, pale hairs ..... ***F. autumnalis***
  2 Achene terete; spikelets subglobose to ovoid, 2-4 mm long; ligule absent ..... ***F. littoralis***
1 Style branches 2; achene lenticular or terete; plant an annual or perennial.
  3 Plants diminutive annuals, the culms 1-6 (-15) cm tall.
    4 Achene cylindrical, 2-4× as long as wide, curved like a tiny banana; inflorescence bracts 1-2 cm long ..... ***F. perpusilla***
    4 Achene obovate, 1-1.5× as long as wide, not curved; inflorescence bracts 4-10 cm long ..... ***F. vahlii***
  3 Plants small to large annuals or perennials, the culms (6-) 15-150 cm tall.
    5 Plant a medium-sized to robust perennial, the culms generally 5-15 dm tall, either cespitose, with a hardened base, and deeply set in the substrate, or rhizomatous, the rhizomes either slender or thick
      6 Plant cespitose, lacking rhizomes; bases of leaves hard, leathery, dark brown, deeply set in the substrate, the base of the plant generally 5-15 cm below the ground surface; achene (1.3-) 1.5-2 mm long ..... ***F. castanea***

6 Plant rhizomatous, the rhizomes either thick and knotty or slender and scaly (rarely with both); bases of leaves often somewhat thickened, hardened, and brownish, the base of the plant not especially deeply set; achene 0.8-1.2 (-1.3) mm long.
  7 Plant a robust perennial to 15 (-20) dm tall, with elongate, slender, scaly, pale-to-reddish rhizomes (excavate carefully); leaves usually flat or keeled, 2-5 mm wide; stem usually flattened and scabrous-edged above; ligule a line of short, pale hairs ..... ***F. caroliniana***
  7 Plant a medium-sized perennial to 10 dm tall, rhizomatous, the rhizomes short, thick, and knotty (rarely also with slender rhizomes); leaves usually involute, ca. 1 mm wide; stem usually terete or oval in cross-section, smooth; ligule absent or poorly developed..... ***F. puberula var. puberula***
5 Plant a small to medium-sized annual or perennial, the culms to 8 dm tall, neither rhizomatous (except *F. brevivaginata*) nor with a hardened base deeply set in the substrate.
  8 Spikelets pale, usually solitary (-3) on the scape (and thus appearing somewhat like an *Eleocharis*) ..... ***F. schoenoides***
  8 Spikelets dark, usually in a complex inflorescence.
    9 Face (one side) of the achene with 15 or more longitudinal rows of rounded pits, the achene margin noticeably paler. ***F. tomentosa***
    9 Face (one side) of the achene with 13 or fewer longitudinal rows of rectangular pits, the achene margin not noticeably paler.
      10 Plant a perennial; leaves spreading, 2-5 mm wide; achenes lacking warts.
        11 Plant bulbous at base, and also with scale-covered short rhizomes; spikelet scales glabrous or puberulent; [plant a rare native of rock outcrops in GA and AL] ..... ***F. brevivaginata***
        11 Plant neither bulbous nor rhizomatous; spikelet scales glabrous; [plant weedy, probably introduced in North America] ..... ***F. dichotoma***
      10 Plant an annual; leaves spreading or ascending, 1-4 mm wide; achenes with or without warts.
        12 Achenes lacking warts or with warts scattered over the entire surface; primary rays of umbel spreading or ascending, the inflorescence generally longer than broad; leaves relatively soft ..... ***F. annua***
        12 Achenes with a few low warts on the edges; primary rays of umbel stiffly spreading (even deflexed), the inflorescence therefore often as broad as long or broader; leaves relatively hard, broad (averaging 2 mm wide), and spreading subdistichously ..... ***F. decipiens***

*? ***Fimbristylis annua*** (Allioni) Roemer & J.A. Schultes. Pd, Cp (GA, NC, SC, VA), Mt (NC, SC, VA): wet, disturbed areas, thin soils of rock outcrops; common, variously interpreted as entirely alien or partly native. July-September. Ranging north to VA and MO. [= C, FNA, G, GW, K, W, Z; < *F. dichotoma* – RAB; ? *F. baldwiniana* (J.A. Schultes) Torrey – F, S]

Fimbristylis autumnalis (Linnaeus) Roemer & J.A. Schultes. Cp, Pd, Mt (GA, NC, SC, VA): moist to wet disturbed areas; common. August-October. Throughout e. North America, from ME west to MN and SD and south to s. FL and TX; also widespread in the Old World and New World tropics. [= RAB, C, FNA, G, GW, K, W, Z; > *F. autumnalis* var. *autumnalis* – F; > *F. autumnalis* var. *mucronulata* (Michaux) Fernald – F; > *F. autumnalis* – S; > *F. geminata* (Nees) Kunth – S]

Fimbristylis brevivaginata Kral, Flatrock Fimbry. Pd (GA): pools and seepage over granite; rare (GA Special Concern). Also in the Cumberland Plateau of AL, on sandstone (Kral 1992). See Kral (1992) for details. [= FNA, K]

Fimbristylis caroliniana (Lamarck) Fernald. Cp (GA, NC, SC, VA): brackish or alkaline sands of marsh edges and dune swales, less typically in savannas or pine flatwoods; common (VA Watch List). July-September. NJ south to s. FL and west and south to TX and the Yucatan Peninsula. This species often grows in proximity to *F. castanea*, which, however, occupies the brackish marsh itself. [= C, F, FNA, G, GW, K, Z; < *F. spadicea* (Linnaeus) Vahl – RAB; ? *F. harperi* Britton ex Small – S]

Fimbristylis castanea (Michaux) Vahl. Cp (GA, NC, SC, VA): brackish marshes and dune swales; common. July-September. NY (Long Island) south to s. TX and adjacent Mexico, and on the Yucatan peninsula and in the West Indies. Replaced southward (as in the West Indies and Central America by the closely related *F. spadicea* (Linnaeus) Vahl. [= C, F, FNA, G, GW, K, S, Z; < *F. spadicea* (Linnaeus) Vahl – RAB]

*? ***Fimbristylis decipiens*** Kral. Cp (GA, NC), Pd (GA): wet, disturbed areas; rare, possibly introduced. July-September. E. NC south to n. FL and west to e. TX. [= FNA, GW, K, Z]

* ***Fimbristylis dichotoma*** (Linnaeus) Vahl. Cp (GA, NC, SC, VA), Pd (GA): wet, disturbed areas; rare, presumably introduced. July-September. Ranging north to VA. [= FNA, GW, K, Z; < *F. dichotoma* – RAB (also see *F. annua* and *F. tomentosa*); ? *F. diphylla* (Retzius) Vahl – S]

* ***Fimbristylis littoralis*** Gaudichaud. Cp, Pd (GA, NC, SC), Mt (NC, SC): disturbed wet ground; common, native of Asia. July-September. Kral (1971) suggests that it may have been introduced into se. United States early, in association with rice. In North America, now ranging from Central America and the West Indies north to NC, KY, and AR. The name F. miliacea has been rejected as a nomen ambiguum (Brummitt 2005). [= K; = *F. miliacea* (Linnaeus) Vahl – RAB, C, FNA, GW, S, W, Z, misapplied?]

Fimbristylis perpusilla R.M. Harper ex Small & Britton, Harper's Fimbry. Cp (GA, NC, SC, VA): drawdown zones of natural depression ponds or exposed banks of blackwater rivers; rare (GA Endangered, NC Rare, SC Rare, VA Endangered). July-September. The "range" consists of geographically scattered and "irregularly apparent" populations, usually on the drawdown zones of natural ponds or rivers, in the Coastal Plain from DE and e. MD south through e. VA, se. NC, and ne. SC, to sw. GA, and disjunct in the Cumberland Plateau of se. TN, where associated with other Coastal Plain species (Wofford & Jones 1988). See Leonard (1981a, 1981b, 1987) for the first reports of the species in SC and NC. The species characteristically occurs on dry to moist banks exposed in summer by falling water levels, often with other diminutive annuals, such as *Hemicarpha micrantha*, *Oldenlandia uniflora*, *Juncus repens*, *Lindernia dubia*, *Eleocharis baldwinii*, and *Eragrostis hypnoides*. At known locations it does not appear every year; presumably it is present in a seedbank which germinates only under favorable hydrologic (and other?) conditions. [= C, FNA, GW, K, S, Z]

Fimbristylis puberula (Michaux) Vahl *var.* ***puberula***. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): savannas, pine flatwoods, bogs, wet meadows or prairie-like areas, granite outcrops; common (VA Rare). July-September. Var. *puberula* ranges from Long Island, NY south to s. FL and west to TX, KS, and NE; var. *interior* (Britton) Kral ranges from NE south to TX and west to NM and AZ. [= C, FNA, K, Z; < *F. spadicea* (Linnaeus) Vahl – RAB, W; ? *F. drummondii* (Torrey & Hooker) Böckler – F; > *F. puberula* – GW, S; > *F. anomala* Böckler – S]

* ***Fimbristylis schoenoides*** (Retzius) Vahl, an Asian introduction. Cp (GA, NC): disturbed wetlands; uncommon, native of Asia. Reported for sw. GA (Jones & Coile 1988) and also occurs in se. GA (B. Sorrie, pers. comm.). Also recently reported for Ocracoke Island, Hyde County (R. LeBlond, pers. comm., 2005). [= FNA, GW, K]

* ***Fimbristylis tomentosa*** Vahl. Cp (GA, NC, SC), Mt, Pd (NC, SC): wet, disturbed areas; uncommon, presumably introduced. July-September. Ranging north to NC, e. TN, and AR. [= FNA, GW, K, Z; < *F. dichotoma* – RAB]

Fimbristylis vahlii (Lamarck) Link. Cp (GA, SC?): on exposed silty or clayey sediments; rare (SC Rare). July. Primarily from MO south to MS and e. TX, but with scattered outliers as far away as NJ, SC (?), IL, and KS; also in western United States, Mexico, Central America. Note that the basis of the SC record is uncertain, and may be based on a misidentification of *F. perpusilla*. [= RAB, C, F, FNA, G, GW, K, S, Z]

Fuirena Rottbøll (Umbrella-sedge)

A genus of about 30 species, herbs, primarily in Africa and America, in tropical and warm temperate regions. References: Kral (1978a)=Z; Kral in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Sheaths of leaves glabrous, the largest leaf blades 0-2 (-5) cm long; plant strongly rhizomatous, the culms usually about 10 cm apart.
  2 Blades of culm leaves <5 cm long; spikelets mostly lance-ovoid, sessile in terminal clusters and also often with additional sessile or peduncled clusters lower on the culm; involucrral bract longer than the spikelets ..... ***F. longa***
  2 Blades of culm leaves very short (< 0.5 cm long); spikelets mostly ovoid, sessile in terminal clusters; subtending involucral bract shorter than the spikelets ..... ***F. scirpoidea***
1 Sheaths of leaves sparsely to densely hirsute, the largest leaf blades 10-15 cm long; plant more-or-less cespitose, annual or perennial, if perennial the rhizomes short and cormlike, the culms usually arising together.
  3 Perianth bristles no longer than the achene stipe (not nearly reaching halfway up the achene body), without barbs (sometimes very finely toothed, the teeth ascending); blades of the perianth scales with a blunt or short-apiculate apex ..... ***F. breviseta***
  3 Perianth bristles longer than the achene stipe, reaching the middle of or exceeding the achene body, strongly and retrorsely barbed; blades of the perianth scales with an acuminate to awned apex.
    4 Perianth bristles as long as or exceeding the achene body; anthers about 0.5 mm long; blades of the perianth scales mostly awned; annual ..... ***F. pumila***
    4 Perianth bristles reaching 1/2 to 3/4 the length of the achene body; anthers about 1.0 mm long; blades of the perianth scales mostly acuminate; perennial ..... ***F. squarrosa***

Fuirena breviseta (Coville) Coville in R.M. Harper, Short-bristled Umbrella-sedge. July-October. Cp (GA, NC, SC, VA): savannas, ditches, other wet habitats; common (VA Rare). A Southeastern Coastal Plain endemic: se. VA south to s. FL and west to e. TX, primarily in the outer Coastal Plain. [= C, F, FNA, G, GW, K, S, Z; < *F. squarrosa* – RAB]

Fuirena longa Chapman, Chapman's Umbrella-sedge. Cp (GA): pond margins; rare, possibly introduced (GA Special Concern). Panhandle FL and sw. GA west to e. TX. Possibly a hybrid derivative of *F. breviseta* and *F. scirpoidea*. [= FNA, GW, K, S, Z]

Fuirena pumila (Torrey) Sprengel, Dwarf Umbrella-sedge. Cp (GA, NC, SC, VA): savannas, ditches, other wet habitats; common. July-October. Primarily a species of the Southeastern Coastal Plain, ranging from se. MA south to s. FL and west to TX, and also disjunct in the lowlands around the Great Lakes (as in n. IN and s. MI). [= RAB, C, F, FNA, G, GW, K, Z; = *F. squarrosa* – S, misapplied]

Fuirena scirpoidea Michaux, Southern Umbrella-sedge. Cp (GA, NC?): natural lakes, pineland depression ponds, wet savannas; rare (GA Special Concern, NC Watch List). July-October. A Southeastern Coastal Plain endemic: se. GA (Jones & Coile 1988) and FL, west to se. TX, also in Cuba and apparently disjunct (or introduced?) in ne. NC and s. IL. Kral's (1978a) report of this species from ne. NC, where disjunct from the main body of the range in the deep South, needs further investigation. [= C, FNA, G, GW, K, S, Z]

Fuirena squarrosa Michaux, Hairy Umbrella-sedge. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC): savannas, seepages, ditches, bogs, other wet habitats; common. July-October. NY (Long Island) south to n. FL, west to c. TX, inland to w. NC, w. TN, KY, s. AR, and se. OK, mainly on the Coastal Plain, but less strictly limited to it than our other species. [= C, F, FNA, G, GW, K, W, Z; < *F. squarrosa* – RAB (also see *F. breviseta*); = *F. hispida* Elliott – S]

Isolepis R. Brown (Club-rush)

A genus of about 60 species, herbs, subcosmopolitan in distribution. Since *Isolepis* is more closely related to *Cyperus* than to *Scirpus*, in which it has often been included, its separation from *Scirpus* is clearly warranted. The generic delimitation of *Isolepis* in relation to *Ficinia* and *Scirpoides* is uncertain. References: Smith in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Achenes 1.0-1.5 mm long; scales in middle of spikelet 1.8-2.0 mm long, with a short awn ..... ***I. carinata***
1 Achenes 0.7-0.9 mm long; scales in middle of spikelet 1.0-1.2 mm long, mucronate ..... ***I. pseudosetacea***

Isolepis carinata Hooker & Arnott ex Torrey. Pd (GA, NC, SC), Cp (NC, VA): moist soils adjacent to granitic flatrocks, moist sandy sites, low fields; rare (VA Watch List). May-June. C. NC, TN, and se. KS south to panhandle FL and c. TX; also in CA. [= FNA, K; = *Scirpus koilolepis* (Steudel) Gleason – RAB, C, F, G, GW; = *Sc. carinatus* (Hooker & Arnott ex Torrey) A. Gray – S (not *S. carinatus* Sm.); = *I. koilolepis* Steudel]

Isolepis pseudosetacea (Daveau) Gandoger. Cp? (GA): moist soils; rare. E. GA west to sw. MO, AR, and c. TX. This species often grows intermixed with *I. carinata* and may be more widespread in our area. [= FNA; ? *Isolepis molesta* (M.C. Johnston) S.G. Smith – K; ? *Scirpus molestus* M.C. Johnston]

Kyllinga Rottbøll (Greenhead Sedge)

A genus of about 60 species, pantropical to warm temperate, especially in Africa. References: Delahoussaye & Thieret (1967)=Z; Tucker (1987)=Y; Tucker (1984)=X; Tucker in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Plant a rhizomatous perennial, mat-forming, the culms arising singly along the rhizome; anthers 0.8-1.1 mm long.
  2 Achene 1.0-1.2 (-1.3) mm long; scale keel denticulate or smooth; stamen 2 (rarely 1); longest inflorescence bract erect ..... ***K. brevifolia***
  2 Achene 1.5-1.8 mm long; scale keel smooth; stamens 2-3; longest inflorescence bract horizontal to slightly reflexed..... ***K. gracillima***
1 Plant a cespitose annual or perennial, the culms arising clumped; anthers 0.2-0.5 mm long.
  3 Mature achene purple black, with stipe and apiculus contrastingly light in color; achene obovate, 0.7-0.8 (-0.9) mm wide; scale keel denticulate or smooth..... ***K. odorata***
  3 Mature achene uniformly tan or light brown, not bicolored; achene oblong, 0.4-0.6 (-0.7) mm wide; scale keel denticulate (very rarely smooth)..... ***K. pumila***

Kyllinga brevifolia Rottbøll, Perennial Greenhead Sedge. Pd (GA, NC, SC, VA?): moist soils of fields, ditches, lawns; rare. June-September. Pantropical, north in North America to n. NC, se. OK, and CA. Likely to occur in s. VA. [= FNA, K, S, X, Y; = *Cyperus brevifolius* – RAB, GW, Z; < *Cyperus brevifolius* (Rottbøll) Endlicher & Hasskarl – F, G]

*? ***Kyllinga gracillima*** Miquel, Asiatic Greenhead Sedge. Cp (GA, NC, SC, VA), Pd (NC), Mt (NC, VA): river sand bars, tidal marshes, tidal shores, moist soils of pastures and ditches; rare. See Bryson et al. (1996). *K. gracillima* Miquel (1866) appears to be the oldest valid combination in the genus *Kyllinga*, predating *K. brevifolioides* (Thieret & Delahoussaye) Tucker (1987). Some authors consider this taxon to be introduced from e. Asia; others consider it possibly native. Its distribution in North America is still somewhat obscure (because of confusion with *C. brevifolia*), but it is currently known from scattered locations in NC, SC, VA, CT, PA, MD, TN, AL, GA, NJ, DE, AR, MS, and KY. Reported for South Carolina by Hill & Horn (1997), as *K. brevifolioides*. [= FNA, K; > *Cyperus brevifolioides* Thieret & Delahoussaye – RAB, C, GW, W, Z; < *C. brevifolius* (Rottbøll) Endlicher & Hasskarl – F; > *K. brevifolioides* (Thieret & Delahoussaye) Tucker – Y]

Kyllinga odorata Vahl, Whitehead Sedge. Cp (GA, NC, SC): moist soils of fields, ditches, lawns, shores of ponds and rivers, sand and gravel bars; common. July-September. Pantropical, north in North America to ne. NC and se. AR. Likely to occur in se. VA. [= K, S, X, Y; = *Cyperus sesquiflorus* (Torrey) Mattfeld & Kükenthal ex Kükenthal – RAB, C, GW, Z]

Kyllinga pumila Michaux, Annual Greenhead Sedge. Cp, Pd, Mt (GA, NC, SC, VA): moist soils of fields, ditches, lawns, shores of ponds and rivers; common. July-October. Pantropical, north in North America to e. PA, MO, and e. KS. [= K, S, X, Y; = *Cyperus tenuifolius* (Steudel) Dandy – RAB, C, F, G, GW, W, Z]

Lipocarpha R. Brown

A genus of about 35 species, herbs, pantropical and extending into warm temperate regions. Several recent authors have advocated submerging *Hemicarpha* in *Lipocarpha*, including Tucker (1987). References: Tucker (1987)=Z; Tucker in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Spikes 2.5-12 mm long; anther 0.5 mm long; stigmas 3 ..... ***L. maculata***
1 Spikes 2-5 (-8) mm long; anther 0.1-0.25 mm long; stigmas 2.
  2 Scales about as long as the achene, with long awns..... ***L. aristulata***
  2 Scales reduced, shorter than the achene, awnless ..... ***L. micrantha***

*? ***Lipocarpha aristulata*** (Coville) G. Tucker. Cp (SC): moist ground; rare. Se. SC south to FL, west to the mw. and w. United States; the eastern occurrences may be adventive. [= FNA, K, Z; = *Hemicarpha aristulata* (Coville) Smyth – F, GW; = *H. micrantha* var. *aristulata* Coville – C, G]

Lipocarpha maculata (Michaux) Torrey, American Lipocarpha. Cp (GA, NC, SC, VA): ditches, moist exposed soil; uncommon (VA Rare). July-September. Se. VA south to s. FL, west to AL. [= RAB, C, F, FNA, G, GW, K, S, Z]

Lipocarpha micrantha (Vahl) G. Tucker. Cp (NC, SC, VA), Pd (SC, VA), {GA}: riverbank draw-down zones, other moist sandy areas; rare (SC Rare, NC Rare, VA Rare). July-August. ME west to Ontario and MN, south to s. FL and TX; south into tropical America. [= FNA, K, Z; = *Hemicarpha micrantha* (Vahl) Pax – RAB, F, GW, S; = *H. micrantha* var. *micrantha* – C; = *H. micrantha* var. *minor* (Schrader) Friedland – G]

Oxycaryum Nees

A monotypic genus of tropical and subtropical America and Africa. References: Bruhl in FNA (2002b).

* ***Oxycaryum cubense*** (Poeppig & Kunth) Lye, Cuban Bulrush. Cp (GA): swamps, marshes, ponds, ditches; uncommon, aggressively weedy, probably adventive from the New World tropics. See Bryson et al. (1996). [= FNA, K; = *Scirpus cubensis* Poeppig & Kunth – GW, S]. {not yet keyed}

Rhynchospora Vahl 1805 (Beaksedge, Beakrush)
(by Richard J. LeBlond)

A genus of about 250 species, subcosmopolitan, but concentrated in tropical and warm temperate America. See Thomas (1984) for the reasons for the inclusion of *Dichromena* in *Rhynchospora*. References: Gale (1944)=Z; Kral in FNA (2002b); Kral (1996, 1999); Goetghebeur in Kubitzki (1998b). Distributions given for tropical America are largely derived from Thomas (1992).

Identification notes: measurements and descriptions of the achene are of the achene body only, *not* including the tubercle, unless otherwise indicated.

Key to groups

1 Tubercles 3-23 mm long ..... **Key A**
1 Tubercles < 3 mm long.
  2 Inflorescence bracts several, foliaceous, basally bright white, reflexed to horizontally spreading ..... **Key B**
  2 Inflorescence bracts 0-several, capillary to foliaceous, green throughout (straminous in age), variously oriented.
    3 Bristles present, plumose (at least proximally) ..... **Key C**
    3 Bristles absent, or present and smooth or minutely barbed.
      4 Bristles present, retrorsely barbed (at least distally), or antrorsely barbed and straplike (flattened) ..... **Key D**
      4 Bristles absent, or present and smooth, or antrorsely barbed and filiform.
        5 Achene surface smooth, minutely pitted, or finely striate (not ridged, rugose, or reticulate) ..... **Key E**
        5 Achene surface transversely ridged, rugose, or honeycombed-reticulate (sometimes faintly so) ..... **Key F**

Key A - beaksedges with tubercles 3-23 mm long

1 Spikelets in 1-4 globose clusters; tubercle 3-5 mm long; leaf blades 2-8 mm wide ..... ***Rh. tracyi***
1 Spikelets in > 4 paniculate or corymbose clusters; tubercle 10-23 mm long; leaf blades 6-20 mm wide.
  2 Longest bristles shorter than the achene.
    3 Achene 5-6 mm long, 2.8-3.3 mm wide ..... ***Rh. corniculata*** var. ***corniculata***
    3 Achene 4.4-5.3 mm long, 2.4-2.8 mm wide ..... ***Rh. corniculata*** var. ***interior***
  2 Longest bristles longer than or equaling the achene.
    4 Plants cespitose; primary clusters with 10-50 (rarely 7 or fewer) densely clustered spikelets; achene (4.5-) 5-6 mm long.
      5 Achene 3.0-3.8 mm wide; tubercle base 1.8-2.4 mm wide; [primarily of fresh tidal marshes] ..... ***Rh. macrostachya*** var. ***colpophila***
      5 Achene 2.6-3.1 mm wide; tubercle base 1.0-1.8 mm wide; [primarily of non-tidal wetlands] ..... ***Rh. macrostachya*** var. ***macrostachya***
    4 Plants rhizomatous; primary clusters with 1-6 loosely clustered spikelets; achene (3.5-) 4.0-4.8 mm long.
      6 Bristles 2-8 mm long, the central bristle longest on one face, shortest or absent on the other ..... ***Rh. careyana***
      6 Bristles 7-12 mm long, essentially of equal length ..... ***Rh. inundata***

Key B - beaksedges with basally-white bracts (White-bracted Sedges)

1 Inflorescence bracts 3-6 (-7); basal bract (1.4-) 2-5 mm wide, the white portion (2.5-) 9-25 mm long, tapering gradually into the green portion; rhizomes slender, straight, (0.6-) 0.7-1.7 (-2.1) mm in diameter; achene 1.0-1.2 mm wide; tubercle broadly truncate on achene ..... ***Rh. colorata***
1 Inflorescence bracts (5-) 6-10; basal bract 5-12 mm wide, the white portion 22-55 mm long, tapering abruptly into the green portion; rhizomes often bent and swollen at the nodes, 1.4-3.8 mm in diameter; achene 1.2-1.5 mm wide; tubercle decurrent on achene ..... ***Rh. latifolia***

Key C - beaksedges with plumose bristles

1 Spikelets 2-4 mm long, borne several to many in clusters, none of the spikelets on slender stalks; achene 1.4-1.8 mm long, 0.9-1.4 mm wide ..... ***Rh. plumosa***
1 Spikelets (4-) 5-8 mm long, borne singly or a few together in loose clusters, some or all spikelets on slender stalks; achene 1.7-2.6 mm long, 1.2-2.0 mm wide.
  2 Achene obovoid, 1.7-2.0 mm long, 1.2-1.5 mm wide, the tubercle seated on its summit without a constriction or basal flange; longer bristles < ½ as long as achene ..... ***Rh. breviseta***
  2 Achene broadly elliptic, 1.9-2.6 mm long, 1.5-2.0 mm wide, its summit constricted below a collar-like flange at the base of the tubercle; longer bristles three-fourths to exceeding length of achene ..... ***Rh. oligantha***

Key D - beaksedges with bristles retrorsely barbed (at least distally) or antrorsely barbed and straplike (flattened)

1 Bristles 8-25, retrorsely barbed distally, antrorsely barbed proximally; spikelets white, turning tan with age.
  2 Spikelets with 2-3 florets; bristles 8-12; achene 1.6-2.1 mm long, 0.9-1.3 mm wide ..... ***Rh. alba***

2 Spikelets with 1 floret; bristles 16-25; achene 2.0-2.4 mm long, 1.3-1.5 mm wide ..... ***Rh. macra***

1 Bristles 6 or fewer, either retrorsely or (rarely) antrorsely barbed their entire length; spikelets variously brown, rufous, or tan (or very rarely white).

3 Spikelets 1-fruited, the solitary achene terminating the axis; clusters 1-7, globose to turbinate.

4 Clusters globose to turbinate; achene (measured from base of bristles) 1.3-1.8 mm long, 0.65-0.95 mm wide; tubercle 0.7-1.6 mm long.

5 Clusters turbinate to hemispheric (rarely subglobose), the lowest spikelets usually spreading-ascending to spreading; larger leaves < 2 mm wide; achene 1.6-1.8 mm long; tubercle 1.0-1.6 mm long ..... ***Rh. chalarocephala***

5 Clusters globose to subhemispheric, the lowest spikelets usually reflexed; larger leaves > 2 mm wide; achene 1.3-1.6 mm long; tubercle 0.7-1.2 mm long ..... ***Rh. microcephala***

4 Clusters globose to hemispherical; achene (measured from base of bristles) 1.8-2.6 mm long, 1.1-1.8 mm wide; tubercle 1.4-2.4 mm long.

6 Achene 1.1-1.2 mm wide, 1.8 mm long ..... ***Rh. cephalantha*** var. ***attenuata***

6 Achene 1.2-1.8 mm wide, 2.1-2.6 mm long.

7 Spikelet clusters 1-3 (-4), subglobose to loosely hemispherical, the lateral clusters mostly subterminal ..... ***Rh. cephalantha*** var. ***cephalantha***

7 Spikelet clusters 4-7, densely subglobose, the lowest clusters remote ..... ***Rh. cephalantha*** var. ***pleiocephala***

3 Spikelets 1-5 fruited (if 1-fruited, then the axis terminated by a sterile floret); clusters 2-many, ovoid to turbinate (rarely globose).

8 Clusters numerous, usually 20 or more; tubercle 1.3-1.8 mm long; achene 1.1-1.4 mm wide, 1.5-2.0 mm long, the summit narrowly truncate, the faces umbonate, the margin thickened and wire-like; leaves 2.5-7 mm wide ..... ***Rh. glomerata*** var. ***glomerata***

8 Clusters 2-8; tubercle 0.4-1.2 mm long; achene 0.6-1.2 mm wide, 1.1-2.0 mm long, the summit more rounded than truncate, the faces lenticular, a wire-like margin narrow or not evident; leaves 0.2-3.5 mm wide.

9 Achene 0.6-0.8 mm wide, 1.1-1.3 mm long; tubercle 0.4-0.6 mm long; bristles more-or-less equaling the achene ..... ***[Rh. knieskernii]***

9 Achene 0.8-1.2 mm wide, 1.3-2.0 mm long; tubercle 0.8-1.6 mm long; bristles more-or-less equaling the tubercle.

10 Inflorescence typically with 1 terminal and 1 lateral cluster, the clusters ovoid, with 1-10 spikelets each; achene 1.8-2.0 mm long, 0.8-1.0 mm wide, 2-3 × as long as wide; leaves 0.2-0.4 mm wide ..... ***Rh. capillacea***

10 Inflorescence with 1-6 lateral clusters, the clusters turbinate with usually > 10 spikelets; achene 1.3-1.8 mm long, 0.9-1.2 mm wide, 1.5-2 × as long as wide; leaves 1.5-3.5 mm wide.

11 Scales chestnut brown, the inner with a mucro 0.1-0.2 mm long; longer bristles 0.4 mm shorter than to 0.3 mm longer than the tubercle; achene and tubercle 2.4-2.8 mm long; tubercle 0.9-1.2 mm long; [widespread in our area] ..... ***Rh. capitellata***

11 Scales tan, the inner without a mucro, or mucro < 0.05 mm long; longer bristles exceeding tubercle by 0.3-1.0 mm; achene and tubercle 2.0-2.4 mm long; tubercle 0.5-1.1 mm long; [of the Coastal Plain] ..... ***Rh. leptocarpa***

Key E - beaksedges with bristles smooth, or antrorsely barbed and filiform, or absent, the achene surface smooth, minutely pitted, or finely striate

1 Bristles 12 ..... ***Rh. baldwinii***

1 Bristles 6 or fewer.

2 Leaves with a short taper at the tip, blunt to acute, but not long-acuminate; achene surface minutely pitted near the margin.

3 Basal leaves 4-6 mm wide, ciliate, rosulate; scales acuminate, the midrib ciliate; bristles 6, < ½ the length of the achene ..... ***Rh. ciliaris***

3 Largest basal leaves 2.5-3 mm wide, eciliate, not rosulate; scales aristate, the midrib eciliate; bristles 3-4, 1 or more equaling or exceeding the tubercle ..... ***Rh. solitaria***

2 Leaves long-acuminate at the tip; achene surface smooth or finely striate.

4 Scales white to pale tan; bristles absent or 1-3 rudimentary.

5 Base of plant not bulb-like, not enclosed in bladeless sheaths; achene 1.0-1.2 mm long, 0.8-1.0 mm wide ..... ***Rh. chapmanii***

5 Base of plant blub-like, enclosed in bladeless sheaths; achene 1.4-1.8 mm long, 1.2-1.5 mm wide ..... ***Rh. pallida***

4 Scales tan, rufous, or brown; bristles present (if rudimentary, then 4-6).

6 Achene 0.6-1.1 mm wide, pyriform, obovoid, or narrowly elliptic, pale to dark brown but not blackish; tubercle margin setose (bearing bristle-like projections).

7 Achene narrowly elliptic or narrowly obovoid, 1.2-1.5 mm long by 0.6-0.7 mm wide, twice as long as wide; tubercle 0.8-1.2 mm long ..... ***[Rh. curtissii]***

7 Achene broadly elliptic to obovoid or pyriform, < 2× as long as wide; tubercle 0.4-1.5 mm long.

8 Leaves 2-4 (-5) mm wide; stipe subtending achene 0.5-1.0 mm long ..... ***Rh. crinipes***

8 Leaves 0.2-1.5 (-2) mm wide; stipe subtending achene < 0.4 mm long.

9 Leaves to 1.5 (-2) mm wide; achene 1.0-1.7 mm long, 0.9-1.1 mm wide; tubercle 0.5-1.5 mm long.

10 Culms solitary to loosely cespitose by slender rhizomes; terminal internode straight; clusters turbinate to ovoid; achene 1.0-1.3 mm long, uniformly medium to dark brown; tubercle 0.7-1.5 mm long; bristles usually of two lengths, some equaling the tubercle, and some equaling or shorter than the achene ..... ***[Rh. fusca]***

10 Culms solitary to cespitose, without slender rhizomes; terminal internode often arched; clusters corymbose to hemispheric; achene 1.3-1.7 mm long, pale to reddish-brown, often translucent centrally, with a distinctly thickened wire-like margin; tubercle 0.5-1.0 mm long; all bristles more-or-less equaling the tubercle ..... ***Rh. harperi***

9 Leaves filiform, < 1 mm wide; achene 0.8-1.3 mm long, 0.6-0.9 mm wide; tubercle 0.4-0.8 mm long.

11 Culms without rhizomes; spikelets 2.5-4 mm long; achene translucent centrally; tubercle 0.4-0.6 mm long ..... ***Rh. filifolia***

11 Culms with delicate rhizomes; spikelets 5-7 mm long; achene uniformly opaque; tubercle 0.6-0.8 mm long ..... ***Rh. pleiantha***

6 Achene > 1 mm wide (except 0.8 mm wide in *Rh. fernaldii* with a blackish surface), suborbicular or broadly ellipsoid; tubercle margin smooth or roughened but not setose.

12 Achene 0.8 mm wide, 0.9-1.0 mm long, blackish ..... ***Rh. fernaldii***

12 Achene 1.1-1.7 mm wide, 1.3-2.0 mm long, brown to dark brown.

13 Tubercle 1.0-2.6 mm long, long-attenuate to subulate ..... ***Rh. gracilenta***

13 Tubercle 0.2-0.8 mm long, triangular to triangular-attenuate or with a strap-like beak.

14 Bristles rudimentary to ½ as along as achene body.

15 Larger leaves 2-4 mm wide; mature culms to 13 dm long; floral fascicles (1-) 2-4; tubercle 0.4-0.7 mm long .....

..... ***Rh. fascicularis var. fascicularis***

15 Larger leaves to 1 mm wide; mature culms to 4.5 dm long; floral fascicles 1 (-2); tubercle 0.2-0.5 mm long..... ***Rh. debilis***

14 Bristles > ½ as long to exceeding achene body.

16 Basal leaves filiform to (rarely) 1.3 mm wide, the longer approaching length of culm; tubercle narrowed above the base into a strap-like beak..... ***Rh. wrightiana***

16 Basal leaves 1.3-4 mm wide, all much shorter than the culm; tubercle triangular to triangular-attenuate.

17 Longer bristles equaling to exceeding the achene body; achene body elliptic, 1.1-1.3 mm wide; tubercle triangular-attenuate; larger basal leaves 1.3-2.5 mm wide..... ***Rh. fascicularis*** *var. distans*

17 Longer bristles < ½ as long to rarely exceeding achene body; achene suborbicular, 1.2-1.5 mm wide; tubercle triangular; larger basal leaves 2-4 mm wide..... ***Rh. fascicularis*** *var. fascicularis*

Key F – beaksedges with bristles smooth, or antrorsely barbed and filiform, or absent, the achene surface transversely ridged, rugose, or honeycombed-reticulate

1 Bristles absent (or apparently so at 10×); achene 0.5-0.7 mm wide; tubercle 0.1-0.2 mm long, skull-cap like.

2 Achene including tubercle 1.0-1.2 mm long, the achene surface evidently reticulate and obscurely transversely ridged, the body ellipsoid; bristles present, white, barely visible at 20×, the longest shorter than the achene body..... ***Rh. thornei***

2 Achene including tubercle 0.6-0.9 mm long, the body obovoid; bristles absent.

3 Achene surface smooth, faintly reticulate, not transversely ridged..... ***Rh. divergens***

3 Achene surface rough, distinctly transversely ridge..... ***Rh. pusilla***

1 Bristles present or absent; if absent, then the achene > 1 mm long or > 0.7 mm wide, and tubercle triangular to subulate.

4 Culms and leaves filiform.

5 Achene including tubercle 1.0-1.2 mm long; tubercle minute, skullcap-like..... ***Rh. thornei***

5 Achene including tubercle 1.5-2.9 mm long; tubercle triangular to triangular-acuminate.

6 Tubercle 0.3-0.7 mm long; bristles shorter than the achene..... ***Rh. rariflora***

6 Tubercle 0.8-1.4 mm long; bristles subequaling to exceeding the tubercle..... ***Rh. stenophylla***

4 Culms stouter; leaves wider, not filiform.

7 Achene faces flat or concave; when one face is concave, the opposite face is sometimes slightly convex (slightly biconvex *Rh. decurrens* and *Rh. microcarpa* are keyed here for convenience).

8 Achene at least twice as long as wide, elliptic-oblong; tubercle subulate, 0.8-1.2 mm long..... ***Rh. inexpansa***

8 Achene < twice as long as wide, obovate; tubercle triangular, 0.2-0.9 mm long.

9 Longer bristles exceeding the achene body.

10 Achene ±2.2 mm long, ±1.8 mm wide; tubercle ±0.9 mm long..... ***Rh. punctata***

10 Achene 0.8-1.2 mm long, 0.7-1.2 mm wide; tubercle 0.2-0.5 mm long.

11 Larger leaves (3-) 4-6 mm wide; bristles exceeding tubercle; achene faces flattened..... ***Rh. elliottii***

11 Larger leaves 1-3 (-4) mm wide, bristles half as long as achene to equaling tubercle; achene faces slightly convex..... ***Rh. microcarpa***

9 Longer bristles shorter than to equaling achene body, or absent.

12 Larger leaves 4-5 mm wide; achene 1.4-1.6 mm wide; tubercle 0.6-0.8 mm long, abruptly rising from a flaring basal collar..... ***Rh. compressa***

12 Larger leaves 1-3 (-4) mm wide; achene 0.7-1.3 mm wide; tubercle 0.15-0.5 mm long, without a flaring basal collar.

13 Bristles rudimentary or absent..... ***Rh. perplexa***

13 Bristles one-half as long to equaling achene.

14 Achene 1.3-1.8 mm long, 0.9-1.2 mm wide, the faces flat with 10-12 transverse ridges..... ***Rh. torreyana***

14 Achene 0.8-1.4 mm long, 0.7-1.2 mm wide, the faces slightly biconvex with 6-12 transverse ridges.

15 Clusters elongate; achene 1.0-1.4 mm long, 0.8-1.0 mm wide, narrowly obovate to elliptic, averaging 8-12 transverse ridges; most tubercle bases convexly seated on the achene summit and somewhat decurrent along the achene margins, the tubercle surface often whitish-waxy..... ***Rh. decurrens***

15 Clusters usually compact; achene 0.8-1.2 mm long, 0.7-1.2 mm wide, suborbicular to elliptic, averaging 6-7 transverse ridges; most tubercle bases flat across the achene summit, not decurrent, the tubercle surface usually dark, not waxy..... ***Rh. microcarpa***

7 Achenes biconvex or tumid.

16 Achene 1.4-4.2 mm long, 1.2-3.6 mm wide, the summit with a thickened bony to crustaceous rim surrounding the base of the tubercle.

17 Achene lenticular and transversely ridge, ±1.4 mm long, ±1.2 mm wide..... ***Rh. culixa***

17 Achene tumid, lightly pitted or cancellate in a honeycomb pattern, 1.5-4.2 mm long, 1.4-3.6 mm wide.

18 Leaves 4-8 mm wide; achene 3.0-4.2 mm long, 3.0-3.6 mm wide..... ***Rh. megalocarpa***

18 Leaves 2-4 mm wide; achene < 2.7 mm long and < 2.5 mm wide.

19 Achene 2.0-2.7 mm long, 2.0-2.5 mm wide..... ***Rh. grayi***

19 Achene 1.5-1.8 mm long, 1.4-1.7 mm wide..... ***Rh. harveyi***

16 Achene 0.7-1.8 mm long, 0.7-1.5 mm wide, the summit without a textured rim surrounding the base of the tubercle (if the base of the tubercle is rim-like, then it is distinguished from the summit of the achene by a constriction or articulation).

20 Bristles absent; achene 0.7-1.0 mm long.

21 Scales broadly ovate, obtuse to sub-acute; achene strongly transversely ridged; tubercle depressed, broader than long; style not persistent..... ***Rh. nitens***

21 Scales lance-ovate, acute; achene weakly transversely ridged; tubercle triangular-lanceolate, as long as broad or longer; style usually persistent..... ***Rh. scirpoides***

20 Bristles present (occasionally detached in *Rh. decurrens* and *Rh. miliacea* with achenes 1.0-1.4 mm long).

22 Bristles not exceeding the achene body.

23 Cluster branches flexuous; bristles one-half as long to equaling the achene (or longer in *Rh. microcarpa*); achene slightly biconvex, 0.8-1.4 mm long, 0.7-1.0 (-1.2) mm wide.

24 Clusters elongate; achene narrowly obovate to elliptic, averaging 8-12 transversed ridges; most tubercle bases convexly seated on the achene summit and somewhat decurrent along the achene margins, the tubercle surface often whitish-waxy ..... ***Rh. decurrens***

24 Clusters usually compact; achene suborbicular to elliptic, averaging 6-7 transverse ridges; most tubercle bases flat across the achene summit, not decurrent, the tubercle surface usually dark, not waxy ..... ***Rh. microcarpa***

23 Cluster branches stiff; bristles ¾ or less as long as the achene; achene tumid above, somewhat compressed below, 1.0-1.8 mm long, 1.0-1.6 mm wide; tubercle conical-attenuate, the edges somewhat concave.

25 Larger culm leaves to 5 mm wide; achenes (1.2-) avg. 1.45 (-1.85) mm long, (1.1-) avg. 1.4 (-1.75) mm wide; achene surface alveoli longitudinally narrow; tubercle 0.3-0.7 mm long, base 0.6-1.0 mm wide ..... ***Rh. recognitum***

25 Larger culm leaves to 3 mm wide; achenes (1.0-) avg. 1.3 (-1.5) mm long and wide; if achene surface alveoli longitudinally narrow, then tubercle 0.2-0.4 mm long and base 0.5-0.7 mm wide (*R. globularis*).

26 Longer bristles ⅓-½ (-¾)× the length of the achene; achene surface alveoli longitudinally narrow (typically 0.02-0.05 mm wide between the longitudinal walls), the latitudinal walls raised into horizontal ridges; tubercle 0.2-0.4 mm long, the base 0.5-0.7 mm wide ..... ***Rh. globularis***

26 Longer bristles ⅔-1× the length of the achene; achene surface alveoli nearly as wide as long (typically 0.05-0.1 mm wide between the longitudinal walls), the latitudinal walls obscurely or not at all raised into horizontal ridges; tubercle 0.35-0.7 mm long, the base 0.7-0.9 mm wide ..... ***Rh. pinetorum***

22 Bristles equaling or longer than the tubercle.

27 Primary branches of the inflorescence spreading at right angles from the culm, each spikelet or small cluster on slender spreading or reflexed stalks ..... ***Rh. miliacea***

27 Primary branches of the inflorescence ascending.

28 Spikelets 6-9 mm long ..... ***Rh. odorata***

28 Spikelets < 5 mm long.

29 Tubercle 0.4-0.8 mm long, the edges setose or uneven with waxy or crusty irregular protuberances.

30 Achene obovate to suborbicular, 1.2-1.6 mm wide, latitudinal alveoli walls strongly raised into transverse ridges ..... ***Rh. caduca***

30 Achene slenderly obovoid, 0.8-1.0 mm wide, latitudinal alveoli walls weakly or not at all raised into transverse ridges ..... ***Rh. mixta***

29 Tubercle 0.2-0.5 mm long, the edges smooth.

31 Spikelets 3.5-4 mm long; bristles exceeding the tubercle; achene 1.3-1.5 mm long, 1.2-1.3 mm wide ..... ***Rh. saxicola***

31 Spikelets 2.5-3 mm long; longer bristles about equaling the tubercle; achene 0.8-1.2 mm long, 0.7-1.2 mm wide.

32 Inflorescence occupying the upper ¼-½ of the culm, the lowest 2-4 nodes barren ..... ***Rh. microcarpa***

32 Inflorescence occupying ⅔-¾ of the length of the culm, the lowest lateral panicle at the first or second node above the base ..... ***Rh. sulcata***

Rhynchospora alba (Linnaeus) Vahl, Northern White Beaksedge. Cp (GA, NC, SC, VA), Mt (GA, NC, VA): mountain bogs and fens, peaty situations in the Coastal Plain, such as low pocosins in peat domes or large Carolina bays, and floating peat mats in limesink (doline) ponds and bay lakes, possibly also in seepage bogs with abundant *Sphagnum*, generally occurring in the most open, harshest, and peatiest areas; rare (GA Special Concern, NC Rare, VA Rare). July-October. Widespread in northern North America, south to se. NC, nw. NC, ne. GA, ne. TN, MN, ID, and CA; disjunct in se. GA (Charlton Co., at the Okefenokee Swamp) (Williges & Loftin 1995), s. AL (Escambia Co.; specimen at CLEMS), and the mountains of Puerto Rico. [= RAB, C, F, FNA, G, GW, K, S, W, Z]

Rhynchospora baldwinii A. Gray, Baldwin's Beaksedge. Cp (GA, NC, SC): wet savannas, seepages; uncommon (rare in Sandhills). July-August. Se. NC south to c. FL and west to LA. [= RAB, C, FNA, K, S, GW, Z]

Rhynchospora breviseta (Gale) Channell, Short-bristle Beaksedge. Cp (NC, SC): wet savannas; rare (NC Rare). July-September. Se. NC south to c. FL and west to s. MS; West Indies. This species will colonize disturbances (roadsides, powerline corridors), but not aggressively. The leaf tips of *Rh. breviseta* are acute and minutely serrulate, while those of the closely related *Rh. oligantha* are blunt and smooth; these characters are, however, often difficult to determine. [= RAB, FNA, GW, K; = *Rh. oligantha* A. Gray var. *breviseta* Gale – Z]

Rhynchospora caduca Elliott, Angle-stem Beaksedge. Cp (GA, NC, SC, VA), Pd (NC, SC): savannas, hardwood swamps, other wet areas; uncommon (VA Watch List). July-September. E. and c. VA south to s. FL and west to TX, OK, and AR, north in the interior to sc. TN. This species is found at a few sites in the mountains of GA. See notes under *Rh. miliacea*. [= RAB, C, F, FNA, G, GW, K, W, Z; > *Rh. caduca* – S; > *Rh. patula* A. Gray – S]

Rhynchospora capillacea Torrey. Mt (VA): calcareous wetlands; rare (VA Rare). Newfoundland west to Saskatchewan, south to w. VA, ne. TN, and n. AR. [= C, F, FNA, G, K, Z]

Rhynchospora capitellata (Michaux) Vahl, Brownish Beaksedge. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): bogs and fens, seepages, and wet rock outcrops in the Mountains and upper Piedmont, also in wet habitats in the Coastal Plain of ne. NC and e. VA; common (rare in Piedmont and Coastal Plain). July-September. Widespread in e. North America, south to nc. GA. The only common beaksedge in the Mountains of our area. A somewhat similar species, *Rh. knieskernii*, occurs north of our area, but should be looked for here; they are discussed at the end of this genus. Sorrie (2000) has clarified the relationships and distinctions of this taxon with *Rh. leptocarpa*. [= C, F, G, S, W; < *Rh. capitellata* – RAB, FNA, GW, K, Z (also see *Rh. leptocarpa*)]

Rhynchospora careyana Fernald, Carey's Horned Beaksedge. Cp (GA, NC, SC): limesink (doline) depression ponds and in intermittently flooded depression meadows; rare (NC Watch List). July-September. Apparently ranging from se. NC south to FL, but the range poorly known because of confusion with *Rh. inundata*, from which it is perhaps not specifically distinct. [= FNA, K, S; < *Rh. inundata* – RAB; < *Rh. corniculata* – GW (listed in synonymy under *Rh. corniculata* in GW, but would actually key to *Rh. inundata*)]

Rhynchospora cephalantha A. Gray *var.* ***attenuata*** Gale, Small Bunched Beaksedge. Cp (GA?, NC, SC, VA): savannas, sandhill seeps, openings in streamhead pocosins; rare (NC Watch List, VA Rare). July-October. The range of this variety is

poorly known; is reported by Z from NC, SC, AL, and MS. Recent collections from MD and VA extend the range. See discussion in Sorrie et al. (1997). [= Z; < *Rh. cephalantha* – RAB, C, GW, K; < *Rh. axillaris* – S]

Rhynchospora cephalantha A. Gray *var.* ***cephalantha***, Common Bunched Beaksedge. Cp (GA, NC, SC, VA): savannas; common (VA Rare). July-October. S. NJ south to FL and west to LA. Often weedy, this species occurs commonly along wet roadsides, powerline corridors, and the like. [= F, G, Z; < *Rh. cephalantha* – RAB, C, FNA, GW, K; < *Rh. axillaris* – S]

Rhynchospora cephalantha A. Gray *var.* ***pleiocephala*** Fernald & Gale, Many-headed Bunched Beaksedge. Cp (GA, NC, SC, VA): savannas; uncommon (VA Rare). July-October. Se. VA south to FL and west to LA. [= F, G, Z; < *Rh. cephalantha* – RAB, C, FNA, GW, K; < *Rh. axillaris* – S]

Rhynchospora chalarocephala Fernald & Gale, Loose-head Beaksedge. Cp (GA, NC, SC, VA), Pd (NC, SC, VA), Mt (GA, NC, SC, VA): savannas, limesink ponds, and swamps, often weedy and occurring in abundance on wet roadsides and in powerline corridors; common (rare in Piedmont). July-September. S. NJ south to c. FL and west to LA; disjunct in nw. GA (Jones & Coile 1988) and sc. TN (Coffee County). [= RAB, C, F, FNA, G, GW, K, W, Z]

Rhynchospora chapmanii M.A. Curtis, Chapman's Beaksedge. Cp (GA, NC, SC): savannas, seepage bogs, sandy margins of limesink (doline) ponds, and other wet, acid habitats; uncommon. July-September. Se. NC south to c. FL and west to e. LA; Belize, Nicaragua. [= RAB, FNA, GW, K, S, Z]

Rhynchospora ciliaris (Michaux) C. Mohr, Fringed Beaksedge. Cp (GA, NC, SC): savannas, sandhill seeps; uncommon. July-September. Se. NC south to s. FL and west to LA. [= RAB, FNA, GW, K, S, Z]

Rhynchospora colorata (Linnaeus) H. Pfeiffer, Narrowleaf Whitetop Sedge. Cp (NC, SC, VA): wet savannas, ditches, dune swales; uncommon (VA Rare). May-September. Primarily a Southeastern Coastal Plain endemic: se. VA south to FL and west to TX; Mexico (Tabasco, Chiapas, Yucatán), West Indies, Belize, Guatemala, Costa Rica, Venezuela. [= C, FNA, K; = *Dichromena colorata* (Linnaeus) H. Pfeiffer – RAB, F, G, GW, S]

Rhynchospora compressa Carey ex Chapman. Cp (GA, SC): savannas; rare. S. SC south to FL, west to e. LA. This species was reported for SC (Kartesz 1999), based on the South Carolina Plant Atlas (http://cricket.biol.sc.edu/herb/); McMillan (pers. comm.) states that the record is in error, based on a misidentified specimen. The species occurs in sc. GA (Jones & Coile 1988) and has since been found in SC by McMillan (2003). [= FNA, GW, K, S, Z]

Rhynchospora corniculata (Lamarck) A. Gray *var.* ***corniculata***, Short-bristle Horned Beaksedge. Cp, Pd (GA, NC, SC, VA): pondcypress savannas in Carolina bays, swamp forests, other wetlands; uncommon. July-September. Var. *corniculata* ranges from DE south to FL and west to LA, extending north into KY and MO, also in the West Indies. Var. *interior*, possibly not worth recognition, is distinguished by a shorter and narrower achene, the summit barely broader than the base of the tubercle, and occurs in the Mississippi drainage. [= C, F, G; < *Rh. corniculata* (Lamarck) A. Gray – RAB, FNA, GW, K, S]

Rhynchospora crinipes Gale, Alabama Beaksedge. Cp (GA, NC): sand-clay bars in bed of small blackwater river in the Sandhills (NC) and Coastal Plain (GA); rare (US Species of Concern, GA Special Concern, NC Endangered). July-September. This very rare species is related to *Rh. filifolia*, but is a coarser plant, readily distinguishable by characters of the achene, culm, and leaves. Anderson (1988) discusses its systematics, habitat, and rarity. It has been reported only from a few locations in s. AL, w. FL, sc. GA, and sc. NC. Sorrie et al. (1997) report its occurrence in NC. [= FNA, GW, K, Z]

Rhynchospora culixa Gale, Georgia Beaksedge. Cp (GA): pine savannas, flatwoods; rare (GA Special Concern). GA and FL. [= K, Z; = *Rh. harveyi* W. Boott var. *culixa* (Gale) Kral – FNA]

Rhynchospora debilis Gale, Savanna Beaksedge. Cp (GA, NC, SC, VA), Mt (GA): savannas, sandhill seeps; uncommon (VA Rare). July-September. Se. VA south to n. FL and west to se. TX (Brown & Marcus 1998). Like a small version of *Rh. fascicularis*, often with several ascending, cespitose culms, each terminated by a single glomerule. [= RAB, C, F, FNA, GW, K, Z]

Rhynchospora decurrens Chapman, Swamp-forest Beaksedge. Cp (GA, NC, SC): swamp forests and river marshes, especially along blackwater rivers; rare (GA Special Concern, NC Rare). July-August. Se. NC south to s. FL and west to s. MS (Sorrie & Leonard 1999). [= RAB, FNA, GW, K, S, Z]

Rhynchospora divergens Chapman ex M.A. Curtis, White-seeded Beaksedge. Cp (GA, NC, SC): wet savannas, especially in exposed sands; rare (NC Rare). May-September. Se. NC south to s. FL and west to se. TX; Bahamas, Mexico (Chiapas), Belize. *Rh. divergens*, *Rh. pusilla*, and *Rh. thornei* are all small, grass-like plants, very similar in appearance to one another. [= RAB, FNA, GW, K, S]

Rhynchospora elliottii A. Dietrich, Elliott's Beaksedge. Cp (GA, NC, SC): savannas, ditches, other wet habitats, often weedy; rare (NC Watch List). July-September. Se. NC south to nw. FL and west to e. TX. The achenes are typically flat or concave on one face, and flat or slightly convex on the other. See note under *Rh. microcarpa*. [= FNA, GW, K; = *Rh. schoenoides* (Elliott) Wood – RAB, S, Z]

Rhynchospora fascicularis (Michaux) Vahl *var.* ***distans*** (Michaux) Chapman. Cp (GA, NC, SC, VA): savannas and limesink ponds; rare (VA Rare). June-September. Se. VA south to s. FL and west to s. MS (Sorrie & Leonard 1999); West Indies. Appearing to merge with *Rh. wrightiana* on the outer Coastal Plain of NC. [= F, K, Z; < *Rh. fascicularis* – RAB, FNA, G, GW; = *Rh. distans* (Michaux) Vahl – S]

Rhynchospora fascicularis (Michaux) Vahl *var.* ***fascicularis***, Fascicled Beaksedge. Cp (GA, NC, SC, VA): savannas, limesink ponds, ditches; common in the outer Coastal Plain, less common in the fall-line sandhills (VA Rare). June-September. Se. VA south to s. FL and west to se. TX; West Indies. [= F, K, Z; < *Rh. fascicularis* – RAB, FNA, G, GW; = *Rh. fascicularis* – S]

Rhynchospora fernaldii Gale, Fernald's Beaksedge. Cp (GA): pine flatwoods; uncommon. S. GA south to c. peninsular FL, west to s. MS. [= FNA, GW, K, Z]

Rhynchospora filifolia A. Gray, Threadleaf Beaksedge. Cp (GA, NC, SC, VA): sandy shores of limesink (doline) depressions, especially at the lower margin, savannas; uncommon, rare in the fall-line sandhills (VA Rare). July-September. S. NJ south to c. FL and west to e. TX; Cuba, Mexico (Tabasco), Belize, Nicaragua. [= RAB, C, F, FNA, G, K, S, Z; < *Rh. filifolia* – GW (also see *Rh. harperi*)]

Rhynchospora globularis (Chapman) Small, Globe Beaksedge. Cp, Pd (GA, NC, SC, VA): sandy or peaty depressions, wet ditches, powerline corridors, savannas; uncommon, rare in Piedmont. June-September. Apparently ranges from DE south to s. FL and west to c. TX and OK; north in the interior to nc. TN; also allegedly in n. CA. Both *Rh. globularis* and *Rh. pinetorum* tend to produce shorter plants with smaller glomerules than *Rh. recognita*. Occasional achenes of *Rh. globularis* exhibit the wide alveoli of *Rh. pinetorum* near the base or summit, with little or no horizontal ridging, but centrally have narrow alveoli with pronounced horizontal ridges. The opposite condition occasionally occurs in *Rh. pinetorum* achenes, with narrow alveoli and horizontal ridging basally or at the summit, but wide alveoli and little or no ridging centrally. [= S; < *Rh. globularis* – RAB, W; = C, F, FNA, G, K, Z; < *Rh. globularis* var. *globularis* – GW]

Rhynchospora glomerata (Linnaeus) Vahl *var. **glomerata***, Clustered Beaksedge. Cp, Pd, Mt (GA, NC, SC, VA): savannas, bogs, other wet habitats; common (uncommon in Sandhills, rare in Mountains). July-September. Var. *glomerata* ranges from s. NJ south to n. FL and west to e. TX, and inland in KY, TN, AR, and KS. Var. *angusta* Gale occurs in AR, LA, and e. TX. [= Z; < *Rh. glomerata* – RAB, C, F, FNA, G, GW, K, S, W]

Rhynchospora gracilenta A. Gray, Slender Beaksedge. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): savannas, bogs; uncommon (rare in Piedmont and Mountains). July-September. NJ south to n FL and west to e. TX, north in the inland to nc. TN and AR; Cuba, Mexico (Chiapas), Belize, Nicaragua. [= RAB, C, F, FNA, G, GW, K, S, W, Z]

Rhynchospora grayi Kunth, Gray's Beaksedge. Cp (GA, NC, SC, VA): sandhills and other dry, sandy sites; uncommon (VA Rare). June-September. VA south to FL, west to TX. [= RAB, C, F, FNA, G, K, S, Z]

Rhynchospora harperi Small, Harper's Beaksedge. Cp (GA, NC, SC): peaty limesink depression ponds (dolines), from standing water to the upper margins of the pond-shore; rare (GA Special Concern, NC Rare). July-September. Se. NC south to FL and west to s. AL and s. MS (Sorrie & Leonard 1999); disjunct in DE and MD; disjunct in Belize. See Nelson (1993) for first SC record, and LeBlond (1997) for additional information on the species, especially its distribution. [= FNA, K, S, Z; < *Rh. filifolia* – GW]

Rhynchospora harveyi W. Boott, Harvey's Beaksedge. Cp (GA, NC, SC, VA), Mt (GA, NC), Pd (NC): savannas in the Coastal Plain, seepage bogs in the Sandhills, bogs in the Mountains and Piedmont; rare (VA Rare). July-August. Se. VA south to n. FL and west to TX and OK, and north in the interior to nc. TN and MO. [= RAB, C, F, G, GW, K, S, W, Z; = *Rh. harveyi* var. *harveyi* – FNA]

Rhynchospora inexpansa (Michaux) Vahl, Nodding Beaksedge. Cp (GA, NC, SC, VA), Pd (GA): wet savannas, streamhead pocosins where frequently burned, usually in peaty situations, often weedy, colonizing disturbances; common. July-September. Se. VA south to n. FL and west to e. TX and AR; West Indies. [= RAB, C, F, FNA, G, GW, K, S, Z]

Rhynchospora inundata (Oakes) Fernald, Narrow-fruit Horned Beaksedge. Cp (NC, SC?), {GA, VA}: in water of limesink dolines and clay-based Carolina bays. usually found in shallow water or at the lower margins of pond-shores, typically producing large colonies; rare (NC Watch List, SC Rare, VA Rare). July-September. Apparently ranging from e. MA south to s. FL and west to LA (the range, however, obscured by confusion with *Rh. careyana*). The relation of this species to *Rh. careyana* and to more northern entities of *Rh. inundata* remain unresolved. [= C, F, FNA, G, GW, K, S; < *Rh. inundata* – RAB (also see *Rh. careyana*)]

Rhynchospora latifolia (Baldwin ex Elliott) Thomas, Broadleaf Whitetop Sedge. Cp (GA, NC, SC): wet savannas; uncommon. May-September. A Southeastern Coastal Plain endemic: se. NC south to FL and west to se. TX; disjunct in sc. TN (Coffee County). [= FNA, K; = *Dichromena latifolia* Baldwin ex Elliott – RAB, S, GW]

Rhynchospora leptocarpa (Chapman ex Britton) Small. Cp (GA, NC, SC): seepage bogs, pocosins, especially in openings; uncommon. E. NC south to Panhandle FL, west to se. LA, in the Coastal Plain. It appears that *Rh. leptocarpa* is a valid species, a southeastern Coastal Plain relative of the more northern and montane *Rh. capitellata* (Sorrie 2000). Its occurrence in NC is reported by Sorrie et al. (1997). [= S; < *Rh. capitellata* – RAB, FNA, GW, K, Z]

Rhynchospora macra (C.B. Clarke) Small, Southern White Beaksedge. Cp (GA, NC, SC): *Sphagnum* bogs in frequently-burned streamhead pocosins, and in sandhill seepage bogs; rare (GA Special Concern, NC Endangered, SC Rare). July-September. Sc. NC south to n. FL and west to se. TX; Nicaragua, Puerto Rico. *Rh. macra* is a robust southern relative of *Rh. alba*. Like *Rh. alba* and *Rh. pallida*, it has scales which are at first bright white, "fading" in age to a medium tan or light brown. These three species are thus superficially most distinctive (from other *Rhynchospora*) in June, July, and August. The occurrence of this species in NC and SC is discussed by Sorrie et al. (1997). [= FNA, GW, K, S, Z]

Rhynchospora macrostachya Torrey ex A. Gray *var. **colpophila*** Fernald & Gale, Virginia Horned Beaksedge. Cp (NC, VA): tidal freshwater marshes; uncommon (NC Watch List). July-September. Endemic to e. MD, e. VA, and ne. NC. [= F; < *Rh. macrostachya* – RAB, C, FNA, G, GW, K, S]

Rhynchospora macrostachya Torrey ex A. Gray *var. **macrostachya***, Tall Horned Beaksedge. Cp (GA, NC, SC, VA), Mt (GA): marshes, swamps, upland depression ponds, other wetlands; uncommon (VA Watch List). July-September. E. MA south to FL and west to e. TX, north in the interior to sc. TN, s. MI, MO, and KS; disjunct (historically) in s. ME. This (and var. *colpophila*) are most readily distinguished from *Rh. corniculata*. *Rh. inundata*, and *Rh. careyana* by the large glomerules composed of numerous spikelets. [= F; < *Rh. macrostachya* – RAB, C, FNA, G, GW, K, S]

Rhynchospora megalocarpa A. Gray, Sandhill Beaksedge. Cp (GA, NC, SC): xeric sandhills; uncommon. June-August. Se. NC south to FL, west to MS. [= RAB, FNA, K, Z; = *Rh. dodecandra* Baldwin ex A. Gray – S]

Rhynchospora microcarpa Baldwin ex A. Gray, Southern Beaksedge. Cp (GA, NC, SC), Pd (NC, SC): swamp forests, clay-based Carolina bays; rare (GA Special Concern, NC Watch List). July-August. E. NC south to s. FL and west to TX; West Indies (Cuba, Puerto Rico), Bahamas, Belize. This species is easily confused with *Rh. elliottii* and *Rh. perplexa*. *Rh. elliottii* is distinguished by leaves 4-6 mm wide, bristles longer than the tubercle, flattish achene faces, and a tubercle that is longer than broad. *Rh. microcarpa* and *Rh. perplexa* have leaves 1-3 mm wide and tubercles as broad as long or broader. In *Rh. microcarpa*, the achene is biconvex and the bristles are half as long as the achene to equaling the tubercle. In *Rh. perplexa*, the achene faces are flattish and the bristles are absent or rudimentary (< ½ as long as the achene). [= RAB, F, FNA, GW, S, Z; < *Rh. microcarpa* – K (also see *Rh. sulcata*)]

Rhynchospora microcephala (Britton) Britton ex Small, Small-headed Beaksedge. Cp (GA, NC, SC, VA), Mt (GA): savannas, sandhill-pocosin ecotones; common. July-October. S. NJ south to c. FL and west to MS; Cuba. [= RAB, C, F, FNA, G, GW, K, S, Z; = *Rh. cephalantha* A. Gray var. *microcephala* (Britton) Kükenthal]

Rhynchospora miliacea (Lamarck) A. Gray, Millet Beaksedge. Cp (GA, NC, SC, VA): swamp forests, including maritime swamp forests; rare (VA Rare). July-August. Se. VA south to s. FL and west to LA; West Indies. The inflorescence branches of *Rh. mixta* and (less commonly) *Rh. caduca* can spread at right angles from the culm, superficially resembling *Rh. miliacea*. The three can be separated by tubercle length: the tubercle of *Rh. miliacea* is 0.2-0.4 mm long, while those of *Rh. mixta* and *Rh. caduca* are 0.4-0.9 mm long. [= RAB, C, F, FNA, G, GW, K, S, Z]

Rhynchospora mixta Britton, Mingled Beaksedge. Cp (GA, NC, SC): swamp forests, marshes; uncommon. June-August. Ne. NC south to c. FL and west to TX. See notes under *Rh. miliacea*. [= RAB, FNA, GW, K, S, Z; > *Rh. mixta* – S; > *Rh. prolifera* Small – S]

Rhynchospora nitens (Vahl) A. Gray, Short-beak Beaksedge. Cp (GA, NC, SC, VA): wet savannas, limesink (doline) ponds, ditches, disturbed wet areas, often weedy; rare (NC Watch List, VA Rare). July-August. Primarily a Coastal Plain endemic: MA south to FL and west to se. TX; lowlands around the Great Lakes; West Indies, Belize, Nicaragua. [= C, FNA, K; = *Psilocarya nitens* (Vahl) Wood – RAB, F, G, GW, S]

Rhynchospora odorata C. Wright ex Grisebach, Fragrant Beaksedge. Cp (GA, NC, SC): maritime swamp forests and maritime wet grasslands; rare (NC Rare). June-August. E. NC south to s. Florida; West Indies and Bahamas. First reported for SC by Nelson & Kelly (1997). [= RAB, F, FNA, GW, K, Z; = *Rh. stipitata* Chapman – S]

Rhynchospora oligantha A. Gray, Feather-bristle Beaksedge. Cp (GA, NC, SC, VA): wet savannas, sandhill-pocosin ecotones, sandhill seepage bogs, sea-level fens, usually in rather peaty, acid places; rare (GA Special Concern, NC Rare, SC Rare, VA Rare). July-August. S. NJ south to n. FL and west to se. TX; Belize, Nicaragua. The leaf tips of *Rh. oligantha* are blunt and smooth, while those of the closely related *Rh. breviseta* are acute and minutely serrulate; these characters are, often difficult to determine, however. Considered to be absent between NC and NJ prior to its discovery in e. VA (Fleming & Ludwig 1996). [= RAB, C, F, FNA, G, GW, K; < *Rh. oligantha* – S (presumably including *Rh. breviseta*): = *Rh. oligantha* var. *oligantha* – Z]

Rhynchospora pallida M.A. Curtis, Pale Beaksedge. Cp (NC, SC, VA): savanna-pocosin and sandhill-pocosin ecotones, peaty seepage bogs, usually growing in or near *Sphagnum*; rare (NC Watch List, SC Rare, VA Rare). July-September. Long Island, NY south through NJ to nc. SC, primarily in NJ and NC. Like *Rh. alba* and *Rh. macra*, it has scales which are at first bright white, "fading" in age to a medium tan or light brown. These three species are thus superficially most distinctive (from other *Rhynchospora*) in June, July, and August. The bristle characters separate the three species easily. See Nelson (1993) for first SC record. [= RAB, C, F, FNA, G, GW, K, S, Z]

Rhynchospora perplexa Britton *var. **perplexa***, Pineland Beaksedge. Cp (GA, NC, SC), Mt (GA), {VA}: savannas, sandhill seepage bogs; uncommon (VA Rare). July-September. E. NC south to s. FL, west to TX, and north in the interior to ec. TN; West Indies. Also see note under *Rh. microcarpa*. [= F; < *Rh. perplexa* – RAB, C, FNA, G, GW, K, S, Z]

Rhynchospora perplexa Britton *var. **virginiana*** Fernald, Virginia Pineland Beaksedge. Cp (VA): savannas; rare (VA Rare). July-September. Var. *virginiana* Fernald, alleged to be endemic to se. VA, should be sought in NC. It is alleged to differ in several characters, including larger spikelets (2.5-3.0 mm long vs. 2.0-2.5), the achene tubercles broadly rounded at the tip (rather than deltoid and acute). Also see note under *Rh. microcarpa*. [= F; < *Rh. perplexa* – RAB, C, FNA, G, GW, K, S, Z]

Rhynchospora pinetorum Small, Small's Beakrush. Cp (NC, SC): wet calcareous savannas, maritime wet grasslands; rare. June-September. *Rh. pinetorum* ranges from FL west to MS (Sorrie & Leonard 1999) and LA, apparently disjunct to se. NC and ne. SC, and also in the West Indies. See note under *Rh. globularis*. [= S; = *Rh. globularis* (Chapman) Small var. *pinetorum* (Small) Gale – FNA, GW, K, Z]

Rhynchospora pleiantha (Kükenthal) Gale, Coastal Beaksedge. Cp (GA, NC, SC): sandy margins of limesink depression ponds (dolines), typically in shallow water or at the lower margins of pond-shores; rare (GA Special Concern, NC Rare). July-September. Se. NC south to c. and nw. FL and west to se. AL; also in Cuba. [= RAB, FNA, GW, K, Z; *Rh. fusca* – S, misapplied]

Rhynchospora plumosa Elliott, Plumed Beaksedge. Cp (GA, NC, SC): savannas, sandhill-pocosin ecotones, especially where the sandy surface dries out in summer (on Spodosols such as the Leon soil series); common. July-August. NC south to FL and west to se. TX; West Indies (Cuba), Belize, Honduras, Nicaragua. *Rh. pineticola* C.B. Clarke, from dry sandy pinelands of northern FL, is very similar to *Rh. plumosa*, differing in having leaves 2-3 mm wide and achenes 2.0-2.2 mm long. [= RAB, S; < *Rh. plumosa* – FNA, GW, K, Z]

Rhynchospora punctata Elliott, Pineland Beaksedge. Cp (GA): wet savannas, pitcherplant bogs; rare (GA Special Concern). S. GA south to ne. FL. [= FNA, GW, K, S, Z]

Rhynchospora pusilla Chapman ex M.A. Curtis, Dwarf Beaksedge. Cp (GA, NC, SC), Pd (GA): wet savannas, especially in exposed wet sands of disturbed ground, such as roadsides; uncommon. June-September. E. NC south to s. FL and west to e. TX; West Indies, Mexico (Tabasco, Chiapas), Belize, Guatemala, Nicaragua. *Rh. pusilla, Rh. divergens,* and *Rh. thornei* are all small, grass-like plants, very similar in appearance to one another. [= FNA, GW, K; = *Rh. intermixta* C. Wright – RAB, S]

Rhynchospora rariflora (Michaux) Elliott, Few-flower Beaksedge. Cp, Pd (GA, NC, SC, VA): wet savannas, seepage bogs in the Sandhills, bogs in the Piedmont; common, rare in Piedmont (VA Watch List). July-September. S. NJ south to s. FL and west to e. TX; inland in ec. TN; West Indies, Belize, Honduras, Nicaragua. Resembling *Rh. breviseta* and *Rh. oligantha*, but the spikelets conspicuously smaller. A plant tentatively considered distinct from *Rh. rariflora* has been found in wet savannas and pocosin ecotones in Carteret County, NC; it differs most notably in its distinctly larger achenes and longer tubercles and bristles. It can be distinguished from *Rh. rariflora* as follows: achene 1.36-1.8 mm long, 1.4-1.5 mm wide; tubercle 0.6-1.0 mm long; bristles 2/3-4/5 as long as the achene body (vs. 1.3-1.5 (-1.7) mm long, 1.1-1.4 mm wide; tubercle 0.3-0.6 (-0.7) mm long; bristles 1/3-1/2 (-2/3) as long as the achene body). [= RAB, C, F, FNA, G, GW, K, S, Z]

Rhynchospora recognita (Gale) Kral, Cymose Beakrush. Cp, Pd, Mt (GA, NC, SC, VA): wet to dry low grounds, diabase glades, ditches, powerline corridors, savannas, moist seepage on rock outcrops, other wet areas; common. June-September. NJ south to FL, west to TX, north in the interior to nc. TN and around the Great Lakes; CA; West Indies; and Central America. As explained by Kral (1999), this taxon appears to warrant specific status. [= FNA, K; = *Rh. globularis* (Chapman) Small var. *recognita* Gale – C, F, G, Z; < *Rh. globularis* – RAB, W; < *Rh. globularis* var. *globularis* – GW; *Rh. cymosa* Elliott – S, misapplied]

Rhynchospora saxicola Small. Pd (GA, SC), Cp (GA): seepages on granitic outcrops and Altamaha Grit glades; rare. W. SC south into the Piedmont and rarely Coastal Plain of c. GA and ne. and ec. AL (Kral 1999). [= S; = *Rh. globularis* (Chapman) Small var. *saxicola* (Small) Kükenthal – FNA, K]

Rhynchospora scirpoides (Torrey) A. Gray, Long-beak Beaksedge. Cp (GA, NC, SC, VA): limesink ponds, usually at the lower margins of pond-shores, wet savannas, beaver ponds, and other wetlands with "drawdown" hydrology; rare (GA Special Concern, NC Rare, VA Rare). July-September. Se. MA south to Panhandle FL and s. MS (Sorrie & Leonard 1999), se. OK and TX (Singhurst, Bridges, & Holmes 2007); disjunct in the lowlands around the Great Lakes. [= C, FNA, K; = *Psilocarya scirpoides* Torrey – RAB, GW, S; > *Psilocarya scirpoides* var. *grimesii* Fernald & Griscom – F, G]

Rhynchospora solitaria R.M. Harper, Autumn Beaksedge. Cp (GA, SC): wet, sandy/peaty depressions; rare (GA Special Concern). Known from a few sites in the Gulf Coastal Plain of GA (Colquitt, Irwin, Tift, and Turner counties) (Sorrie 1998b) and SC (Berkeley County) (McMillan, pers.comm. and specimen at NCU). It resembles a delicate *Rh. ciliaris*; its distinctiveness is well described in Bridges & Orzell (1992). It should be sought in seepage bogs in the fall-line sandhills and in wet savannas of the outer Coastal Plain. [= FNA, GW, K, S, Z]

Rhynchospora stenophylla Chapman, Coastal Bog Beaksedge. Cp (GA, NC, SC, VA): peaty seepage bogs, streamhead pocosins, savanna-pocosin ecotones, usually growing in *Sphagnum*, especially where frequently burned; rare (GA Special Concern, NC Watch List, SC Rare). July-September. Se. NC south to nw. FL and west to s. MS; disjunct in se. VA (Southampton Co.) (Belden et al. 2004). Reported for GA by Sorrie (1998b). [= RAB, FNA, GW, K, S, Z]

Rhynchospora sulcata Gale, Grooved Beaksedge. Cp (GA, SC): limesink ponds (dolines); rare. June-July. Se. SC south to GA (Jones & Coile 1988) and FL. Perhaps not distinct from *Rh. microcarpa*. [= RAB, GW, Z; < *Rh. microcarpa* Baldwin ex A. Gray – K]

Rhynchospora thornei Kral, Thorne's Beaksedge. Cp (GA, NC, SC), Mt (GA): in open sands in savannas underlain by marl, and nearby roadsides, moist limestone barrens and prairies (GA); rare (GA Special Concern, NC Endangered). Known from about 35 locations, in Cp of NC, SC, GA, FL, and AL; also in Ridge and Valley region of AL and GA, and Black Belt region of AL. *Rh. thornei*, *Rh. divergens*, and *Rh. pusilla* are all small, grass-like plants, very similar in appearance to one another, and they frequently co-occur. Recently discovered in SC (Georgetown Co.) by McMillan (2003). [= FNA, K]

Rhynchospora torreyana A. Gray, Torrey's Beaksedge. Cp (GA, NC, SC, VA): savannas, seepage bogs, often weedy; common, uncommon in VA, rare in GA (GA Special Concern). July-September. Se. MA south to GA. [= RAB, C, F, G, GW, K, S, Z]

Rhynchospora tracyi Britton, Tracy's Beaksedge. Cp (GA, NC, SC): cypress savannas and graminoid-dominated depressions, in small, clay-based Carolina bays or shallow limesink ponds (dolines), typically in shallow water or at the lower margins of pond-shores; rare (NC Rare, SC Rare). June-September. A Southeastern Coastal Plain endemic: s. NC south to FL, west to s. MS (Sorrie & Leonard 1999); disjunct in sw. LA; West Indies, Belize. [= RAB, FNA, K, GW, S]

Rhynchospora wrightiana Böckler, Wright's Beaksedge. Cp (GA, NC, SC, VA): wet savannas; rare (NC Watch List, VA Rare). July-September. Se. VA south to c. FL and west to s. AL; West Indies. Appearing to merge with *Rh. fascicularis* var. *distans* on the outer Coastal Plain of NC. Leaves are most frequently filiform and < 1 mm wide; rarely flat and to 1.3 mm wide. [= RAB, FNA, GW, K, Z; < *Rh. wrightiana* – S (also see *Rh. brachychaeta*)]

Rhynchospora brachychaeta C. Wright. Cp (SC): cypress ponds, other depressions; rare. AL, FL, MS, and SC. Reported for SC by P. McMillan (pers. comm.). Kral in FNA considers this species possibly adventive. [= FNA, K, Z; < *Rh. wrightiana* – S]

Rhynchospora curtissii Britton has been reported from SC by Kral (1996) and for NC and SC by Kartesz (1999), but specimens so annotated are misidentified. An East Gulf Coastal Plain endemic, in Panhandle FL, AL, and s. MS (Sorrie & Leonard 1999). [= FNA, GW, K, S, Z]

Rhynchospora fusca (Linnaeus) Aiton f., circumboreal, ranges south in North America to NJ, e. PA (Rhoads & Klein 1993), MD, DE, and WV (FNA, Kartesz 1999). [= C, F, FNA, G, K, Z]

Rhynchospora knieskernii Carey. Pinelands. Endemic in NJ and DE. It has been reported, in error, from SC. [= C, F, FNA, G, K, Z]

Rhynchospora semiplumosa A. Gray, in Coastal Plain of GA. [= S; < *Rh. plumosa* – FNA, GW, K, Z] {needs evaluation}

Rhynchospora species 1. Mt (GA): Coosa Valley prairies; rare. Research by Jim Allison. {not yet keyed}

Schoenoplectus (Reichenbach) Palla 1888 (Bulrush)

A genus of about 50 species, herbs, cosmopolitan in distribution. Micromorphologic and anatomic studies have confirmed earlier opinions based on morphology that *Schoenoplectus* is not closely related to *Scirpus* (Strong 1994, Smith 1995, Schuyler, pers. comm.). Most investigators now also favor the separation of *Bolboschoenus* from *Schoenoplectus* (Pignotti & Mariotti 2004). References: Strong (1994)=Z; Smith (1995)=Y; Smith in FNA (2002b); Goetghebeur in Kubitzki (1998b); Pignotti & Mariotti (2004). [also see *Bolboschoenus*]

1 Main involucral bracts 2-8, spreading and foliaceous (the inflorescence thus appearing terminal); rhizomes bearing ovoid tubers; bristles persistent on the achene; achenes 2.5-5 mm long (including body and apiculus) ..... **[*Bolboschoenus*]**

1 Main involucral bract 1 (rarely with an additional 1-2 lateral bracts), erect and terete or triangular, appearing as a continuation of the culm (the inflorescence thus appearing lateral, though in some species the longer inflorescence branches may overtop the bract); rhizomes not bearing tubers; bristles falling from the achene; achenes 1.0-4.5 mm long (including body and apiculus).
  2 Spikelets on stalks of varying lengths, at least some clearly not sessile.
    3 Culms distinctly triangular in cross-section, more sharply so above than below, nearly terete near the base; [section *Malacogeton*] ..... ***Sch. etuberculatus***
    3 Culms terete throughout, or obscurely triangular above; [section *Schoenoplectus*].
      4 Spikelets appearing dull gray-brown, the scales copiously covered with red-brown dots (as seen at 10×) 6-15 mm long; lower and middle scales (3.0-) 3.5-4.0 mm long; culms firm, not easily compressed ..... ***Sch. acutus var. acutus***
      4 Spikelets appearing reddish-brown, the scales not obviously dotted (as seen at 10×), 6-11 mm long; lower and middle scales (2.0-) 2.5-3.0 (-3.5) mm long; culms soft, easily compressed.
        5 Perianth bristles plumose; spikelets acute; culms obscurely triangular near the inflorescence ..... ***Sch. californicus***
        5 Perianth bristles retrorsely barbed; spikelets obtuse; culms terete throughout their length ..... ***Sch. tabernaemontani***
  2 Spikelets all sessile, in a cluster at one point (rarely with 1 or 2 short branches to 5 mm long).
    6 Spikelet solitary; leaves numerous; plant usually aquatic, the culms and leaves flaccid, supported by the water; [section *Malacogeton*] ... . ***Sch. subterminalis***
    6 Spikelets (1-) 2-several; leaves 1-4; usually of wet places, but the culms stiff and erect, not floating.
      7 Rhizomatous perennial; culms triangular in cross-section, usually 5-20 dm tall.
        8 Leaves elongate, > ½ as long as the culms; achenes trigonous; styles 3-branched; [section *Malacogeton*] ..... ***Sch. torreyi***
        8 Leaves short, < ½ as long as the culms; achenes plano-convex; styles 2 (-3) branched; [*Schoenoplectus pungens* complex of section *Schoenoplectus*].
          9 Main involucral bract 1-2.5 (-6) cm long, with no other reduced, scale-like bracts present; mature culms 4-10 mm wide; sides of the culm strongly concave, wing-angled; [strictly of brackish situations in the outer Coastal Plain] ..... ***Sch. americanus***
          9 Main involucral bract (1-) 3-18 cm long, with 1-2 additional, reduced, scale-like bracts present (resembling enlarged scales but lacking a flower); mature culms 1-6 mm wide; sides of the culm flat, slightly concave, or slightly convex; [of inland fresh and salty situations, widespread in our area] ..... ***Sch. pungens var. pungens***
      7 Cespitose annual or perennial; culms terete, 1-6 dm tall.
        10 Perianth bristles absent; achenes 1.2-1.6 mm long, transversely rugose; [section *Supini*].
          11 Achenes biconvex to obscurely trigonous, the faces convex ..... ***Sch. erectus ssp. raynalii***
          11 Achenes biconvex, with a planar or concave area on the adaxial surface ..... ***Sch. hallii***
        10 Perianth bristles 5-6; achenes 1.5-2.0 mm long, smooth, finely pitted, or finely papillose; [section *Actaeogeton*].
          12 Achenes 1.75-2.0 mm long, unequally biconvex (rounded on both faces, but less so on one than the other), rounded-obovate, broadly cuneate at the base, rounded at the apex ..... ***Sch. purshianus***
          12 Achenes 1.5-1.8 mm long, planoconvex (nearly flat on 1 face), obovate, cuneate at the base, subtruncate at the apex .... ***Sch. smithii***

Schoenoplectus acutus (Muhlenberg ex Bigelow) Á. Löve & D. Löve *var.* ***acutus***, Hardstem Bulrush, Great Bulrush. Cp (NC), Mt (VA), Pd (VA): marshes; rare (NC Rare, VA Rare). June-early August; August-October. The species is widespread in temperate North America; var. *acutus* is restricted to e. North America. [= FNA, K, Y; = *Scirpus acutus* Muhlenberg ex Willdenow – RAB, C, F, G, GW, W; ? *Schoenoplectus lacustris* Linnaeus ssp. *glaucus* (Smith) Hartman]

Schoenoplectus americanus (Persoon) Volk ex Schinzius & R. Keller, Olney Threesquare. Cp (GA, NC, SC, VA): tidal freshwater to brackish marshes; rare (NC Watch List). Late May-June; June-September. Nova Scotia west to WA, south to South America. Schuyler (1974) discusses the need to replace the name *S. olneyi* (as traditionally applied) with *S. americanus*, traditionally applied to what must now be called *S. pungens*. Because of this nomenclatural change, the interpretation of much some information and records is now uncertain. [= FNA, K, Z; = *Scirpus americanus* Persoon – C; = *Scirpus olneyi* – RAB, F, G, GW, S]

Schoenoplectus californicus (C.A. Meyer) J. Soják, Giant Bulrush, Southern Bulrush, Tule. Cp (GA, NC, SC): marshes; rare. SC south to FL, west to TX, and extending s. into the New World tropics; on the west coast, from CA southward. [= FNA, K; = *Scirpus californicus* (C.A. Meyer) Steudel – GW, S]

Schoenoplectus erectus (Poiret) Palla ex J. Raynal *ssp.* ***raynalii*** (Schuyler) K. Lye. Cp (GA, SC): sandy or peaty, seasonally wet soils (such as on pond shores); rare (GA Special Concern, SC Rare). September-October. Apparently ranging from SC south to n. FL, c. peninsular FL and sw. GA; also in the tropics of both hemispheres. [= FNA, K; < *Scirpus hallii* A. Gray – RAB, misapplied; ? *Scirpus erismaniae* Schuyler – GW; < *Scirpus erectus* Poiret]

Schoenoplectus etuberculatus (Steudel) J. Soják, Swamp Bulrush, Canby's Bulrush. Cp (GA, NC, SC, VA): beaver ponds, on peat in small depression ponds, in flowing blackwater streams; rare (GA Special Concern, NC Rare, VA Rare). July-August; August-September. DE south to n. FL and west to e. TX (the distribution rather discontinuous); substantially disjunct in s. MO and RI. [= FNA, K, Z; = *Scirpus etuberculatus* (Steudel) Kuntze – RAB, C, F, G, GW, S]

Schoenoplectus hallii (A. Gray) S.G. Smith, Sharpscale Bulrush. Cp (GA): pond shores in peaty sands ; rare (GA Special Concern). It has also been reported for our area by RAB, and is apparently included in our area by C, as *Scirpus supinus* Linnaeus var. *hallii* (A. Gray) A. Gray, and by others; at least some of these reports are misidentifications of the similar *Sch. erectus*. It is reported for sw. GA by Jones & Coile (1988) and Smith in FNA (2002b). It is very similar to *Sch. erectus*, differing in having the spikelet scales yellow brown (vs. reddish brown) and achenes concave on the ventral surface (vs. bulging on the ventral surface). [= FNA, K; = *Scirpus supinus* Linnaeus var. *hallii* (A. Gray) A. Gray – C; = *Scirpus hallii* A. Gray]

Schoenoplectus pungens (Vahl) Palla *var.* ***pungens***, Common Threesquare, Chairmaker's Rush, Swordgrass. Cp (NC, SC, VA), Pd (NC, VA), Mt (VA), {GA}: marshes, rocky river beds; common. Mid May-June; June-September. The species is circumboreal, ranging in North America from Newfoundland west to AK, south to South America; var. *pungens* is widespread. This taxon has traditionally had the name *Scirpus americanus* applied to it; this name, however, is properly applied to the traditional *Scirpus olneyi*. *Scirpus pungens* (or *Schoenoplectus pungens*) becomes the correct name for this plant (Schuyler

1974). [= FNA, K, Y; < *Scirpus americanus* – RAB, F, G, GW, S, W, misapplied; = *Scirpus pungens* Vahl var. *pungens* – C; < *Schoenoplectus pungens* – Z]

Schoenoplectus purshianus (Fernald) M.T. Strong, Bluntscale Bulrush. Mt (GA, NC, SC, VA), Pd (GA, NC, VA), Cp (NC, VA): marshes; common. Late June-August; July-October. ME west to MN, south to nc. GA (Jones & Coile 1988), AL, MS, TN, and KY. [= FNA, K, Z; = *Scirpus purshianus* Fernald – RAB, C, F, GW, W; ? *Scirpus smithii* var. *williamsii* (Fernald) Beetle – G; ? *Scirpus debilis* Pursh – S, misapplied; ? *Scirpus juncoides* Roxburg var. *digynus* (Böckler) T. Koyama; ? *Scirpus juncoides* var. *williamsii* (Fernald) T. Koyama]

Schoenoplectus smithii (A. Gray) J. Soják, Smith's Bulrush, Bluntscale Bulrush. Cp (VA): gravelly intertidal beach; rare (VA Rare). July; Late July-August. Québec west to MN, south to NJ, DE, ne. VA, PA, n. OH, and IL. Reported from mountains of sw. VA. The varieties recognized by Smith in FNA (2002b) are of uncertain value; all three are in or approach our area. Var. *smithii* (south to DE, NJ, and PA) has perianth bristles absent or rudimentary. Var. *levisetus* (with a historic occurrence in VA) has 1-4 perianth bristles, much shorter than to equalling the achene, the bristles smooth or sparsely retrorsely barbed. Var. *setosus* (with records from NC, DE, and MD) has 4-6 perianth bristles, as long as or longer than the achene, and densely retrorsely barbed. [= K, Z; = *Scirpus smithii* A. Gray – C, F; ? *Scirpus smithii* var. *smithii* – G; > *Schoenoplectus smithii* var. *smithii* – FNA; > *Schoenoplectus smithii* var. *setosus* (Fernald) S.G. Smith – FNA; > *Schoenoplectus smithii* var. *levisetus* (Fernald) S.G. Smith – FNA]

Schoenoplectus subterminalis (Torrey) J. Soják, Swaying Rush, Water Bulrush. Cp (GA?, NC, SC, VA), Mt (VA): beaver ponds, bogs, in highly acid water; rare (NC Rare, SC Rare, VA Rare). May-June; June-August. Newfoundland west to s. AK, south to se. NC, nc. SC, GA, panhandle FL, MO, UT (?), and n. CA (the distribution discontinuous, especially southward). [= FNA, K, Z; = *Scirpus subterminalis* Torrey – RAB, C, F, G, GW, S, W]

Schoenoplectus tabernaemontani (C.C. Gmelin) Palla, Softstem Bulrush, Great Bulrush. Cp (GA, NC, SC, VA), Mt (GA, NC, SC, VA), Pd (NC, SC, VA): marshes, sedge maedows, streambeds, riverbeds, calcareous fens; common. June-September. Newfoundland west to AK, south to South America; also in Europe. [= FNA, K, Y; ? *Scirpus validus* Vahl – RAB, C, F, G, GW, S; > *Scirpus validus* var. *validus* – F; *Scirpus validus* var. *creber* Fernald – F; = *Scirpus tabernaemontani* K.C. Gmelin – W; ? *Schoenoplectus validus* (Vahl) A. & D. Löve – Z; ? *Schoenoplectus lacustris* Linnaeus ssp. *validus* (Vahl) T. Koyama var. *validus*; = *Scirpus lacustris* Linnaeus var. *tabernaemontani* (C.C. Gmelin) Döll]

Schoenoplectus torreyi (Olney) Palla, Torrey's Bulrush, Torrey's Threesquare. Mt (VA): sinkhole ponds; rare (VA Rare). New Brunswick west to Manitoba, south to NJ, PA, WV, w. VA, MO, and NE. Known in VA only from natural ponds in Augusta and Rockingham counties. [= FNA, K, Z; = *Scirpus torreyi* Olney – C, F, G, W]

Schoenoplectus deltarum (Schuyler) J. Soják, Delta Bulrush. Brackish marshes and other wetlands, AL and FL west to KS and TX. [= FNA, K; = *Scirpus deltarum* Schuyler] {not yet keyed}

* *Schoenoplectus mucronatus* (Linnaeus) Palla, Rough-seed Bulrush. Weed (native of Eurasia) in rice fields and other disturbed situations, known from old collections in PA, NJ, NY and more recently from KY and TN. [= FNA, K; = *Scirpus mucronatus* Linnaeus] {not yet keyed}

The hybrid *Schoenoplectus etuberculatus* × *subterminalis* has been collected in Hoke Co, NC and Lexington County, SC. It has sterile, malformed achenes.

Scirpus Linnaeus 1753 (Bulrush)

A genus of about 20 species, herbs, of circumboreal distribution, also with species in Australia, Malaysia, and South America. The complex of species including *Sc. atrovirens*, *Sc. georgianus*, *Sc. hattorianus*, *Sc. flaccidifolius* are difficult to identify, and some have doubted their validity. Although further work on this group is needed, they do generally appear to behave as biological species despite their morphological similarity. Schuyler (1967) writes that "the remaining species in the key differ in minute characteristics and often the most satisfactory means of identification is by carefully comparing specimens of them. Despite the close morphological similarity of these species, their characteristics are reasonably constant even in areas where they coexist and occasionally hybridize." References: Whittemore & Schuyler in FNA (2002b); Schuyler (1967)=Z; Strong (1994)=Y; Goetghebeur in Kubitzki (1998b). Key adapted from C, GW, and Z. [also see *Bolboschoenus, Isolepis, Oxycaryum, Schoenoplectus*, and *Trichophorum*]

1 Bristles smooth, without teeth along the margins, strongly contorted and greatly exceeding the achenes when extended.
  2 Scales usually with inconspicuous midribs; mature bristles exceeding the scales and giving the inflorescence a woolly appearance; achenes 0.6-0.9 mm long, yellowish-gray to nearly white ..... ***Sc. cyperinus***
  2 Scales usually with prominent green midribs; mature bristles mostly contained within the scales; achenes1.0-1.3 mm long, brown to purplish-brown when mature.
    3 Perianth bristles (extended) shorter than, equal to, or slightly exceeding the achene; mature culms lax, the inflorescences lopping over to (or nearly to) the ground, with 2-3 lateral inflorescences in addition to the terminal one; rays of the inflorescence scabrous, ascending to divergent, with axillary bulblets..... ***Sc. lineatus***
    3 Perianth bristles (extended) exceeding the achene by 2-3×; mature culms rigid, nearly upright, with 0-2 lateral inflorescences in addition to the terminal one; rays of the inflorescence glabrous, ascending, lacking axillary bulblets..... ***Sc. pendulus***
1 Bristles with retrorse or antrorse teeth along the margins, strongly contorted to nearly straight, shorter than to greatly exceeding the achenes when extended (or bristles absent or nearly so in *Sc. georgianus*).
  4 Spikelets all solitary with distinct pedicels; mature scales with broad green midribs; achenes with protruding angles and concave sides..... ***Sc. divaricatus***
  4 Spikelets all or mostly in glomerules with the pedicels scarcely developed; mature scales with midribs not usually green; achenes less sharply trigonous, the sides convex, flat, or slightly concave.
    5 Culms with 10-20 leaves; spikelets broadly ovate; scales reddish-brown and, excluding the tips, about as wide as long.... ***Sc. polyphyllus***

5 Culms with 2-10 leaves; spikelets broadly ovate to narrowly ovate; scales brown or black and, excluding the tips, mostly longer than wide.
  6 Bristle teeth thick-walled and sharp-pointed, densely arranged almost to the base of the bristle.
    7 Plants cespitose with short, brownish rhizomes; leaf sheaths green throughout; scales broadest above the middle; achenes with well-developed receptacles and firmly attached bristles ..... ***Sc. ancistrochaetus***
    7 Plants spreading with long, reddish rhizomes having conspicuous nodes and internodes; lower leaf sheaths red-tinged near their bases; scales usually broadest below the middle; achenes with poorly-developed receptacles from which the bristles readily detach ..... ***Sc. expansus***
  6 Bristle teeth thin-walled and with rounded tips, mostly restricted to the upper 2/3 of the bristle (or bristles absent or nearly so in *Sc. georgianus*).
    8 Bristles 0-3, shorter than the achenes; teeth, if present, concentrated near the tips of the bristles ..... ***Sc. georgianus***
    8 Bristles usually 5-6, shorter than to slightly longer than the achenes; teeth extending basally from the tips of all or at least some of the bristles.
      9 Mature culms lax and reclining with the inflorescences lopping over to (or nearly to) the ground; glomerules usually with < 15 spikelets; lower scales of spikelets slightly mucronate, blackish ..... ***Sc. flaccidifolius***
      9 Mature culms upright or nearly so; glomerules frequently with > 15 spikelets; lower scales of spikelets mucronate, blackish or brownish.
        10 Lower leaf blades and sheaths usually nodose-septate; spikelets ovate or narrowly ovate; scales mostly brownish; longer bristles frequently exceeding the achenes; achenes 1.0-1.3 mm long ..... ***Sc. atrovirens***
        10 Lower leaf blades and sheaths nearly smooth; spikelets broadly ovate or ovate; scales mostly blackish; longer bristles usually shorter than or about equalling the achenes; achenes 0.8-1.1 mm long ..... ***Sc. hattorianus***

Scirpus ancistrochaetus Schuyler, Northeastern Bulrush. Mt (VA): mountain ponds; rare (US Endangered, VA Endangered). July-September. VT, MA, and NY south to PA, e. WV, and w. VA. See Bartgis (1992) and Schuyler (1962) for additional information on this species. [= FNA, K, Z; < *Sc. atrovirens* var. *atrovirens* – C]

Scirpus atrovirens Willdenow, Black Bulrush. Pd, Mt, Cp (GA?, NC, SC, VA): marshes; common. July-September. Newfoundland west to MN, south to GA and TX; disjunct in AZ. [= FNA, K, Z; < *Scirpus atrovirens* – RAB, GW, S, W; < *Sc. atrovirens* var. *atrovirens* – C, F, G]

Scirpus cyperinus (Linnaeus) Kunth, Woolgrass Bulrush. Cp, Mt, Pd (GA, NC, SC, VA): marshes, disturbed wet ground; common. July-September. Newfoundland west to British Columbia, south to FL, e. TX, and OR. The varieties may be worthy of recognition. [= RAB, FNA, GW, K, W; < *Scirpus cyperinus* – C; > *Scirpus cyperinus* var. *cyperinus* – F; > *Scirpus cyperinus* var. *pelius* Fernald – F; > *Scirpus rubricosus* Fernald – F; > *Scirpus cyperinus* – G, S; > *Scirpus eriophorum* Michaux – G, S]

Scirpus divaricatus Elliott. Cp (GA, NC, SC, VA): swamp forests; common, uncommon in VA (VA Watch List). July-September. Se. VA south to n. FL, west to e. TX, s. TN, and s. MO. [= RAB, C, F, FNA, G, GW, K, S, Z]

Scirpus expansus Fernald, Woodland Bulrush. Mt (NC, SC, VA), Pd (GA, NC, SC, VA), Cp (VA): bogs, marshes, streambeds; common (GA Special Concern). July-September. ME west to MI, south to ne. GA and OH. [= RAB, C, F, FNA, G, GW, K, W, Z; < *Scirpus sylvaticus* Linnaeus – S, misapplied]

Scirpus flaccidifolius (Fernald) Schuyler, Reclining Bulrush. Cp (NC, VA): bottomlands; rare (US Species of Concern, NC Rare, VA Rare). July-September. Endemic to se. VA and ne. NC. A recent status survey (Ludwig 1993) found the following characters to be most useful in distinguishing *Sc. flaccidifolius* from *Sc. georgianus* growing in the same region: bristles 1.2-1.4 mm long (vs. absent or mostly < 0.2, rarely to 1.0 mm long in *Sc. georgianus*), spikelets 1.5-2.1 mm wide (vs. 1.1-2.2 mm wide); spikelets 3-9 (-12) per glomerule (vs. 4-23), and inflorescence rays 5.5-17.9 cm long (vs. 3.5-13.5 cm long). Bristle length was the only character which consistently separated the 2 species; other characters showed overlapping values of possibly statistical value. [= FNA, K, Z; < *Scirpus atrovirens* var. *atrovirens* – C; = *Scirpus atrovirens* Willdenow var. *flaccidifolius* Fernald – F]

Scirpus georgianus R.M. Harper, Georgia Bulrush. Mt, Pd (GA, NC, SC, VA): marshes, wet areas, ditches; common. July-September. Prince Edward Island west to NE, south to GA and e. TX. [= FNA, K, S, Z; < *Scirpus atrovirens* – RAB, GW, W; < *Scirpus atrovirens* var. *atrovirens* – C; = *Scirpus atrovirens* Willdenow var. *georgianus* (R.M. Harper) Fernald – F, G]

Scirpus hattorianus Makino, Northern Bulrush. Mt (NC, VA): seepages, ditches, marshes, mostly at moderate to high elevations; uncommon (VA Watch List). July-September. Newfoundland to w. Ontario and WI, south to MD, NC, OH, and IN. [= FNA, K, Z; < *Scirpus atrovirens* – RAB, GW, W; < *Scirpus atrovirens* var. *atrovirens* – C, F, G]

Scirpus lineatus Michaux. Cp (GA, NC, SC, VA): swamp forests over coquina limestone ("marl"); rare (NC Rare, VA Watch List). May-July. Se. VA south to c. FL, west to LA. [= C, FNA, GW, K, Z; = *Scirpus fontinalis* R.M. Harper – RAB, F, S; > *Scirpus fontinalis* var. *virginiana* Fernald – G]

Scirpus pendulus Muhlenberg. Mt (GA, VA), Pd, Cp (NC, SC, VA): wet ground over limestone, diabase, or other circumneutral rocks; rare (NC Rare). June-July. ME west to MN, SD, and CO, south to NC, ne. FL, NM, and n. Mexico. [= C, FNA, GW, K, W, Z; = *Sc. lineatus* – RAB, F, G, S, misapplied]

Scirpus polyphyllus Vahl. Mt, Pd (GA, NC, SC, VA), Cp (VA): marshes, mountain bogs; common. July-September. MA and VT west to IL and s. MO, south to nc. GA (Jones & Coile 1988) and AL. [= RAB, C, F, FNA, G, GW, K, S, W, Z]

Scirpus atrocinctus Fernald ranges south to WV (Grant, Hampshire, Harrison, Pendleton, Pocahontas, Randolph, and Tucker counties). It is a northern relative of *Sc. cyperinus*, by some not considered distinct. It differs in having spikelets mostly solitary with distinct pedicels (vs. solitary with distinct pedicels or in glomerules with pedicels scarcely developed), scales usually blackish (vs. reddish-brown to brownish, or rarely blackish), and flowering and maturing achenes roughly a month earlier than nearby *Sc. cyperinus*. [= FNA, K; < *Scirpus cyperinus* (Linnaeus) Kunth – C] {synonymy incomplete; not yet keyed}

Scirpus longii Fernald has been reported as occurring in e. NC by Radford, Ahles, & Bell (1968) and Fernald (1950). This report is in error. It does range south to NJ (Kartesz 1999). [= FNA, C, F, K] {synonymy incomplete; not yet keyed}

Scirpus microcarpus J. & K. Presl ranges south to WV (Monongalia, Pocahontas, Randolph, and Tucker counties). It should key straightforwardly to key lead 21, differing however from all later species in the key in having the styles mostly 2-parted (vs. 3-parted) and the achenes 2-angled (vs. 3-angled). [= FNA, C, K] {synonymy incomplete; not yet keyed}

Scirpus pallidus (Britton) Fernald ranges south to se. PA (Rhoads & Klein 1993) and NJ (Kartesz 1999). [= FNA, K; = *Scirpus atrovirens* Willdenow var. *pallidus* Britton – C] {synonymy incomplete; not yet keyed}

Scirpus pedicellatus Fernald, south to NJ, PA, OH, and KY (Kartesz 1999). [= FNA, K; < *Scirpus cyperinus* (Linnaeus) Kunth – C] {synonymy incomplete; not yet keyed}

Scleria P.J. Bergius 1765 (Nutrush)
(by Richard J. LeBlond)

A genus of about 250 species, herbs, pantropical, and locally extending into warm temperate regions. This treatment attempts to recognize the stablest and most distinctive *Scleria* entities. Intermediate and otherwise difficult-to-classify specimens are occasionally encountered within some species groups, suggesting hybridization or incomplete speciation. This is particularly true within the *S. ciliata/pauciflora* group (here boldly treated as four species and two varieties). This complex genus likely will continue to challenge and exasperate those who study it. References: Kessler (1987)=Z; Fairey (1967)=Y; Reznicek, Fairey, & Whittemore in FNA (2002b); Core (1936); Goetghebeur in Kubitzki (1998b).

Identification notes: *Scleria* superficially resembles *Rhynchospora* in the field, but mature specimens are readily recognized by the terete white, gray, or black bony achenes. Hardened achenes are necessary for reliable identification to species. In the key, achene length includes hypogynium when present. The scale character applies only to the ultimate bracteate structure clasping the achene.

1 Base of achene without hypogynium (a circular, angular, lobed, or tuberculate disk differing in texture and structure from the achene body), the achene base constricted, pitted, and/or ribbed, but appearing as a continuation of the achene body.
  2 Inflorescence of 2-9 sessile clusters along an axis up to 13 cm long, the individual spikelets 2-5 mm long; bracts (at least above proximal cluster) setaceous.
    3 Plants perennial with rhizomes; leaf blades usually pubescent, 1.5-5 mm wide; bract and scale margins long-ciliate; spikelets 4-5 mm long; achenes smooth ..... ***S. distans***
    3 Plants annual with fibrous roots; leaf blades glabrous, 0.5-2 mm wide; bract and scale margins eciliate; spikelets 2-3 (-4) mm long; achenes reticulate-pappilose to reticulate-verrucose ..... ***S. verticillata***
  2 Inflorescence of a single cluster, the individual spikelets 4-10 mm long; bracts foliaceous.
    4 Triangular base of achene lacking pits in the three concave sides; achene 3-4 mm long ..... ***Scl. baldwinii***
    4 Triangular base of achene with a pair of pits on each of the three sides; achene 2-3 mm long ..... ***Scl. georgiana***
1 Base of achene with hypogynium.
  5 Achene body smooth (often longitudinally ribbed); hypogynium with 0, 8, or 9 tubercles.
    6 Hypogynium with 8 or 9 minutely papillate tubercles ..... ***Scl. oligantha***
    6 Minutely papillate portion of hypogynium continuous, not divided into separate tubercles.
      7 Achene 1-2 mm long; culm 1-2 mm wide at base; leaves 1-3 mm wide ..... ***Scl. minor***
      7 Achene 2-4 mm long; culm 2.5-6 mm wide at base; leaves 5-9 mm wide.
        8 Plants long-rhizomatous to cespitose; sheaths purple to reddish, the ventral surface uniformly pubescent; achenes 2.8-4.0 mm long, 1.35-1.54× as long as wide (averaging 1.45); mostly of dry to dry-mesic habitats ..... ***Scl. nitida***
        8 Plants cespitose to short-rhizomatous; sheaths brown or straminous to reddish, glabrous to glabrate on the ventral surface except for a pubescent and often thickened summit; achenes 2.0-3.3 mm long, 1.12-1.38× as long as wide (averaging 1.24); of wet to mesic habitats ..... ***Scl. triglomerata***
  5 Achene reticulate or papillose, rarely smooth (most often from apparent abortion or abnormal development); hypogynium with 3 tongue-shaped lobes, or 3 or 6 tubercles.
    9 Hypogynium of 3 tongue-shaped lobes appressed to the underside of the achene (appearing nearly bract-like); achene reticulate, the pits generally squarish or rectangular and arranged regularly in rows, rarely smooth (apparently by abortion or abnormal development).
      10 Achene pubescent (occasionally becoming glabrate); lower lateral inflorescences on long, filiform, usually drooping peduncles; bract of the uppermost lateral inflorescence usually reaching from 1/3-3/4 the length of the terminal internode; terminal internode 6-30 cm long ..... ***Scl. muehlenbergii***
      10 Achene glabrous; lower lateral inflorescences sessile or on short-erect peduncles; bract of the uppermost lateral panicle usually reaching 3/4 the length of to exceeding the terminal internode; terminal internode 3-8 cm long ..... ***Scl. reticularis***
    9 Hypogynium with 3 or 6 tubercles; achene papillose, sometimes reticulate (if so, the pits generally variable in shape and not forming regular rows), or rarely smooth.
      11 Achenes 1.5-2 mm long, the hypogynium with 6 paired but distinctly separate tubercles.
        12 Culms, leaves, and bracts copiously villous-cilliate with spreading hairs 0.5-1 mm long ..... ***Scl. pauciflora*** *var.* ***caroliniana***
        12 Culms, leaves, and bracts glabrous or sparsely hirtellous, but not copiously villous-ciliate ..... ***Scl. pauciflora*** *var.* ***pauciflora***
      11 Achenes 2.0-3.6 mm long, the hypogynium with 3 tubercles, these often 2-lobed, the lobes united (becoming separate in *S.* species 1 with achenes smoothish and > 2.5 mm long).
        13 Achenes 2-2.5(-3) mm long, 1.5-2.0(-2.3) mm wide; larger leaves 1-3.5 mm wide; culms, sheaths, blades, and bracts glabrous to moderately pubescent or ciliate.
          14 Culms and/or sheaths hairy; blades and bracts ciliate; plants of loamy sands (e.g., ultisols) ..... ***Scl. ciliata*** *var.* ***ciliata***
          14 Culms, sheaths, blades, and bracts glabrous; plants of sandy soils (e.g., spodosols) ..... ***Scl. ciliata*** *var.* ***glabra***
        13 Achenes 2.6-3.3(-3.6) mm long, 2.0-2.6 mm wide; larger leaves 3-7 mm wide; culms, sheaths, blades, and bracts moderately to densely pubescent and/or ciliate; plants usually of loamy soils (e.g., ultisols and alfisols).
          15 Herbage pubescent between as well as along primary sheath and adaxial leaf surface nerves and culm angles; most pistillate scales pubescent with appressed hairs 0.1 (-0.2) mm long, the keel similarly pubescent or ciliate with hairs (0.1-)0.2 mm long; achene body distinctly papillose, 2.0-2.4 (-2.5) mm wide, averaging 2.2 mm, the length:width ratio 1.2-1.5 (-1.7); hypogynium with 3 usually lobed tubercles ..... ***Scl. elliottii***

15 Herbage pubescence restricted to primary sheath and leaf surface nerves and culm angles; pistillate scales glabrous, the keel ciliate with glutinous hairs, the longer 0.5-1.0 mm; achene body smoothish, uneven with low, broad non-papillose rises, (2.3-) 2.4-2.6 mm wide, averaging 2.5 mm, the length:width ratio 1.1-1.25; hypogynium with 3 deeply lobed tubercles, or 6 paired but separate tubercles..... ***Scl. species 1***

Scleria baldwinii (Torrey) Steudel, Baldwin's Nutrush. Cp (GA, NC, SC): wet savannas, under *Pinus serotina, P. palustris*, and/or *Taxodium ascendens*; rare (NC Rare, SC Rare). June-July. Se. NC south to FL and west to se. TX; also in Cuba and the Bahamas (Sorrie & LeBlond 1997). *S. baldwinii* is a more robust plant, with larger achenes, than *S. georgiana*. [= RAB, FNA, K, GW]

Scleria ciliata Michaux var. ***ciliata***, Hairy Nutrush. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC): wet to dry sandy thickets and flatwoods, typically on sandy soil; frequent, rare in the mountains, rare in VA (VA Rare). May-August. VA south to FL, west to MO and TX, and in the West Indies, Mexico, and Central America. [= FNA, S, Y; < *S. ciliata* – RAB, C, F, G, GW, W; < *S. ciliata* var. *ciliata* – K]

Scleria ciliata Michaux var. ***glabra*** (Chapman) Fairey, Smooth Nutrush. Cp (GA, NC, SC, VA?): savannas and flatwoods; frequent in the outer Coastal Plain of NC and SC. NC (VA?) south to FL, west to TX. *S. ciliata* var. *curtissii* (Britton) Kessler (=*S. pauciflora* Muhl. ex Willd. var. *curtissii* (Britton) Fairey) is currently of uncertain taxonomic standing. It is distinguished by its reticulate, non-papillose achenes, but such a condition has been observed in achenes with the hypogynium lobing of both *S. ciliata* and *S. pauciflora* (as suggested by the synonymy), and may only represent a form or condition. [= FNA, Y, K; > *S. brittonii* Core ex Small – S; < *S. ciliata* – RAB, C, F, G, GW, W; > *S. ciliata* var. *glabra* – K; > *S. ciliata* var *curtissii* (Britton) Kessler – Z; > *S. pauciflora* Muhl. ex Willd. var. *curtissii* (Britton) Fairey – K]

Scleria distans Poiret in J. Lamarck et al., Riverswamp Nutrush. Cp (GA): moist sandy or peaty soil of pine savannas and flatwoods, boggy areas, and wet openings along roads; rare. May-October. GA and FL west to TX, and in West Indies, Mexico, Central and South America; Africa. [= FNA; *? S. hirtella* Swartz – GW, K, S, Y, Z, misapplied]

Scleria elliottii Chapman, Broad-leaved Hairy Nutrush. Cp (GA, NC, SC, VA): savannas, flatwoods, pine-oak woodlands, meadows, bogs, and clay-based Carolina bays, typically on loamy sands; occasional. May-September. VA south to FL, west to TX, MO, OK. The descriptions of *S. elliottii* in S and of *S. ciliata* Michaux var. *elliottii* (Chapman) Fernald in F do not include the entity here treated as *S. species 1*. [= S; = *S. ciliata* Michaux var. *elliottii* (Chapman) Fernald – F, FNA, Y; < *S. ciliata* var. *ciliata* – K; < *S. ciliata* – RAB, C, G, GW, W]

Scleria georgiana Core, Georgia Nutrush. Cp (GA, NC, SC): pine savannas, cypress savannas, depression meadows, mostly on the outer coastal plain; rare (NC Rare). June-August. NC south to s. FL, west to TX; and in the West Indies, Central and South America. See note under *S. baldwinii*. [= RAB, FNA, GW, K; = *S. gracilis* Elliott – S (name preoccupied)]

Scleria minor W. Stone, Slender Nutrush. Cp, Mt (NC, SC, VA): wet savannas and peaty seepages in the Coastal Plain and Sandhills, bogs in the Mountains; rare (NC Watch List, VA Rare). June-August. NJ south to FL, west to se. TX. [= RAB, C, F, FNA, G, K, W; < *S. triglomerata* – GW, S]

Scleria muehlenbergii Steudel, Pitted Nutrush. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): open wet sand, pine savannas and flatwoods, depression meadows, cypress savannas, limesink ponds, bogs; common. June-September. NY (Long Island), NJ, and NC south to FL, west to TX, north in the interior to MO and IN; also in the West Indies, Bahamas (Sorrie & LeBlond 1997), Mexico, and Central America. *S. muehlenbergii* is adapted to a variety of freshwater wetland habitats, while *S. reticularis* is primarily restricted to the drawdown zones of limesink (doline) ponds and clay-based Carolina bays. Also see notes under *S. reticularis*. In normal specimens, the achene reticulation ridges are sharp-edged and steeply sloped (compare *S. reticularis*). The achene pubescence is often tawny, and achenes appearing superficially glabrous often have a tawny residue under magnification. [= FNA, K; < *S. reticularis* Michaux – RAB, C, GW, W; = *S. muhlenbergii* – F, orthographic variant; = *S. reticularis* var. *pubescens* Britton – G; = *S. setacea* Poiret – S]

Scleria nitida Willdenow, Shining Nutrush. Cp, Mt, Pd (NC, SC, VA) {GA?} (complete distribution by province by state has yet to be determined): dry sandy or rocky soil of pine/scrub oak woodlands, ridgetop forests at lower elevations in the Mountains such as pine/oak heaths, and heath balds. May-October. MA, VA, and KY south to FL, west to LA and MO (also see note under *S. triglomerata*). *S. flaccida* Steudel, here synonymized because of achene and sheath characters, is a poorly known entity with pendulous capillary axillary peduncles and swamp habitat as in *S. oligantha*, but with an unlobed hypogynium; F gives a range of se. VA to FL and LA. [= G; < *S. triglomerata* Michaux – RAB, C, FNA, GW, K, S, W; > *S. flaccida* Steudel – F; > *S. nitida* – F]

Scleria oligantha Michaux, Few-flowered Nutrush. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC, VA): dry to moist forests and woodlands, swamp forests; common. June-September. NJ and MO south to FL and TX, also in Puerto Rico, Mexico, and Central America. The long, filiform, arching lateral peduncles are distinctive. [= RAB, C, F, FNA, G, GW, K, S, W]

Scleria pauciflora Muhlenberg ex Willdenow *var.* ***caroliniana*** A. Wood, Carolina Nutrush. Cp (GA, NC, SC, VA?): savannas; uncommon. June-September. NH west to MI, south to n. FL, TN, and MO. [= F, FNA, G, K; < *S. pauciflora* – RAB, C, GW, S, W]

Scleria pauciflora Muhlenberg ex Willdenow *var.* ***pauciflora***, Papillose Nutrush. Cp, Pd, Mt (GA, NC, SC, VA): wet to dry pine flatwoods, pine savannas, depression meadows; common. June-September. NJ west to KS, south to FL and TX, also in Cuba. Typification of *S. pauciflora* is controversial and unresolved at this time (Fairey & Whittemore 1999). [= F, FNA, G, K; < *S. pauciflora* – RAB, C, GW, S, W]

Scleria reticularis Michaux, Netted Nutrush. Cp (GA, NC, SC): limesink ponds, clay-based Carolina bays; rare (NC Rare). June-September. MA south to FL, west to TX, north to IN, MI, and WI. Reports from Mexico are based on *S. muehlenbergii*. See notes under *S. muehlenbergii*. In normal specimens, the achene reticulation ridges are soft-edged and obliquely sloped. Occasional stipitate-capitate fungal growth on the achene has been mistaken for pubescence (a condition perhaps restricted to herbarium specimens), apparently contributing to the unwarranted agglomeration of this distinctive taxon and *S. muehlenbergii*.

There is conbtroversy about typification of the name *Scleria reticularis* (Camelbeke, Reznicek, & Goetghebeur 2003). [= F, FNA, K, S; < *S. reticularis* – RAB, C, GW, W (also see *S. muehlenbergii*); = *S. reticularis* var. *reticularis* – G]

Scleria species 1, Smooth-seeded Hairy Nutrush. Cp, Pd (NC): wet savannas shallowly underlain by coquina limestone in the Coastal Plain, and apparently in diabase glades and barrens in the Piedmont. May-September. Currently known only from Granville, Onslow, and Pender counties, NC. On the Coastal Plain, it is associated with other narrow endemics such as *Thalictrum cooleyi, Allium sp. 1*, and *Carex lutea.*

Scleria triglomerata Michaux, Tall Nutrush. Cp, Mt?, Pd (GA, NC, SC, VA): wet to mesic flatwoods, savannas, and hardwood forests; frequent. May-September. VT and Ontario west to MN, south to FL and TX. *S. triglomerata* sensu lato also occurs in Puerto Rico and Mexico, and may include *S. nitida.* [= F, G; < *S. triglomerata* – RAB, C, FNA, GW, K, S, W]

Scleria verticillata Muhlenberg ex Willdenow, Savanna Nutrush. Cp (GA, NC, SC, VA), Mt (VA): wet calcareous savannas of the outer coastal plain, freshwater marshes and maritime wet grasslands on barrier islands influenced by salt spray and shell deposits, wet calcareous or mafic fens or seepages in the mountains, calcareous grasslands; rare (NC Rare, VA Rare). July-September. MA and Ontario west to MN, south to FL and TX, also in the West Indies, Mexico, Central and South America. This species is a distinct calciphile, with only scattered occurrences in or near our area. The roots are strongly fragrant. [= RAB, C, F, FNA, G, GW, K, S]

Trichophorum Persoon (Deergrass)

A genus of about 10 species, herbs, primarily circumboreal, but with disjunct occurrence in montane tropical Asia and montane tropical South America. *Trichophorum* has long been recognized as distinct from *Scirpus* by many authors (especially in Europe and Asia). Molecular and other studies have clearly confirmed that these species are more closely allied to *Eriophorum* than to *Scirpus*, and their removal from *Scirpus* creates a more natural classification (Strong 1994). *Trichophorum* resembles *Eriophorum* in most morphologic characters, and shares with it a generally boreal and north temperate distribution. *Trichophorum alpinum* (Linnaeus) Persoon demonstrates previous confusion over the affinities of the group; it has been variously treated (by those who do not recognize *Trichophorum*) as *Eriophorum alpinum* Linnaeus or *Scirpus hudsonianus* (Michaux) Fernald. References: Crins in FNA (2002b); Strong (1994)=Z; Goetghebeur in Kubitzki (1998b).

1 Culms terete or nearly so, smooth; [(in our area) of moderate to high elevation cliffs] ..... ***Tr. caespitosum ssp. caespitosum***
1 Culms sharply triangular in cross-section, the angles scabrous; [plants of low to moderate elevation forests, woodlands, and bluffs] ..... ***Tr. planifolium***

Trichophorum caespitosum (Linnaeus) Schur *ssp.* ***caespitosum***, Deergrass, Deerhair Bulrush. Mt (GA, NC, SC): cliffs receiving fog/cloud deposition and seepage, mostly at high elevations, over amphibolite, granite, gneiss, or schist, notably at Grandfather Mountain, Roan Mountain, Whiteside Mountain, and Chimney Rock; rare (GA Special Concern, NC Rare). July-September. A circumboreal tundra species, south in North America to the mountains of New England and fens in NY, and to n. IL, MN, montane UT, and OR, common in wet tundra and on alpine summits, disjunct (from NY) to about a dozen sites in the Southern Appalachians of w. NC, e. TN, sw. SC, and ne. GA (Jones & Coile 1988). The disjunct southern occurrences are certainly relicts of a more widespread distribution during the Pleistocene. Reported for South Carolina by Hill & Horn (1997) and Hill (1999). [< *Trichophorum caespitosum* – K; > *Scirpus cespitosus* var. *callosus* Bigelow – RAB, F, G; < *Scirpus cespitosus* Linnaeus – C, W; < *Trichophorum cespitosum* – FNA, orthographic variant; < *Scirpus caespitosus* – S; ? *Baeothryon cespitosum* (Linnaeus) A. Dietrich]

Trichophorum planifolium (Sprengel) Palla. Pd, Mt (VA): woodlands, bluffs, forests; uncommon. ME west to Ontario, south to sc. VA, e. WV, KY, OH, and se. MO. See Crins (1989a) for an interesting discussion of this species. [= FNA, K, Z; = *Scirpus verecundus* Fernald – C, F, G, W; = *Scirpus clintonii* – S, misapplied]

DIOSCOREACEAE R. Brown 1810 (Yam Family)

A family of about 3-20 genera and 600-880 species, of tropical and warm temperate regions. References: Raz in FNA (2002a); Huber in Kubitzki (1998a).

Dioscorea Linnaeus 1753 (Yam)

A genus of about 575-850 species, vines, of tropical and warm temperate regions of the Old World and New World. Huber in Kubitzki (1998a) advocates the division of the large and unwieldy *Dioscorea* into separate genera. *Dioscorea* (broadly defined) has a wide variety of economic uses, especially in the tropics, where it is most diverse. Various species are cultivated for their edible tubers (yams, not to be mistaken for sweet potatoes, *Ipomoea batatas*, often referred to colloquially as "yams" in the southern United States), especially in Africa. Oral contraceptives were developed from extracts of *Dioscorea*. Many other uses are described in Al-Shehbaz & Schubert (1989). References: Raz in FNA (2002a); Al-Shehbaz & Schubert (1989)=Y; Ward (1977c)=Z; Huber in Kubitzki (1998a).

1 Leaves halberd-shaped or sagittate, the sides with a concave portion (*D. polystachya*) or continuously convex (*D. alata*); aerial tubers often present in the leaf axils; perennial from large, vertically-oriented tubers; [non-native species, usually in disturbed areas, especially in bottomlands]; [section *Enantiophyllum*].

2 Stems broadly winged; leaf margins sagittate, the sides continuously convex ..... ***D. alata***
2 Stems terete, not winged; leaf margins halberd-shaped, the sides with a concave portion ..... ***D. polystachya***
1 Leaves cordate-ovate, the sides of the leaves continuously convex; aerial tubers never present; perennial from rhizomes < 1.5 cm in diameter; [native species, usually of forests and woodlands]; [section *Macropoda*].
3 Staminate inflorescences usually of 1 large and 1-2 smaller secondary panicles in each axil (of upper stem leaves); filaments inwardly curved, ca. 0.4 mm long; anther lobes connate; tepals oblong; [of SC south] ..... ***D. floridana***
3 Staminate inflorescence a single panicle in each axil (of median or upper leaves); filaments straight, ca. 0.2 mm long; anther lobes separate; tepals ovate; [widespread in our area].
4 Lower leaves in whorls of 4-7, upper leaves alternate; stem terete in cross-section; rhizomes 10-15 mm in diameter, often contorted and much-branched ..... ***D. quaternata***
4 All leaves alternate (rarely the lowermost approximate, with short internodes, and appearing nearly whorled); stem polygonal in cross-section, with 8-14 narrowly-winged ribs; rhizomes 5-10 mm in diameter, usually relatively straight and little-branched ..... ***D. villosa***

* ***Dioscorea alata*** Linnaeus, White Yam, Great Yam. Cp (FL, GA): disturbed areas, in moist soils; rare, native of se. Asia. [= FNA, K, WH, Y, Z]

* ***Dioscorea bulbifera*** Linnaeus, Air Yam. Cp (FL, LA, MS): disturbed forests, thickets, and banks; uncommon, native of Africa and Asia. [= FNA, K, WH] {add to key; add to synonymy}

Dioscorea floridana Bartlett, Florida Wild Yam. Cp (FL, GA, SC): mesic to dry forests, swampy forests; uncommon. June-July; August-November. SC south to n. FL, on the Coastal plain. *D. floridana* is "the most distinctive of North American species" (Al-Shehbaz & Schubert 1989). [= FNA, K, S, WH, Y, Z; = *D. villosa* Linnaeus var. *floridana* (Bartlett) Ahles – RAB]

* ***Dioscorea polystachya*** Turczaninow, Cinnamon Vine, Chinese Yam. Mt, Pd (GA, NC, SC, VA), Cp (LA, NC, SC, VA): thickets, disturbed areas, bottomland forests; uncommon, native of China. June-August. [= FNA; = *D. batatas* Decaisne – RAB, C, F, G, W, Z; = *D. oppositifolia* Linnaeus – K, Y, misapplied]

Dioscorea quaternata J.F. Gmelin, Whorled Wild Yam. Mt, Pd (GA, NC, SC, VA), Cp (FL): moist forests; common. April-June; September-October. This species has been shown to be quite distinct from *D. villosa*. It has a more northern and montane range than *D. villosa*, ranging from NJ, NY, s. Ontario, WI, MN, and IA south to n. FL and LA, centered, and most abundant, in the Appalachians. The status of *D. glauca* requires further investigation (see Ward 1977c). [= C, F, G, K, S, Y, Z; < *D. villosa* var. *villosa* – RAB; *D. glauca* Muhlenberg ex Bartlett – S; < *D. villosa* – FNA, W, WH]

Dioscorea villosa Linnaeus, Common Wild Yam. Cp (FL, GA, NC, SC, VA), Pd, Mt? (GA, NC, SC, VA): moist forests and woodlands; uncommon. April-June; September-November. MA and RI south to n. FL, primarily in the Coastal Plain. Various specific and infraspecific taxa are here combined. Ward (1977c) states that "a recent study at Duke University by Shu-fun Au, unfinished due to the death of its author, tentatively recognized *D. hirticaulis* and *D. floridana* but combined all other entities without distinction under *D. villosa*." Further study is needed. Al-Shehbaz & Schubert (1989) indicate that the lectotype of *D. villosa* has pubescent stems; nomenclatural changes are apparently needed, if varietal status of the 2 varieties here recognized proves warranted. [= Y; > *D. villosa* var. *villosa* – C; >< *D. villosa* var. *villosa*– RAB (also see *D. quaternata*); < *D. villosa* – FNA, K, WH; > *Dioscorea villosa* Linnaeus var. *hirticaulis* (Bartlett) Ahles – RAB, C; > *D. hirticaulis* Bartlett – F, G, S, Z ; > *D. villosa* – F, G, S, W, Z]

ERIOCAULACEAE Palisot de Beauvois 1828 (Pipewort Family)

A family of about 10 genera and 1100 species, of tropical and warm temperate regions (few in cold temperate regions), especially America, and most diverse in n. South America. References: Kral in FNA (2000); Kral (1966c)=Z; Stützel in Kubitzki (1998b).

1 Scape glabrous, 10-110 cm tall at maturity; roots thickened, septate (not requiring magnification), unbranched; leaves with obvious air spaces; petals 2, fused below; stamens (3-) usually 4 (-6), the anthers black at maturity ..... ***Eriocaulon***
1 Scape pubescent (in our species, or very rarely nearly glabrous), 6-40 cm tall at maturity; leaves lacking obvious air spaces; roots fibrous or spongy, not septate; petals 3 or absent; stamens 2-3, the anthers yellow at maturity.
2 Scape pubescent with eglandular hairs; roots fibrous, branched, dark; heads white, gray, or brown; leaves bright green, tapering gradually through most of their lengths, herbaceous in texture ..... ***Lachnocaulon***
2 Scape pubescent with glandular hairs (or a mixture of glandular and eglandular hairs); roots spongy, unbranched, pale; heads yellowish-tan or gray; leaves bluish green, narrowly linear to the abruptly flared base, stiff in texture ..... ***Syngonanthus***

Eriocaulon Linnaeus 1753 (Pipewort)

A genus of about 400 species, of tropical and warm temperate regions (few in cold temperate areas). References: Kral in FNA (2000); Kral (1966c)=Z; Stützel in Kubitzki (1998b). Key based on Kral in FNA (2000).

1 Receptacle and/or base of flowers copiously hairy; some or most of perianth parts with chalk white hairs; heads overall appearing white, 5-20 mm in diameter when in full flower or fruit.
2 Heads hard (little compressed by a plant press and feeling hard and knotty when squeezed between finger and thumb); leaves dark green, the tip acute to obtuse; scape sheaths shorter than most leaves; involucral bracts straw-colored, the apex acute; receptacular bracteoles pale, the apex narrowly acuminate; pistillate flower petals adaxially glabrescent; terminal cells of club-shaped hairs of the perianth whitened, the basal cells often uncongested and transparent.
3 Leaves to 1 cm wide, with acute to rounded tip; heads 7-15 mm in diameter; [widespread in our area] ..... ***E. decangulare var. decangulare***
3 Leaves to 2 cm wide, with rounded tip; heads 13-20 mm in diameter; [of the East Gulf Coastal Plain, known from Panhandle FL and s. AL] ..... ***E. decangulare var. latifolium***

2 Heads soft (much flattened by a plant press, and easily compressed when fresh between finger and thumb); leaves pale green, the tip attenuate-subulate; scape sheaths longer than most leaves; involucral bracts gray or dark, the apex rounded or obtuse; receptacular bracteoles gray to dark gray, the apex acute; pistillate flower petals adaxially villous; all cells of club-shaped hairs on perianth white.
  4 Mature heads 10-20 mm in diameter; leaves 5-30 cm long; petals of staminate flowers conspicuously unequal; [plants primarily of seasonally flooded ponds] ..... ***E. compressum***
  4 Mature heads 5-10 mm in diameter; leaves (1-) 2-5 (-7) cm long; petals of staminate flower nearly equal ..... ***E. texense***
1 Receptacle and/or base of flowers glabrous or sparingly hairy; receptacular bracteoles and/or perianth parts glabrous or hairy, the hairs club-shaped, clear or white; heads dark gray or white, 3-4 mm (*E. koernickianum*, *E. parkeri*, and *E. ravenelii*), or 4-10 mm (*E. aquaticum* and *E. lineare*) in diameter when in full flower or fruit.
  5 Stamens 6; pistil 3-carpellate ..... ***E. cinereum***
  5 Stamens 4; pistil 2-carpellate.
    6 Heads 4-10 mm in diameter when in full flower or fruit; outer involucral bracts usually reflexed, obscured by bracteoles and flowers.
      7 Inner involucral bracts, receptacular bracts, and sepals darkened, usually gray to nearly black; young heads dark; seeds very faintly reticulate, not papillate; [of ne. North America] ..... ***E. aquaticum***
      7 All bracts of staminate and pistillate flowers straw-colored or pale with grayish midzone, sepals of pistillate flowers basally pale, darkening toward the tip to grayish, gray-green, or gray-brown; heads (young and mature) pale; seeds faintly rectangular-reticulate, often papillate in lines; [of the se. Coastal Plain] ..... ***E. lineare***
    6 Heads 3-4 mm in diameter when in full flower or fruit; outer involucral bracts neither reflexed nor obscured by bracteoles and flowers.
      8 Bracts straw-colored, greenish, or light gray to gray, dull, the margins often erose or lacerate, the apex blunt to obtuse; [of tidal waters and large natural lakes of the outer Coastal Plain] ..... ***E. parkeri***
      8 Bracts dark, gray to blackish, very shiny, the margins all nearly entire, the apex acute; [of moist acidic sites].
        9 Bracts orbicular or broadly oblong, the apex rounded or apiculate; bract margins and apex hairy; perianth hairy; seed not pale-reticulate ..... ***E. koernickianum***
        9 Bracts narrowly ovate to oblong or spatulate, the apex acute; bracts and perianth parts (except sometimes the petals) glabrous; seed conspicuously pale-reticulate ..... ***E. ravenelii***

Eriocaulon aquaticum (Hill) Druce, Seven-angled Pipewort. Cp (NC, VA), Mt (VA): ponds, lakes; uncommon. July-October. New Brunswick and Newfoundland west to Ontario and MN, south to e. NC, VA, AL, and IN; also Great Britain and Ireland. The name *E. septangulare* is invalid. *E. aquaticum* is the correct name if the species is interpreted to include both northern European and northeastern North American plants. If North American plants are distinct from European, the correct name is *E. pellucidum*. [= C, FNA, K; > *E. pellucidum* Michaux – RAB; = *E. septangulare* Withering – F, G, GW, W, Z, invalid name]

* ***Eriocaulon cinereum*** R. Brown, Ashy Pipewort. Pd (SC): drawdown shore of manmade lake; rare, native of Australasia. See Kilpatrick & McMillan (2003). [= FNA, GW, K, Z]

Eriocaulon compressum Lamarck. Cp (FL, GA, NC, SC, VA), Pd (NC), Mt (NC, VA): ponds, lakes, other depressions, wetter places in pine flatwoods and pine savannas; common. June-October. NJ south to s. FL, west to e. TX. [= RAB, C, F, FNA, G, GW, K, S, W, WH, Z]

Eriocaulon decangulare Linnaeus *var.* ***decangulare***, Common Ten-angled Pipewort. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC, SC): wet savannas and pine flatwoods, bogs, seasonally flooded ponds; common. June-October. NJ south to s. FL, west to sw. AR and e. TX; Mexico, Central America. [= FNA, K; < *E. decangulare* – RAB, C, F, G, GW, S, W, WH, Z]

Eriocaulon decangulare Linnaeus *var.* ***latifolium*** Chapman ex Moldenke, Panhandle Pipewort. Cp (AL, FL): seepage bogs; rare. Restricted to Panhandle FL, s. AL, and s. MS. It appears to warrant taxonomic status, but needs additional study. [= FNA, K; < *E. decangulare* – GW, S, WH, Z]

Eriocaulon koernickianum van Heurck & Mueller-Aargau, Dwarf Pipewort. Pd (GA): seepage areas on granite flatrocks; rare (GA Special Concern). W. AR and e. OK south to e. TX; disjunct in c. GA. See Watson et al. (2002) for information on variation within the species. [= FNA, K; = *E. kornickianum* – GW, orthographic variant]

Eriocaulon lineare Small. Cp (FL, GA): seepage bogs; rare. Sw. GA south to c. peninsular FL, west to s. AL. It has been reported for NC (Kral in FNA 2000), but this is apparently in error. Kral & Sorrie (1998) proposed the conservation of the name *E. lineare* with a conserved type, as the designated type actually represents *E. texense*; this course was accepted by Brummitt (2005). [= FNA, GW, K, S, WH]

Eriocaulon parkeri B.L. Robinson, Estuary Pipewort. Cp (NC, VA): natural lakes, tidal marshes; uncommon. S. Canada south to e. NC. [= C, F, FNA, G, GW, K, Z]

Eriocaulon ravenelii Chapman. Cp (FL, GA, SC): wet pine savannas; rare. July-September. SC south to s. peninsular and Panhandle FL. [= RAB, FNA, GW, K, S, WH, Z]

Eriocaulon texense Körnick, Texas Hatpins. Cp (FL, GA, NC, SC): sandhill seepage bogs, Altamaha Grit outcrops; rare (GA Special Concern). Sc. NC south to w. Panhandle FL, west to e. TX. [= FNA, GW, K, WH, Z]

Eriocaulon nigrobracteatum E.L. Bridges & Orzell, Dark-headed Hatpins. Cp (FL): seepage bogs; rare. Endemic to the FL Panhandle (Bay, Calhoun, and Gulf counties). [= K, WH] {not yet keyed; add to synonymy]

Lachnocaulon Kunth 1841 (Bogbuttons)

A genus of 7 species, herbs, of se. North America and Cuba. References: Kral in FNA (2000); Kral (1966c)=Z; Stützel in Kubitzki (1998b).

1 Trichomes at the tips of the receptacular bracts milky white, opaque, the head therefore appearing gray to white, obscuring the brown color of the bractlets.
  2 Mature heads 4-7 mm across; seeds obviously longitudinally striate (as seen at 10× magnification) ..... ***L. anceps***

2 Mature heads 3.5-4.0 mm across; seeds not obviously longitudinally striate, the striations obscure and very fine (not visible at 10× magnification) ..... ***L. beyrichianum***
1 Trichomes at the tips of the receptacular bracts translucent, the head therefore showing the brown color of the bractlets.
3 Scape with ascending hairs ..... ***L. minus***
3 Scape glabrous.
4 Leaves 0.5-1 (-2) cm long; head light brown, usually globose; carpels 2 ..... ***L. digynum***
4 Leaves 2-3 cm long; head reddish- or dark brown, usually elongate-cylindric; carpels 3 ..... ***L. engleri***

Lachnocaulon anceps (Walter) Morong, Common Bogbuttons. Cp (FL, GA, NC, SC, VA), Pd (GA, NC?), Mt? (GA?): moist to dry sands, moist peats, in pinelands, sometimes locally abundant in open disturbed areas where competition has been removed; common (rare in VA). May-October. S. NJ south to s. FL, west to se. TX; disjunct in ec. TN. [= RAB, C, F, FNA, G, GW, K, WH, Z; > *L. anceps* – S; > *L. floridanum* – S; > *L. glabrum* Körnick – S]

Lachnocaulon beyrichianum Sporleder ex Körnick, Southern Bogbutton. Cp (FL, GA, NC, SC): upper margins of Coastal Plain doline ponds (sometimes under scrub oaks), flatwoods; rare. May-September. Se. NC south to Panhandle FL and s. peninsular FL. [= RAB, FNA, GW, K, S, WH, Z]

Lachnocaulon digynum Körnick, Pineland Bogbutton. Cp (AL, FL, LA, MS): pine savannas, bogs; rare. Panhandle FL and s. AL west to TX. [= FNA, GW, K, S, WH, Z]

Lachnocaulon engleri Ruhland, Engler's Bogbutton. Cp (AL, FL): pondshores, pine savannas; uncommon. N. FL peninsula south to s. FL; Panhandle FL and s. AL. [= FNA, GW, K, S, WH, Z]

Lachnocaulon minus (Chapman) Small, Brown Bogbutton. Cp (FL, GA, NC, SC): upper margins of Coastal Plain doline ponds, other pineland situations; common (uncommon north of FL). May-October. E. NC south to s. peninsular FL, west to Panhandle FL and se. AL. [= RAB, FNA, GW, K, WH, Z; > *L. minus* – S; > *L. eciliatum* Small – S]

Syngonanthus Ruhland 1900 (Yellow Hatpins)

A genus of about 200 species, primarily of tropical America, but some in Africa and Madagascar; ours is the only temperate species. References: Kral in FNA (2000); Kral (1966c)=Z; Stützel in Kubitzki (1998b).

Syngonanthus flavidulus (Michaux) Ruhland, Yellow Hatpins, Bantam-buttons. Cp (FL, GA, NC, SC): pine savannas, pine flatwoods, borders of pineland ponds, and adjacent ditches; common (uncommon in GA and SC, rare in NC). May-October. Se. NC south to s. FL, west to s. MS. [= RAB, FNA, GW, K, S, WH, Z]

HAEMODORACEAE R. Brown 1810 (Bloodwort Family)

A family of about 14 genera and 100 species, herbs, of semicosmopolitan distribution, but centered in Australia. The Haemodoraceae is primarily a family of the Southern Hemisphere; *Lachnanthes* is the only member native to e. North America. *Lophiola* has often been treated in the Haemodoraceae; recent evidence, however, indicate that it is better placed in the Nartheciaceae (or Liliaceae *sensu lato*); see *Lophiola* (Nartheciaceae) for additional details. References: Robertson (1976)=Z; Simpson in Kubitzki (1998b); Robertson in FNA (2002a). [also see *MELANTHIACEAE*]

Lachnanthes Elliott 1816 (Redroot)

A monotypic genus, an herb, of se. North America and the West Indies. References: Simpson in Kubitzki (1998b); Robertson in FNA (2002a); Gandhi (1999)=Y.

Identification notes: A very distinctive plant when in flower, with its densely woolly inflorescence and flowers. When not in flower, recognizable by its equitant (iris-like) base and bright red roots.

Lachnanthes caroliniana (Lamarck) Dandy, Redroot. Cp (FL, GA, NC, SC, VA), Mt (VA): wet savannas, pocosin edges, shores of Coastal Plain depression ponds (and similar ponds in the mountains of Virginia), ditches, wet disturbed ground; common (rare in Mountains, rare in VA). June-early September; September-November. The range is almost strictly on the Coastal Plain, and rather disjunct: s. Nova Scotia, from MA to DE, from se. VA south to s. FL and west to LA, with inland disjunctions in w. VA and sc. TN (Coffee County); also in Cuba. The correct spelling of the specific epithet has been disputed; the original spelling was "*caroliana*," and Gandhi (1999) argues convincingly that it is a correctable typographic error. [= RAB, C, FNA, GW, W, Y; = *Lachnanthes caroliana* – K, WH, Z, orthographic variant; = *L. tinctoria* (J.F. Gmelin) Elliott – F, G; = *Gyrotheca tinctoria* (J.F. Gmelin) Salisbury – S]

HEMEROCALLIDACEAE R. Brown 1810 (Day-lily Family)

A family of about 13 genera and 50 species, herbs, of temperate, subtropical, and tropical regions. The circumscription of this family is uncertain; it is often treated as monotypic, excluding (for instance) the Phormiaceae. References: Zomlefer (1998, 1999); Clifford, Henderson, & Conran in Kubitzki (1998a).

Hemerocallis Linnaeus 1753 (Day-lily)

A genus of about 15-30 species, temperate, of e. Asia. References: Zomlefer (1998)=Z; Straley & Utech in FNA (2002a).

1 Flowers tawny-orange (or many variants thereof), not fragrant; inner tepal margins wavy ..... ***H. fulva***
1 Flowers lemon-yellow, fragrant; inner tepal margins planar ..... ***H. lilioasphodelus***

* ***Hemerocallis fulva*** (Linnaeus) Linnaeus, Orange Day-lily, Tawny Day-lily. Cp (FL, NC, SC, VA), Pd, Mt (NC, SC, VA), {GA}: commonly cultivated, frequently escaping to forests, streambanks, suburban woodlands, lawns, waste places; common (rare in FL), native of Asia. Late May-early July. [= RAB, C, FNA, G, K, W, WH, Z; > *H. fulva* var. *fulva* – F; > *H. fulva* var. *kwanso* Regel – F]
* ***Hemerocallis lilioasphodelus*** Linnaeus, Yellow Day-lily, Lemon Day-lily. Pd (NC): less commonly cultivated, only rarely escaping; rare, native of Asia. May-July. [= C, FNA, K, Z; = *H. flava* (Linnaeus) Linnaeus – F, G]

HOSTACEAE B. Mathew 1988 (Hosta Family)

A family of a single genus, of about 25 species, of temperate e. Asia. This family is closely related to the Agavaceae, and its inclusion there may prove warranted. References: Kubitzki in Kubitzki (1998a).

Hosta Trattinick 1812 (Hosta, Plantain-lily)

A genus of about 25-40 herbs, of temperate Asia, widely cultivated (since at least the 8th century), and with numerous cultivars. References: Kubitzki in Kubitzki (1998a); Utech in FNA (2002a). Key based on Utech in FNA (2002a).

1 Flowers long-tubular, to 13 cm long, white, fragrant ..... ***H. plantaginea***
1 Flowers campanulate to urceolate, 4-5.5 cm long, blue or purplish, not fragrant.
  2 Leaves lanceolate to oblong, 10-17 cm long, 5-7.5 cm wide, with 5-6 lateral veins on each side of the midvein; flowers purplish violet; anthers purple ..... ***H. lancifolia***
  2 Leaves ovate to cordate, the blade 20-30 cm long, 15-20 cm wide, with 7-9 lateral veins on each side of the midvein; flowers bluish purple; anthers spotted purple ..... ***H. ventricosa***

* ***Hosta lancifolia*** Engler, Narrowleaf Plantain-lily. {distr.}: widely planted as a shade ornamental, rarely persistent; common in cultivation, rarely persistent, "native" of Japan (probably only of garden origin). [= FNA, K]
* ***Hosta plantaginea*** (Lamarck) Ascherson, Fragrant Plantain-lily. {distr.}: widely planted as a shade ornamental, rarely persistent; common in cultivation, rarely persistent, native of China. [= FNA, K]
* ***Hosta ventricosa*** (Salisbury) Stearn, Blue Plantain-lily. Mt (NC, VA), Pd (VA), {distr.}: widely planted as a shade ornamental, rarely persistent; common in cultivation, rarely persistent, native of China. [= FNA, K]

HYACINTHACEAE Batsch 1786 (Hyacinth Family)

A family of about 67 genera and 900 species, herbs, nearly cosmopolitan. References: Speta in Kubitzki (1998a); Pfosser et al. (2003). [also see *AGAVACEAE*]

1 Tepals united into a perianth tube longer than the free portion; [subfamily *Hyacinthoideae*, tribe *Hyacintheae*].
  2 Perianth tube <2 × as long as the lobes; corolla spreading and open at the mouth ..... ***Hyacinthus***
  2 Perianth tube >2 × as long as the lobes; corolla contracted at the mouth ..... ***Muscari***
1 Tepals free or fused only at the extreme base.
  3 Bracts 2 per flower; tepals fused at the extreme base; tepals blue (less commonly white or pink); [subfamily *Hyacinthoideae*, tribe *Hyacintheae*] ..... ***Hyacinthoides***
  3 Bracts 0-1 per flower; tepals free; tepals white, with a greenish stripe on the outer surface; [subfamily *Ornithogaloideae*] ..... ***Ornithogalum***

Hyacinthoides Medikus 1791 (Bluebell)

A genus of 3-4 species, herbs, of se. Europe and n. Africa. The narrow circumscription of *Scilla* (excluding *Hyacinthoides*) is supported by molecular phylogenetic studies (Pfosser et al. 2003). References: Stace (1997)=Z; McNeill in FNA (2002a); Speta in Kubitzki (1998a). Key based on Stace (1997).

1 Racemes erect; perianth campanulate; anthers blue ..... ***H. hispanica***
1 Racemes pendant at apex; perianth tubular; anthers cream ..... ***H. nonscripta***

* ***Hyacinthoides hispanica*** (P. Miller) Rothm., Spanish Bluebell. Pd (NC, VA): persistent after cultivation; rare, native of Europe. [= FNA, K, Z; = *Endymion hispanicus* (P. Miller) Chouard]

* ***Hyacinthoides nonscripta*** (Linnaeus) Choard ex Rothm., English Bluebell. Pd (VA): persistent after cultivation; rare, native of Europe. [= K, Z; = *Scilla non-scripta* (Linnaeus) Hoffmannsegg & Link – C, G; = *Scilla nonscripta* (Linnaeus) Hoffmannsegg & Link – F; = *Hyacinthoides non-scripta* – FNA, orthographic variant; = *Endymion nonscripta* (Linnaeus) Garcke]

Hyacinthus Linnaeus 1753 (Hyacinth)

A genus of 3 species, herbs, of w. Asia. References: Stace (1997)=Z; Speta in Kubitzki (1998a).

* ***Hyacinthus orientalis*** Linnaeus, Hyacinth. Pd (VA): persistent after cultivation; rare, native of w. Asia. [= K, Z]

Muscari P. Miller 1754 (Grape-hyacinth)

A genus of about 50 species, herbs, of Europe, Mediterranean areas, and w. Asia. References: Stace (1997)=Z; Straley & Utech in FNA (2002a); Speta in Kubitzki (1998a).

1 Raceme 10-20 cm long; pedicels of the terminal flowers > 5 mm long; flowers brown (the lower and fertile) and blue (the upper and sterile); leaves flat, mostly 8-20 mm wide ..... ***M. comosum***
1 Raceme 1-5 cm long in flower (somewhat longer in fruit); pedicels < 5 mm long; flowers all blue to blue-black; leaves flat, channeled, or terete, mostly 1-8 mm wide.
  2 Leaves flat or channeled, 3-8 mm wide ..... ***M. botryoides***
  2 Leaves nearly terete, 1-3 mm wide ..... ***M. neglectum***

* ***Muscari botryoides*** (Linnaeus) P. Miller, Compact Grape-hyacinth. Pd (NC, VA), Mt, Cp (VA): cultivated as an ornamental, persistent and naturalized in lawns, old fields, suburban woodlands, and disturbed areas; uncommon, native of Europe. March-April; May-June. [= RAB, C, F, FNA, G, K, S, Z]
* ***Muscari comosum*** (Linnaeus) P. Miller, Tassel Grape-hyacinth. Pd (GA, NC, VA), Cp (VA): cultivated as an ornamental, persistent and naturalized in lawns, old fields, suburban woodlands, and disturbed areas; rare, native of Europe. March-April; May-June. [= C, F, FNA, G, K, Z]
* ***Muscari neglectum*** Gussoni ex Tenore, Grape-hyacinth. Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA), Mt (GA, VA): cultivated as an ornamental, persistent and naturalized in lawns, old fields, suburban woodlands, and disturbed areas; common (rare in FL), native of Europe. March-April; May-June. [= FNA, K, WH, Z; = *M. racemosum* (Linnaeus) Lamarck & A.P. de Candolle – RAB, C, F, G, S; ? *M. atlanticum* Boissier & Reuter – W]

Ornithogalum Linnaeus 1753 (Star-of-Bethlehem)

A genus of about 50 species, herbs, of Mediterranean s. Europe, n. Africa, east to w. Asia. References: Straley & Utech in FNA (2002a); Speta in Kubitzki (1998a).

1 Lower pedicels < 1 cm long, about as long as the upper pedicels (and shorter than the perianth segments); leaves mostly 8-15 mm wide; scape 2-5 dm tall ..... ***O. nutans***
1 Lowest pedicels 2-6 cm long, longer than the upper pedicels (and longer than the perianth segments); leaves mostly 2-5 mm wide; scape 1-3 dm tall ..... ***O. umbellatum***

* ***Ornithogalum nutans*** Linnaeus, Drooping Star-of-Bethlehem. Pd (NC, VA), Cp, Mt (VA): lawns and suburban woodlands; cultivated and rarely naturalized or persistent, native of w. Asia. March-April. [= RAB, C, F, FNA, G, K]
* ***Ornithogalum umbellatum*** Linnaeus, Star-of-Bethlehem, Snowflake, Nap-at-noon. Pd (GA, NC, SC, VA), Cp (NC, SC, VA), Mt (GA, NC, VA): lawns, old fields, bottomlands, forests; commonly cultivated and persistent and naturalizing, native of Europe. March-May. [= RAB, C, F, FNA, G, K, S, W]

HYDROCHARITACEAE A.L. de Jussieu 1789 (Frog's-bit Family)

A family of about 17 genera and 80 species, aquatic herbs, cosmopolitan. The Hydrocharitaceae is here circumscribed traditionally; it should perhaps include *Najas*, as suggested by Haynes, Holm-Nielsen, & Les in Kubitzki (1998b). References: Haynes in FNA (2000), Cook in Kubitzki (1998b).

1 Leaves in a basal rosette, either elongate with parallel sides, or petiolate with a leaf blade.
  2 Leaves differentiated into petiole and blade, the blade ovate to orbicular ..... ***Limnobium***
  2 Leaves straplike, elongate, linear, the sides parallel and not differentiated into petiole and blade ..... ***Vallisneria***
1 Leaves in whorls along the stem.
  3 Leaves in whorls of 2-3 (no whorls with > 4 leaves) ..... ***Elodea***
  3 Leaves in whorls of 3-8 (some or most whorls with 4 or more leaves).
    4 Leaves mostly 2-3 cm long, finely toothed with slender, weak teeth on the margins and rarely also the midrib beneath; fresh leaves not noticeably rough to the touch; leaf whorls generally crowded on all stems; petals white, 9-11 mm long ..... ***Egeria***

4 Leaves mostly 1-2 cm long, toothed with stout, sharp teeth on the margins and also on conical bases along the midrib beneath; fresh leaves noticeably rough to the touch; leaf whorls crowded on terminal portions of stems, remote on older stems; petals translucent, 2-5 mm long ..... ***Hydrilla***

Egeria Planchon 1849 (South American Waterweed)

A genus of 2 species, aquatic herbs, native of tropical America (now subcosmopolitan in tropical and warm temerate regions by naturalization). References: Haynes in FNA (2000), Cook in Kubitzki (1998b).

* ***Egeria densa*** Planchon, Brazilian Waterweed, "Elodea," "Anacharis." Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC, VA), Pd (GA, VA): ponds and stagnant water of streams or rivers; uncommon, native of South America. May-November. This is the "Elodea" or "Anacharis" of the aquarium trade. [= RAB, FNA, GW, K, W, WH; = *Elodea densa* (Planchon) Caspary – F; = *Anacharis densa* (Planchon) Victorin – G; = *Philotria densa* (Planchon) Small & St. John – S]

Elodea Michaux 1803 (Waterweed)

A genus of about 5-12 species, aquatic herbs, native of temperate America. References: Haynes in FNA (2000); Cook in Kubitzki (1998b).

1 Flowers perfect, with 3 stamens ..... ***[E. schweinitzii]***
1 Flowers unisexual, the staminate with 9 stamens.
  2 Well-developed leaves (1-) avg. 2 (-5) mm wide, mostly 2-5× as long as wide; staminate spathe 4-8 (-15) mm long, the flower at anthesis on an elongated, very slender, flexuous stalk; sepals of pistillate flowers 2-4.5 mm long ..... ***E. canadensis***
  2 Well-developed leaves (0.3-) avg. 1.3 (-2) mm wide, mostly 5-10× as long as wide; staminate spathe 2-3 mm long, the flower at anthesis separating from the spathe (and plant) at maturity; sepals of pistillate flowers 1-1.5 mm long ..... ***E. nuttallii***

Elodea canadensis Michaux, Common Waterweed. Cp (FL, NC, VA), Pd, Mt (NC, VA), {SC}: lakes, ponds, stagnant waters of streams; common (rare in FL and NC). July-September. Québec west to Saskatchewan, south to NC, Panhandle FL, OK, NM, and CA. [= RAB, C, F, FNA, GW, K, W, WH, WV; = *Anacharis canadensis* (Michaux) Planchon – G; < *Philotria canadensis* (Michaux) Britton – S (also see *E. nuttallii*)]

Elodea nuttallii (Planchon) St. John, Nuttall's Waterweed, Free-flowered Waterweed. Cp, Mt (NC, VA), Pd (VA): lakes, ponds, stagnant waters of streams; uncommon. July-September. ME and Québec west to MN and ID, south to NC, TN, OK, and NM. [= RAB, C, F, FNA, GW, K, W, WV; = *Anacharis nuttallii* Planchon – G; >< *Philotria canadensis* – S; > *Philotria linearis* Rydberg – S]

Elodea schweinitzii (Planchon) Caspary, Schweinitz's Waterweed, is known only from eighteenth century collections in e. PA and NY. Haynes in FNA (2000) rejects it as a valid taxon. [= C, G, K]

Hydrilla L.C. Richard 1814 (Hydrilla)

A monotypic genus, an aquatic herb, native to the Old World. References: Haynes in FNA (2000); Cook in Kubitzki (1998b).

* ***Hydrilla verticillata*** (Linnaeus f.) Royle, Hydrilla. Pd (NC, SC, VA), Cp (GA, NC, VA), Mt (NC, VA): ponds, lakes, rivers; uncommon (but locally very abundant), native of the Old World. June-August. This species has become a serious aquatic weed. Reported for SC by Nelson & Kelly (1997). [= C, FNA, GW, K]

Limnobium L.C. Richard 1814 (Frog's-bit)

A genus of 1-2 species, of se. North America and tropical America. References: Haynes in FNA (2000); Cook in Kubitzki (1998b).

Limnobium spongia (Bosc) L.C. Richard ex Steudel, American Frog's-bit. Cp (GA, NC, SC, VA): swamps, marshes, ponds, pools; uncommon. June-September. NJ and MD south to n. FL, west to e. TX, north in the interior in the Mississippi Embayment to s. MO and s. IL; disjunct around the Great Lakes (as in n. IN and w. NY); also in tropical America. Often free-floating, the leaves with prominently large cells below. [= RAB, C, F, FNA, G, GW, K, S]

Vallisneria Linnaeus 1753 (Eelgrass)

A genus of ca. 15 species, aquatic herbs, of tropical and warm temperate regions of the Old and New World. References: Les et al. (2008)=Z; Haynes in FNA (2000); Frère Marie-Victorin (1943)=Y; Cook in Kubitzki (1998b).

1 Sepals 2-3 mm long; leaves 5-6 (-10) mm wide; leaves lacking red-purple longitudinal stripes ..... ***V. americana***

1 Sepals 4-5.5 mm long; leaves 15-20 mm wide; leaves with red or purple longitudinal stripes..... ***V. neotropicalis***

Vallisneria americana Michaux, Eelgrass, Water-celery, Tapegrass. Cp (FL, GA, NC, SC, VA), Pd (VA), Mt (GA, VA): lakes, rivers, estuaries, sounds; common. July-October. Nova Scotia and Québec west to ND, south to FL, TX, NM, AZ; south into tropical America {or is this all or partly *V. neotropicalis*?}. [= Y, Z; < *V. americana* – FNA, GW, K, WH; ? *V. americana* – RAB, F, G, S, W, WV; ? *V. americana* var. *americana* – C] {add and check synonymy}

Vallisneria neotropicalis Marie-Victorin, Large Eelgrass. Cp (FL): spring runs; other aquatic habitats; uncommon. FL Panhandle, s. FL; Cuba. The distinctiveness of this taxon has been defended by Les et al (2008) on morphological and molecular grounds. [= Y, Z; < *V. americana* – FNA, GW, K, WH] {add synonymy}

HYPOXIDACEAE R. Brown 1814 (Stargrass Family)

A family of about 9 genera and 100-220 species, herbs, subcosmopolitan (though not well distributed in the northern hemisphere of the Old World, and especially diverse in South Africa). The recognition of Hypoxidaceae at the family level is supported by a variety of authors, on morphologic and molecular grounds (see Judd 2000 for summary). References: Nordal in Kubitzki (1998a); Herndon in FNA (2002a); Judd (2000).

Hypoxis Linnaeus 1759 (Stargrass)

A genus of about 50-150 species, herbs, of tropical and warm temperate regions of the Old and New World, with a center of diversity in South Africa. References: Judd (2000)=Z; Herndon in FNA (in prep.); Nordal in Kubitzki (1998a). Key based on Herndon in FNA (2002a).

1 Leaves glabrous, or with a few trichomes near the base; seeds black.
  2 Leaves filiform, 0.3-1.0 mm wide, stiff; floral bracts much smaller than pedicel, often < 1 mm; ovaries densely pubescent; seeds with truncated pebbling..... ***H. juncea***
  2 Leaves over 2 mm wide, soft and flexible; seeds coarsely muricate.
    3 Ovaries longer than broad, cylindric, with scattered trichomes; floral bracts usually exceeding pedicels; tepals equaling or shorter than ovaries..... ***H. curtissii***
    3 Ovaries as broad at long or nearly so, deltate, densely pubescent; pedicels much longer than bracts or flowers; tepals much longer than ovaries..... ***H. hirsuta***
1 Leaves evenly pubescent, at least near the base; seeds black or brown.
  4 Pedicels much longer than bracts or flowers; seeds black.
    5 Leaves flattened, > 1 mm wide; seeds coarsely muricate..... ***H. hirsuta***
    5 Leaves filiform, 0.3-12.0 mm wide; seeds with truncated pebbling..... ***H. juncea***
  4 Pedicels < 2× as long as subtending bracts; seeds black or brown.
    6 Anthers greater than 2 mm long; flowers much longer than pedicels; floral bracts exceeding pedicels; seeds with round pebbling, black. ..... ***H. rigida***
    6 Anthers < 2 mm long; {floral bracts character}; seeds muricate and brown, **or** with rounded pebbling and black-iridescent.
      7 Tepals 1.5-2× as long as ovaries; seeds pebbled, black but with iridescent membranous coats..... ***H. sessilis***
      7 Tepals ca. 1 (-1.5)× the length of the ovaries; seeds minutely muricate, dark brown..... ***H. wrightii***

Hypoxis curtissii Rose in Small, Swamp Stargrass. Cp (FL, GA, NC, SC): swamp forests, alluvial forests, water courses, wet hammocks; common (uncommon north of FL). March-June; May-July. E. NC south to c. peninsular FL, west to e. TX. [= FNA, K, WH, Z; = *H. hirsuta* (Linnaeus) Coville var. *leptocarpa* (Engelmann & A. Gray) Fernald – RAB; < *H. hirsuta* – C; = *H. leptocarpa* (Engelmann & A. Gray) Small – GW]

Hypoxis hirsuta (Linnaeus) Coville, Common Stargrass. Mt, Pd, Cp (GA, NC, SC, VA): in a wide variety of dry to moist forests; common. March-June; May-July. S. ME west to Saskatchewan and ND, south to GA and e. TX. [= FNA, GW, Z; = *H. hirsuta* var. *hirsuta* – RAB; < *H. hirsuta* – C, K]

Hypoxis juncea Sm., Fringed Stargrass. Cp (FL, GA, NC, SC): wet pine savannas; common (rare north of FL). April-May (-later, especially in response to fire); May-June.(-later, especially in response to fire). Se. NC south to s. FL, west to s. AL. [= RAB, FNA, GW, K, WH, Z]

Hypoxis rigida Chapman, Savanna Stargrass. Cp (FL, GA, NC, SC): wet pine savannas; rare. April (-later, especially in response to fire); May.(-later, especially in response to fire). Se. NC south to Panhandle FL, west to e. TX. [= RAB, FNA, GW, WH, Z; < *H. hirsuta* – K]

Hypoxis sessilis Linnaeus, Glossy-seed Stargrass. Cp (FL, GA?, NC, SC, VA): wet pine savannas; rare. April (-later, especially in response to fire); May (-later, especially in response to fire). NC south to s. FL, west to e. TX, s. AR, and se. OK. [= RAB, FNA, GW, K, WH, Z; > *H. longii* Fernald – C; > *H. sessilis* – C]

Hypoxis wrightii (Baker) Brackett, Bristleseed Stargrass. Cp (FL, GA, NC, SC, VA): wet pine savannas; common (uncommon in FL). March-April (-later, especially in response to fire); April-May (-later, especially in response to fire). Se. VA south to s. FL, west to TX; disjunct in the West Indies (Cuba, Bahamas, Jamaica, Hispaniola, Puerto Rico). [= FNA, K, Z; = *H. micrantha* Pollard – RAB, C, GW, misapplied]

IRIDACEAE A.L. de Jussieu 1789 (Iris Family)

A family of about 65-82 genera and 1700-1810 species, herbs, of cosmopolitan distribution (most diverse in s. Africa). References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

1 Inflorescence a spike or panicle of spikes; plants from corms; flowers slightly zygomorphic.
  2 Stem usually branched, the inflorescence appearing paniculate; tepals orange to red ..... ***Crocosmia***
  2 Stem unbranched, the inflorescence a spike; tepals any of a wide range of colors (including orange and red)
    3 Inflorescence bent at its base, the inflorescence axis more-or-less horizontal, the flowers facing upwards ..... ***Freesia***
    3 Inflorescence erect, the flowers facing outwards ..... ***Gladiolus***
1 Inflorescence an umbellate 1-sided cyme; plants from rhizomes or bulbs; flowers actinomorphic.
  4 Leaves planar; plants from rhizomes (or indistinct) or a bulb (in *Iris xiphium*).
    5 Style branches broad, petaloid, terminating in paired crests ..... ***Iris***
    5 Style branches not broad or petaloid.
      6 Tepals 16-35 mm long, orange or red; seeds 4-6 mm in diameter ..... ***Iris domestica***
      6 Tepals 6-15 mm long, blue, purple, lavender, pink, magenta, white, or yellowish-white; seeds 0.6-1.3 mm in diameter .. ***Sisyrinchium***
  4 Leaves plicate; plants from bulbs.
    7 Tepals unequal, the inner whorl < ½ as long as the outer whorl ..... ***Herbertia***
    7 Tepals nearly equal in length.
      8 Style recurved, with 3 flat branches that are < 2 mm long ..... ***Calydorea***
      8 Style straight, each of the 3 branches further divided into slender lobes
        9 Style branches divided for ca. ½ their length; style arms arching over or between the anthers; tepals dark purple ..... ***[Alophia]***
        9 Style branches divided nearly to base; style arms extending horizontally between the anthers; tepals blue, white in the center ..... ***[Nemastylis]***

Alophia Herbert (Propellor-flower)

A genus of ca. 5 species, of sc. North America, Mexico, Central America, and South America. References: Goldblatt in FNA (2002a).

Alophia drummondii (Graham) R.C. Foster, Propellor-flower. MS west to TX and OK; Mexico; Guyana. [= FNA, K; = *Herbertia drummondii* (Graham) Small]

Calydorea Herbert 1843 (Ixia)

A genus of about 8 species, of warm temperate and tropical America. The circumscription relative to *Nemastylis* is uncertain. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

Calydorea coelestina (Bartram) Goldblatt & Henrich, Bartram's Ixia. Cp (FL): pine flatwoods; rare. Endemic to ne. FL (Chafin 2000); the single GA record is by P.O. Schallert, a notoriously sloppy collector, and should therefore be discounted unless additional information comes to light. [= FNA, K; = *Salpingostylis coelestina* (Bartram) Small – S; = *C. caelestina* – WH, orthographic variant; = *Nemastylis coelestina* (Bartram) Nuttall; = *Sphenostigma coelestinum* (Bartram) R.C. Foster; = *Ixia coelestina* Bartram]

Crocosmia Planchon 1851 (Montbretia)

A genus of 8-9 species, herbs, native of sub-Saharan Africa. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Dunlop (2004); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

* ***Crocosmia ×crocosmiiflora*** (V. Lemoine) N.E. Brown [*C. aurea* × *pottsii*], Montbretia. Cp (FL, NC, SC): disturbed areas, especially in moist to wet sites, including salt marshes; rare, the parents of the hybrid both native to sub-Saharan Africa. Late June-July. [= FNA, K, WH; = *C. ×crocosmiflora* – RAB, orthographic variant]

Crocus Linnaeus 1753 (Crocus)

A genus of about 80 species, herbs, from Mediterranean Europe to w. China. References: Goldblatt, Manning, & Rudall in Kubitzki (1998a).

Various species of *Crocus* are cultivated and are long-persistent at old house sites. {not keyed or otherwise treated}

Freesia Eklon ex Klatt 1865 (Freesia)

A genus of about 15 species, perennials, natives of s. Africa. References: Goldblatt in FNA (2002a).

* ***Freesia alba*** (G.L. Meyer) Gumbleton, Freesia. Cp (FL): disturbed areas; rare, native of s. Africa. [= FNA, WH; ? *F. corymbosa* (Burmann f.) N.E. Brown -- K]

Gladiolus Linnaeus 1754 (Gladiolus)

A genus of about 255 species, largely of Africa. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Rudall in Kubitzki (1998a). Key based on FNA.

1 Inner tepals 60-70 mm long ..... ***Gl. ×gandavensis***
1 Inner tepals < 60 mm long.
  2 Tepals white, cream, orange, or red; perianth tube plus dorsal sepal 60-95 mm long ..... ***[Gl. dalenii ssp. dalenii]***
  2 Tepals pink, reddish, or light purple, with white markings on the outer 3 tepals.
    3 Anthers 10-13 mm long; capsules oblong, 18-24 mm long; seeds winged ..... ***Gl. communis***
    3 Anthers ca. 15 mm long; capsules globose, 10-12 mm long; seeds not winged ..... ***[Gl. italicus]***

* ***Gladiolus communis*** Linnaeus, False Corn-flag. Cp (NC, SC), Pd (GA): cultivated as ornamentals; commonly cultivated, rarely persisting or weakly spreading; native of Meditteranean s. Europe and n. Africa. Introduced in TN and KY, as well. [= FNA; > *G. papilio* Hooker – RAB, K, misapplied; > *Gladiolus communis* Linnaeus ssp. *byzantinus* (P. Miller) A. Hamilton – K; > *G. byzantinus* P. Miller]
* ***Gladiolus ×gandavensis*** Van Houtte [*G. dalenii* × *oppositiflorus*]. Cp (FL, GA, NC, SC, VA), Pd, Mt (NC): cultivated as ornamentals; commonly cultivated, rarely persisting or weakly spreading, native of s. Africa. Goldblatt suggests that as many as 5 species are involved in the origin of the large-flowered garden gladiolus. [= RAB, FNA, K, WH; ? *G. hortulanus* Bailey]

* *Gladiolus dalenii* Van Geel ssp. *dalenii*. Introduced in AL and LA. [= FNA]
* *Gladiolus italicus* P. Miller. Introduced in TN. [= FNA, K; ? *G. segetum* Ker-Gawler]

Herbertia Sweet 1827 (Pleat-leaf Iris)

A genus of about 5 species, herbs, in se. North America and temperate South America. References: Goldblatt in FNA (2002a).

Herbertia lahue (Molina) Goldblatt, Prairie-nymph. Cp (FL, LA, MS): prairies and marshes; rare. AL and FL west to TX; central South America. [= FNA, WH; > *H. lahue* ssp. *caerulea* (Herbert) Goldblatt – K; > *H. caerulea* Herbert – S]

Iris Linnaeus 1753 (Iris, Flag, Blackberry-lily)

A genus of about 225 species, herbs, of Eurasia, n. Africa, and North America. Wilson (2004) suggests that *Belamcanda* is phylogenetically nested within *Iris* and should be included there; Goldblatt & Mabberley (2005) make the appropriate nomenclatural combination. References: Henderson in FNA (2002a); Goldblatt in FNA (2002a); Goldblatt & Mabberley (2005)=Z; Wilson (2004); Goldblatt, Manning, & Rudall in Kubitzki (1998a). Key based on Henderson in FNA (2002a).

Identification notes: the **petals** are usually erect, smaller than the petaloid **sepals** (which are brightly colored, generally reflexed, and marked with a "signal"). The **styles** are also petaloid, arched over the sepals, and 2-cleft at the tip (except in *I. domestica*).

1 Plant from an ovoid bulb; [subgenus *Xiphium*] ..... ***[I.. xiphium]***
1 Plant from short to elongate rhizomes.
  2 Style branches not broad, petaloid, or crested; seeds black, shiny, exposed at maturity in a blackberry-like cluster ..... ***I. domestica***
  2 Style branches broad, petaloid, terminating in paired crests; seeds tan to brown, in a capsule.
    3 Sepal "signal" (see above) of multicellular hairs (the "beard"), along the midrib of the the claw and the base of the blade; [subgenus *Iris*].
      4 Spathes green (or purplish) and herbaceous, with scarious margins ..... ***I. germanica***
      4 Spathes scarious, silvery-white ..... ***I. pallida***
    3 Sepal "signal" consisting of contrasting color, ridges, small unicellular hairs, and/or a cockscomb-like crest; [subgenus *Limniris*].
      5 Rhizome branches cord-like, with scale-like leaves, enlarging at the apex to produce vegetative leaves , additional branches, and flowering stems.
        6 Stems 30-80 cm tall; leaves 30-60 cm long, 0.2-0.7 cm wide; cordlike portions of rhizomes to 4 dm long; [of wetlands]; [section *Limniris*, series *Prismaticae*] ..... ***I. prismatica***
        6 Stems 2-15 cm tall; leaves 10-45 cm long, 0.3-2.5 cm wide; cordlike portions of rhizomes to to 2 dm long; [of dry to mesic uplands].
          7 Sepals crested with a 3-ridged, toothed crest; leaves 10-25 mm wide, green, falcate; flowers not or only slightly fragrant; rhizomes surficial (one can "pull" them off the ground by gently tugging on the leaves); [generally of mesic and fertile soils]; [section *Lophiris*] ..... ***I. cristata***
          7 Sepals not crested; leaves 3-13 mm wide, blue-green, straight or nearly so; flowers strongly fragrant; rhizomes deeply buried (not easily "pulled"); [generally of dry and acid soils; [section *Limniris*, series *Vernae*].
            8 Leaves 5-13 mm wide; rhizomes 1-3 cm between offshoots, thus forming clumps; capsules 1.7-3.2 cm long; [primarily of the Mountains, and upper Piedmont, extending into the Coastal Plain in sw. GA and panhandle FL]... ***I. verna var. smalliana***

8 Leaves 3-8 mm wide; rhizomes 5-15 cm between offshoots, thus hardly clump-forming; capsules 1.2-1.8 cm long; [of the Coastal Plain and lower Piedmont, from e. GA northward] ..... ***I. verna** var. **verna***
5 Rhizome branches like the primary rhizome, not as above.
9 Petals 1-2 cm long; [section *Limniris*; series *Tripetalae*] ..... ***I. tridentata***
9 Petals 2-9.5 cm long.
10 Stems hollow; [section *Limniris*; series *Sibirica*].
11 Spathes herbaceous at flowering time; capsule 3.5-5.5 cm long ..... ***I. sanguinea***
11 Spathes scarious at flowering time; capsule 2-3.5 cm long ..... ***I. sibirica***
10 Stems solid.
12 Capsules 3-angled or nearly round in cross-section; [section *Limniris*; series *Laevigatae*].
13 Perianth yellow ..... ***I. pseudacorus***
13 Perianths blue-violet (rarely white).
14 Flowers 8-15 cm in diameter; leaves 0.5-1.5 cm wide; [alien, cultivated, rarely escaped] ..... ***I. ensata***
14 Flowers 6-8 cm in diameter; leaves 1-4 cm wide; [native].
15 "Signal" a greenish-yellow, papillate patch, surrounded by an area of heavily veined purple-on-white; [of VA northward] ..... ***I. versicolor***
15 "Signal" a bright yellow, pubescent patch.
16 Plants to 10 dm tall, usually with 1-2 well-developed branches; capsule 7-11 cm long ..... ***I. virginica** var. **shrevei***
16 Plants to 6 dm tall, little or not at all branched; capsule 4-7 cm long ..... ***I. virginica** var. **virginica***
12 Capsules 6-angled or ridged in cross-section; [section *Limniris*; series *Hexagonae*].
17 Perianths dull copper or orange-brown (or dark yellow) (fading in nature or drying in the herbarium to a bluish or purplish color); petals spreading or declining ..... ***I. fulva***
17 Perianths blue-violet (rarely white); petals erect to spreading.
18 Stems declining or semi-erect, sharply zigzag ..... ***I. brevicaulis***
18 Stems erect, slightly if at all zigzag.
19 Capsules 2.5-3.5 cm long, hexagonal in cross-section, 3 sides flat, the alternating sides with 2 rounded ridges separated by a shallow groove ..... ***I. hexagona***
19 Capsules 6-10 cm long, slightly to strongly hexagonal in cross-section.
20 Capsules with 6 broad rounded lobes, indehiscent ..... ***[I. giganticaerulea]***
20 Capsules with 6 sharp, winglike ridges, dehiscent ..... ***I. savannarum***

Iris brevicaulis Rafinesque, Short-stem Iris, Lamance Iris. Cp (FL), {AL, GA, KY, TN}: swamps, bottomlands, bogs, seeps, marshes; rare. OH west to KS, south to Panhandle FL and TX. [= C, F, FNA, G, GW, K, WH; > *I. foliosa* Mackenzie & Bush – S; > *I. mississippiensis* Small – S]

Iris cristata Aiton, Dwarf Crested Iris. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): April-May; June-July. MD west to IN and MO, south to NC, AL, MS, AR, and e. OK. [= RAB, C, F, FNA, G, K, W; = *Neubeckia cristata* (Aiton) Alefani – S]

* ***Iris domestica*** (Linnaeus) Goldblatt & Mabberley, Blackberry-lily. Pd (GA, NC, SC, VA), Mt (NC, SC, VA), Cp (FL, GA): dry woodlands, forests, edges of granitic flatrocks, suburban areas; rare, native of e. Asia. June-August. [= Z; = *Belamcanda chinensis* (Linnaeus) de Candolle – RAB, C, F, FNA, G, K, S, W, WH]

* ***Iris ensata*** Thunberg, Japanese Iris. Mt (NC): roadsides; rare, cultivated and rarely escaped, native of Japan, n. China, and Sakhalin. Also reported from se. PA (Rhodes & Klein 1993). [= K; *I. kaempferi* Siebold ex Lamarck]

*? ***Iris fulva*** Ker-Gawler, Red Flag, Copper Iris. Cp (FL, GA): swamp forests, wet hammocks; rare. S. IL, MO, and TN south to GA, w. Panhandle FL, AL, and LA (introduced elsewhere). [= C, F, FNA, G, GW, K, S, WH]

* ***Iris germanica*** Linnaeus, German Iris, Fleur-de-Lys. Pd (NC, SC, VA), Cp (FL?, VA), Mt (VA), {GA}: roadsides, old homesites, ditches; uncommon, cultivated and rarely persistent or escaped, native of Europe. April-May. [= RAB, C, F, FNA, G; > *I. flavescens* Delile – K; > *I.* ×*germanica* – K]

Iris hexagona Walter, Anglepod Blue Flag. Cp (FL, GA, SC): swamps; uncommon (rare in GA and SC). May-June. SC south to s. FL. [= RAB, FNA, GW, S, WH; = *I. hexagona* var. *hexagona* – K; > *I. hexagona* – S; > *I. kimballiae* Small – S; > *I. alabamensis* Small – S]

* ***Iris pallida*** Lamarck in J. Lamarck et al., Sweet Iris. Cultivated and persistent around buildings in GA and elsewhere (FNA). [= F, FNA, K]

Iris prismatica Pursh ex Ker-Gawler, Slender Blue Iris, Slender Blue Flag. Cp (NC, SC, VA), Pd (VA), Mt (GA, NC): bogs and marshes; rare. May-June; June-July. Nova Scotia south to GA, disjunct in w. NC (Henderson County) and sc. TN (Coffee County). [= RAB, C, FNA, G, GW, K, S, W; > *I. prismatica* var. *prismatica* – F; > *I. prismatica* var. *austrina* Fernald – F]

* ***Iris pseudacorus*** Linnaeus, Water Flag, Yellow Flag. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (FL, NC, VA): swamps, marshes, streams, ponds; uncommon (rare in FL), cultivated as a water plant, native of Eurasia and Africa. May-June; August-October. [= RAB, C, F, FNA, G, GW, K, S, W, WH]

* ***Iris sanguinea*** Hornemann ex Donn, Japanese Iris. Mt (NC): roadsides; rare, cultivated and rarely escaped, native of Japan, n. China, Korea, Japan, and w. Russia. [= K]

Iris savannarum Small. {GA}. In GA and FL. [= FNA, S; = *I. hexagona* Walter var. *savannarum* (Small) R.C. Foster – K]

* ***Iris sibirica*** Linnaeus, Siberian Iris. Pd (VA): cultivated and escaping or persisting near plantings; rare, native of Eurasia (c. and e. Europe west to Lake Baikal). [= FNA, K]

Iris tridentata Pursh. Cp (FL, GA, NC, SC): wet savannas, pine flatwoods, margins of pineland pools; rare. Late May-June; August-October. Se. NC south to ne. FL and Panhandle FL. [= RAB, FNA, GW, K, WH; ? *I. tripetala* – S, misapplied]

Iris verna Linnaeus *var.* ***smalliana*** Fernald ex M.E. Edward, Upland Dwarf Iris. Mt (GA, NC, SC, VA), Pd (GA, NC, VA), Cp (FL, GA): dry, rocky or sandy woodlands and forests; common (rare in FL). April-May; June-early August. Sc. PA and WV

south to w. NC, e. TN, n. GA, se. GA, Panhandle FL, and AL. [= RAB, F, FNA, K, W, WH; < *I. verna* – C, G; < *Neubeckia verna* (Linnaeus) Alefani – S]

Iris verna Linnaeus *var.* ***verna***, Coastal Plain Dwarf Iris, Sandhill Iris. Cp, Pd (GA, NC, SC, VA): longleaf pine sandhills, dry, rocky forests and woodlands; common. March-May; May-June. MD south to se. SC and e. GA, primarily on the Coastal Plain, but extending into the Piedmont. [= RAB, F, FNA, K; < *I. verna* – C, G; < *Neubeckia verna* (Linnaeus) Alefani – S]

Iris versicolor Linnaeus, Northern Blue Flag, Poison Flag. Mt, Pd, Cp (VA): {habitat}; uncommon. May-July. Reported as occurring as far south as VA in C, F, and W. [= C, FNA, G, K, S?, W]

Iris virginica Linnaeus *var.* ***shrevei*** (Small) E. Anderson. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): marshes, swamps, streams; uncommon. May; July-September. Sw. Québec to MN, south to w. NC, n. AL, e. TN, AR, and e. KS. [= C, F, K; < *I. virginica* – RAB, FNA, W; = *I. shrevei* Small – G, S]

Iris virginica Linnaeus *var.* ***virginica***, Southern Blue Flag. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): marshes, swamps, streams; common (uncommon in FL). April-May; July-September. Se. VA south to c. peninsular FL, west to e. TX, north in the interior to w. TN; disjunct in sc. TN. [= C, F, K; < *I. virginica* – RAB, FNA, W; = *I. virginica* – G, S]

Iris giganticaerulea Small, Giant Blue Iris, in AL, MS, and LA. [= FNA, K; *I. rivularis* Small – S]
* *Iris xiphium* Linnaeus, introduced in c. TN. {investigate} [= K]

Nemastylis Nuttall 1835 (Celestial-lily)

A genus of about 5 species, herbs, of s. North America and Central America. The circumscription relative to *Calydorea* is uncertain. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

Nemastylis geminiflora Nuttall, Prairie Celestial, Prairie Pleatleaf. MO and KS south to w. LA and TX; disjunct eastward in Al and MS. [= FNA, K; *Ixia acuta* Bartram; *Nemastylis acuta* Herbert]

Sisyrinchium Linnaeus 1753 (Blue-eyed-grass, Irisette)

A genus of about 80 species, herbs, of the Americas. *Sisyrinchium* is a very difficult genus, with a number of taxonomic questions remaining in our area. References: Cholewa & Henderson in FNA (2002a); Hornberger (1991)=Y; Bicknell (1896, 1899a, 1899b); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

1 Perianth urceolate-campanulate, the segments widely flaring; annual; flowers lavender, pink, magenta, white, or yellowish-white; [plants usually occurring in distinctly weedy habitats, such as roadsides and lawns] ..... ***S. rosulatum***
1 Perianth stellate-rotate; perennial; flowers blue, violet, or white; [plants occurring in various habitats].
  2 Inflorescences paired (rarely solitary) and sessile (rarely the outer inflorescence with a peduncle to 7 mm long), closely subtended by a leaf-like bract; outer spathe bract connate 0-1 (-1.5) mm.
    3 Stems 1.5-3.4 mm wide, flattened, obviously winged; outer spathe bract 14-30 mm long; capsule 2.8-4.0 mm long; [mainly of the Piedmont and Mountains] ..... ***S. albidum***
    3 Stems 0.5-1.0 mm wide, wiry, not winged; outer spathe bract 12-15 mm long; capsules 2.0-3.3 mm long; [of Coastal Plain pinelands].... ..... ***S. capillare***
  2 Inflorescences solitary, terminating the stem or branch, not paired; outer spathe bract connate (0.7-) 2-6 mm.
    4 Stems mostly simple, unbranched (sometimes some plants in a population slightly branched).
      5 Stems (1.5-) 2.0-3.7 mm wide; capsule 4.0-6.8 mm long ..... ***S. montanum*** *var.* ***crebrum***
      5 Stems 0.5-1.0 (-2.0) mm wide; capsule 3.2-5.5 mm long ..... ***S. mucronatum***
    4 Stems mostly branched, with 1-5 nodes.
      6 Stems with 2-5 nodes, the branching dichotomous; tepals white, recurved at maturity (like a miniature, white *Lilium superbum*); [endemic to low to medium elevation forests in the Blue Ridge Escarpment region of sw. NC and nw. SC] ..... ***S. dichotomum***
      6 Stems with 1-3 nodes, the branching uneven; tepals violet to blue (rarely white), not notably recurved at maturity; [widespread].
        7 Widest stems (0.5-) 0.8-1.9 mm wide.
          8 Leaf bases not persistent as a fibrous tuft; capsules dark brown to black, 2.0-4.1 mm long ..... ***S. atlanticum***
          8 Leaf bases persistent as a fibrous tuft; capsules light to medium brown, 2.9-4.3 mm long ..... ***S. fuscatum***
        7 Widest stems 2.3-5.7 mm wide.
          9 First internode equal to or shorter than the longest leaves, or if equalling the leaves then the hyaline margin on the inner spathe bract acute to acuminate; upper stem scabrous ..... ***[S. xerophyllum]***
          9 First internode equalling or longer than the longest leaves, if equalling the leaves then the hyaline margin of the inner spathe bract broadly obtuse or acute at the apex; upper stem generally glabrous.
            10 Leaf bases not persistent or not fibrous; outer spathe bract 18-38 mm long, the margins connate 4-6 mm; capsules dark brown to black, 4.0-7.0 mm long ..... ***S. angustifolium***
            10 Leaf bases persistent as a basal tuft of fibers; outer spathe bract 18-26 mm long, the margins basally connate 2-4 mm; capsules tan, 2.5-4.8 mm long ..... ***S. nashii***

Sisyrinchium albidum Rafinesque. March-May. Pd (GA, NC, SC), Mt (GA, NC, SC, VA), Cp (NC), {GA}: woodlands, savannas?, mesic sandhills, open limestone barrens; uncommon (VA Rare). March-May; May-June. S. NY west to s. WI, south to Panhandle FL, and LA. [= C, F, FNA, G, K, Y; < *S. albidum* – RAB, W (also see *S. capillare*); > *S. albidum* – S; > *S. scabrellum* E.P. Bicknell – S]

Sisyrinchium angustifolium P. Miller. March-June. Mt, Pd, Cp (NC, SC, VA), {GA}: woodlands, forests, meadows, sandhill swales; common. March-June; May-July. VT, NH, and s. Ontario west to WI, e. KS, and OH, south to GA, AL, LA, and TX. [= RAB, C, F, FNA, GW, K, W, Y; > *S. angustifolium* – G, S; > *S. graminoides* E.P. Bicknell – G, S]

Sisyrinchium atlanticum E.P. Bicknell, Atlantic Blue-eyed-grass. Cp, Pd, Mt (NC, SC, VA), {GA}: dry, sandy or rocky places; common. March-June; June-August. Nova Scotia and ME west to OH, IN, and MO, south to FL and LA. [= C, F, FNA, G, GW, K, S, W, Y; = *S. mucronatum* var. *atlanticum* (E.P. Bicknell) Ahles – RAB]

Sisyrinchium capillare E.P. Bicknell, Wiry Blue-eyed-grass. Cp (GA, NC, SC, VA): wet pine savannas and flatwoods; uncommon. March-June; May-June. Se. VA south to GA (and FL?), west to AL. [= C, F, FNA, G, GW, K, S; < *S. albidum* – RAB, W]

Sisyrinchium dichotomum E.P. Bicknell, White Irisette, Isothermal Irisette. Mt, Pd (NC, SC): dry to mesic woodlands and forests, usually over mafic rocks (such as amphibolite), at low to moderate elevations (400-1000 m) in the Blue Ridge escarpment; rare (US Endangered, NC Endangered, SC Rare). May-June; June-August. Endemic to Henderson, Polk, and Rutherford counties, NC, and Greenville County, SC. [= FNA, K, W]

Sisyrinchium fuscatum E.P. Bicknell. Cp, Pd (GA, NC, SC, VA): wet pine savannas, marshy areas; common (VA Watch List). Late April-June; June-October. E. VA (or extreme se. PA?) south to FL, west to MS. [= C, FNA, K; > *S. arenicola* E.P. Bicknell – RAB, F, G, GW; > *S. fuscatum* – S; > *S. incrustatum* E.P. Bicknell – S; > *S. rufipes* E.P. Bicknell – S]

Sisyrinchium montanum Greene *var.* ***crebrum*** Fernald. Mt (NC?, VA?): {habitat in our area not known}; rare. May-July. Newfoundland and Ontario south to NY. The status of this taxon in our area is not clear. *S. montanum* var. *crebrum* is reported for VA by F, and *S. montanum* (variety not specified) is reported for NC and VA by C and G. FNA considers var. *crebrum* to range south only to NY, and var. *montanum* south only to OH and PA. Herbarium documentation is needed. [= F, K; < *S. montanum* – G; ? *S. angustifolium* – S, misapplied]

Sisyrinchium mucronatum Michaux. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (NC, VA): forests, woodlands, fields; common. April-June; June-July. ME west to Saskatchewan, south to SC, GA, MI, MN. [= C, F, FNA, GW, G, K, S, W; = *S. mucronatum* var. *mucronatum* – RAB]

Sisyrinchium nashii E.P. Bicknell, Nash's Blue-eyed-grass. Cp, Pd (GA, NC, SC), Mt (GA, VA?): woodlands and forests; uncommon. April-June. NC and TN (sw. VA?) south to FL and MS. [= FNA, K, W; > *S. fibrosum* E.P. Bicknell – S]

*? ***Sisyrinchium rosulatum*** E.P. Bicknell, Lawn Blue-eyed-grass. Cp (GA, NC, SC, VA), Pd (GA, SC): lawns, roadsides; uncommon. April-May; May-June. Se. VA south to FL, west to e. TX. Perhaps only adventive in our area. [= RAB, FNA, GW, K, S, Y; > *S. exile* E.P. Bicknell]

Sisyrinchium campestre E.P. Bicknell, Prairie Blue-eyed-grass. MS and MI west to SD and NM. [= FNA, K] {not yet keyed}

Sisyrinchium corymbosum E.P. Bicknell. Cp (GA): pinelands; rare. Se. GA and ne. FL west to s. AL. See Ward (2005a) for its resurrection. [< *S. atlanticum* Bicknell – FNA, K] {not yet keyed}

Sisyrinchium langloisii Greene ranges east to AL, GA, and TN. It will key to couplet 8, where difficulties will be encountered. Like *S. atlanticum*, its leaf bases are not persistent in a fibrous tuft, but it differs in having the dark ovary and capsules not contrasting strongly with the much lighter foliage. [= FNA; < *S. langloisii* – K (also see *S. pruinosum*)] {not yet keyed}

Sisyrinchium miamiense E.P. Bicknell, reported for SC (Kartesz 1999) and GA, AL, MS, and FL (FNA). {investigate} [= FNA, K] {not yet keyed}

Sisyrinchium pruinosum E.P. Bicknell, ranges east to AL. [= FNA; < *S. langloisii* – K] {not yet keyed}

Sisyrinchium sagittiferum E.P. Bicknell, ranges east to AL (FNA). [= FNA, K] {not yet keyed}

Sisyrinchium xerophyllum Greene, Florida Blue-eyed-grass, occurs in FL and allegedly s. GA; it is also alleged to occur in NC (FNA) but this report does not seem plausible. [= FNA, K, S]

JUNCACEAE A.L. de Jussieu 1789 (Rush Family)

A family of about 8 genera and 350-440 species, herbs (and a few shrubs), largely of temperate regions of the Old and New World. References: Brooks & Clemants in FNA (2000); Balslev in Kubitzki (1998b); Drábková et al. (2003).

1 Leaves terete or flat, glabrous (or scabrous); capsule with > 3 seeds; [often in wetlands] ..... ***Juncus***
1 Leaves flat, pubescent; capsule with 3 seeds; [rarely in wetlands] ..... ***Luzula***

Juncus Linnaeus 1753 (Rush)
(by B.A. Sorrie, B. van Eerden, and W.M. Knapp)

A genus of about 250-300 species, herbs, of cosmopolitan distribution. Drábková et al. (2003) indicate that *Juncus trifidus* may not be part of *Juncus*, and may be as closely related to *Luzula*. References: Brooks & Clemants in FNA (2000); Kirschner et al. (2002b, 2002c)= Y; Clemants (1990); Balslev in Kubitzki (1998b); Zika (2003)=Z; Drábková et al. (2003); F; GW; RAB. The key based, in part, on those references.

subgenus *Juncus*, section *Juncus*: *acutus ssp. leopoldii, roemerianus*
subgenus *Juncus*, section *Graminifolii*: *filipendulus, marginatus, biflorus, longii, repens*
subgenus *Juncus*, section *Iridifolii*: *polycephalus*
subgenus *Juncus*, section *Ozophyllum*: *abortivus, acuminatus, brachycephalus, brevicaudatus, caesariensis, canadensis, megacephalus, militaris, nodosus, pelocarpus, subcaudatus, torreyi, trigonocarpus, validus var. validus*
subgenus *Agathryon*, section *Tenageia*: *bufonius var. bufonius*

subgenus *Agathryon*, section *Steirochloa*: *gerardii, coriaceus, [brachyphyllus], georgianus, secundus, dichotomus, tenuis, anthelatus, interior, dudleyi*
subgenus *Agathryon*, section *Juncotypus*: *gymnocarpus, [filiformis], inflexus, effusus var. solutus, pylaei, balticus*
UNCERTAIN placement (probably not a *Juncus*): *trifidus*

Identification Notes: For identification of most rushes, it is important to collect plants with mature capsules and seeds. Care must also be taken to collect specimens with uninjured heads, especially for the group of rushes in Key D; the long beaks of the capsules are often fragile and easily broken off.

1 Inflorescence appearing lateral; inflorescence bract erect, appearing to be a continuation of the culm ..... **Key A**
1 Inflorescence appearing terminal; inflorescence bract not appearing to be a continuation of the culm.
  2 Leaf blades non-septate ..... **Key B**
  2 Leaf blades septate (sometimes obscure in dried specimens; if so, rest leaf on hard surface and run fingernail over it lengthwise).
    3 Mature seeds distinctly tailed with elongate appendages at each end (may be obscure in *J. subcaudatus*), seeds 0.7-2.5 mm long; [subgenus *Juncus*, section *Ozophyllum*] ..... **Key C**
    3 Mature seeds without appendages, < 0.7 mm long.
      4 Flowers solitary (rarely up to 3) along branches of inflorescence; flowers often aborted; inflorescence diffuse, with slender flexuous branches; [subgenus *Juncus*, section *Ozophyllum*] ..... **Key D**
      4 Flowers in heads (glomerules) of 3 or more; flowers seldom aborted; inflorescence various.
        5 Heads spherical or nearly so, usually 15-60 flowered ..... **Key E**
        5 Heads turbinate to hemispherical, 3-15 flowered; [subgenus *Juncus*, section *Ozophyllum*] ..... **Key F**

KEY A

1 Flowers borne in heads (glomerules) of 2-6; leaves spine-tipped; single bracteole subtending glomerule present at base of pedicel; [subgenus *Juncus*, section *Juncus*] ..... ***J. roemerianus***
1 Flowers borne singly on branches of inflorescence; leaves not spine-tipped; each flower subtended by two bracteoles in addition to bracteole at base of pedicel.
  2 At least a few sheaths at base of plant with well developed blades; inflorescence bract channeled on one side; [subgenus *Agathryon*, section *Steirochloa*] ..... ***J. coriaceus***
  2 Sheaths at base of plant bladeless; bract not channeled; [subgenus *Agathryon*, section *Juncotypus*].
    3 Culms well spaced along creeping rhizomes.
      4 Anthers shorter than filaments.
        5 Rhizomes 1.5-2 mm diameter; culms 1 mm diameter; inflorescence 3-12 flowered; [boreal, south to ne. WV] ..... ***[J. filiformis]***
        5 Rhizomes 2-4 mm diameter; culms 1.5-2.5 mm diameter; inflorescence 8-30+ flowered; [rare montane plant in NC and SC] ..... ***J. gymnocarpus***
      4 Anthers longer than filaments ..... ***J. balticus var. littoralis***
    3 Culms cespitose or tufted on short branching rhizomes.
      6 Perianth much shorter than capsule (about ½ as long); stamens 6; [rare montane plant in NC and SC] ..... ***J. gymnocarpus***
      6 Perianth > 3/4 length of capsule; stamens 6 or 3.
        7 Capsules 3-4 mm long; stamens 6; [rare alien in piedmont and mountains of VA] ..... ***J. inflexus***
        7 Capsules 1.5-3.2 mm long; stamens 3; [widespread native].
          8 Stems coarsely grooved, with 10-20 ridges just below inflorescence, firm; perianth 2.7-3.6 mm long, sepals slightly exceeding petals and capsule ..... ***J. pylaei***
          8 Stems finely grooved, with 25-30 striations just below inflorescence, soft, easily compressed; perianth 1.9-2.8 mm long, sepals equaling petals ..... ***J. effusus ssp. solutus***

KEY B

1 Flowers borne in heads (glomerules) of 2 or more, individual flowers not subtended by two bracteoles (in addition to the bracteole at the base of the pedicel); [subgenus *Juncus*, section *Graminifolii*].
  2 Perianth 6-10 mm long; plant aquatic, submersed and sterile or emersed/stranded and fertile; stems weak, creeping, mat-forming ..... ***J. repens***
  2 Perianth < 6 mm long; plant of uplands or wetland margins, never submersed; stems erect, never creeping or mat-forming.
    3 Rhizomes 5-20 cm long, slender (1-1.5 mm wide), flexuous; inflorescence compact (usually < 5 cm long); heads 2-5 flowered ..... ***J. longii***
    3 Rhizomes < 5 cm long (usually < 3 cm), thick (2-4 mm wide) or thin or absent (< 2 mm wide); inflorescence various; heads 2-15 flowered.
      4 Heads 2-5 flowered; rhizomes thick (2-4 mm); inflorescence elongate (usually 8-20 cm); seeds narrowly ellipsoid, coarsely ribbed, both ends tailed ..... ***J. biflorus***
      4 Heads 5-15 flowered; rhizomes thin or absent (< 2 mm); inflorescence < 8 cm long; seeds plump, finely ribbed, both ends apiculate (but without tails).
        5 Perianth straw colored with green midstripe; capsules tan to reddish brown; heads 1-5 (-10) per culm; [calcareous glades inland, east to GA and TN] ..... ***J. filipendulus***
        5 Perianth dark brown; capsules brown; heads > 10 per culm; [widespread] ..... ***J. marginatus***
1 Flowers borne singly on branches of inflorescence, individual flowers subtended by two bracteoles (in addition to the bracteole at the base of the pedicel).
  6 Plants annual, without coarse roots or persistent leaf bases; [subgenus *Agathryon*, section *Tenageia*] ..... ***J. bufonius***
  6 Plants perennial, with coarse roots or persistent leaf bases.
    7 Leaves finely serrulate or scabrid; auricles deeply lacerate; [rare and local in high elevation "alpine" situations] ..... ***J. trifidus***
    7 Leaves entire; auricles not lacerate; [subgenus *Agathryon*, section *Steirochloa*].

8 Auricles 3-6 mm long at summit of leaf sheath.
9 Capsules < 3/4 length of perianth, borne widely spaced along the usually diffuse branches of the inflorescence ..... ***J. anthelatus***
9 Capsules > 3/4 length of perianth, borne congested on branches with internodes about as long as perianth ..... ***J. tenuis***
8 Auricles < 2 mm long or absent.
10 Cauline leaves present in addition to basal leaves; blades flat ..... ***J. gerardii***
10 Cauline leaves absent.
11 Leaf blades terete or channeled ..... ***J. dichotomus***
11 Leaf blades flat.
12 Perianth obtuse apically; capsule chestnut brown or darker; [alien, ranging south to MD] ..... ***J. compressus***
12 Perianth acute to acuminate; capsule light brown or tan; [native].
13 Inflorescence bract shorter than inflorescence; capsules 3-locular.
14 Perianth usually 2.5-3.5 mm long; flowers secund; capsules globose to ellipsoid ..... ***J. secundus***
14 Perianth usually 4.0-5.5 mm long; flowers not secund; capsules ellipsoid or narrowly so; restricted to granite flatrocks ..... ***J. georgianus***
13 Inflorescence bract longer than inflorescence; capsules 1-locular to falsely 3-locular.
15 Auricles yellowish, glossy; perianth spreading in fruit ..... ***J. dudleyi***
15 Auricles whitish or straw colored, dull; perianth not spreading.
16 Mature capsules pale brown or darker; [of the Coastal Plain] ..... ***J. dichotomus***
16 Mature capsules pale tan or darker; [of prairies and plains, east to KY, se TN] ..... ***J. interior***

KEY C

1 Culms and leaves scabrid, gray-green or blue-green; seeds 2.0-2.5 mm long ..... ***J. caesariensis***
1 Culms and leaves smooth, green; seeds 0.7-2.2 mm long.
2 Seeds 1.2-2.2 mm long, seed body < ½ length of seed.
3 Mature capsules 3.0-4.0 mm long, < 1.5 mm longer than perianth, light reddish brown to light brown; heads 5-50 flowered ..... ***J. canadensis***
3 Mature capsules 4.0-5.0 mm long, 2 mm longer than perianth, dark reddish purple; heads 3-7 flowered ..... ***J. trigonocarpus***
2 Seeds 0.7-1.2 mm long, seed body > ½ length of seed.
4 Perianth obtuse to subacute, with wide scarious margins ..... ***J. brachycephalus***
4 Perianth acuminate, with narrow scarious margins.
5 Inflorescence narrow, the branches erect; mature capsules dark brown; heads 2-7 flowered ..... ***J. brevicaudatus***
5 Inflorescence open, the branches widely spreading; mature capsules dark straw colored; heads 5-20 flowered ..... ***J. subcaudatus***

KEY D

1 Rhizomes 2-6 mm thick; perianth acute; culms erect, 3-8.5 dm tall; [southeastern, ranging north to Isle of Wight and City of Suffolk Counties, VA] ..... ***J. abortivus***
1 Rhizomes about 1 mm thick; perianth obtuse; culms ascending to erect, < 5 dm tall; [northeastern, ranging south to Accomack County, VA] ..... ***J. pelocarpus***

KEY E

1 Leaves flattened, narrowly elliptic in cross-section.
2 Leaves with incomplete septae; heads about 10 mm diameter; tips of dehisced capsules united; [subgenus *Juncus*, section *Iridifolii*] ..... ***J. polycephalus***
2 Leaves with complete septae; heads about 12 mm diameter; tips of dehisced capsules split; [subgenus *Juncus*, section *Ozophyllum*] ..... ***J. validus*** *var.* ***validus***
1 Leaves terete, not at all flattened; [subgenus *Juncus*, section *Ozophyllum*].
3 Stamens 6.
4 Plants cespitose, lacking rhizomes ..... ***J. acuminatus***
4 Plants rhizomatous.
5 Heads 6-20 flowered, 6-9 mm diameter; auricles cartilaginous, 0.5-1.0 mm long ..... ***J. nodosus***
5 Heads 25-100 flowered, 10-14 mm diameter; auricles membranous, 2.5-4.0 mm long ..... ***J. torreyi***
3 Stamens 3.
6 Plants cespitose, lacking rhizomes; tepals lanceolate ..... ***J. acuminatus***
6 Plants rhizomatous; tepals lance-subulate.
7 Mature capsules included, < ½ length of perianth ..... ***J. brachycarpus***
7 Mature capsules exserted or slightly included.
8 Uppermost stem leaf and/or inflorescence bract > inflorescence; capsule valves separating at apex during dehiscence ..... ***J. nodosus***
8 Uppermost stem leaf and/or inflorescence bract < inflorescence; capsule valves remaining united.
9 Uppermost cauline leaf blade non-septate, much shorter than its sheath; Outer tepals significantly longer than the inner tepals ..... ***J. megacephalus***
9 Uppermost cauline leaf blade septate, longer than its sheath; outer tepals and inner tepals of similar length.
10 Heads lobulate; mature capsule 2.0-3.0 mm long ..... ***J. scirpoides*** *var.* ***compositus***
10 Heads spherical, not lobulate; mature capsule 3.0-4.5 mm long ..... ***J. scirpoides*** *var.* ***scirpoides***

KEY F

1 Mature capsules 2 mm or more longer than perianth, 4.0-5.2 mm long ..... ***J. diffusissimus***
1 Mature capsules < 1.5 mm longer than perianth, or subequal.
  2 Stamens 6.
    3 Proximal culm leaf overtopping inflorescence; culms well spaced along creeping rhizomes; plants often exceed 8 dm tall; [northeastern, south to DE, MD, disjuncts in ne. NC] ..... ***J. militaris***
    3 Proximal culm leaf shorter than inflorescence; plants cespitose; plants < 8 dm tall.
      4 Mature capsules slightly shorter than to slightly longer than perianth (< 0.5 mm longer); perianth 2.6-3.9 mm long; inflorescence 4-16 cm long; [widespread] ..... ***J. acuminatus***
      4 Mature capsules exceeding perianth by about 1 mm (>0.5 mm longer); perianth 1.7-3.0 mm long; inflorescence 2-8 cm long; [northern, in our region montane] ..... ***J. articulatus***
  2 Stamens 3.
    5 Mature capsules about 1/3 longer than perianth (roughly 1-1.5 mm longer) ..... ***J. debilis***
    5 Mature capsules equaling or barely exceeding perianth.
      6 Heads 5-50; capsules 2.8-3.5 mm long ..... ***J. acuminatus***
      6 Heads 30-250; capsules 1.9-2.9 mm long.
        7 Capsules deep chestnut brown; roots with terminal tubers; inner tepals usually > 2.4 mm long; [plants southeastern] ..... ***J. elliottii***
        7 Capsules straw colored; roots without terminal tubers; inner tepals usually 1.7-2.3 mm long; [plants midwestern, east to nw. FL and se. TN] ..... ***J. nodatus***

Juncus abortivus Chapman. Cp (GA, NC, SC, VA): ditches, along pond and stream margins, seepage slopes, disturbed open areas; uncommon. July-October. Se. VA to FL Panhandle. The septae along the narrow leaf blades of *J. abortivus* are often difficult to detect. [= RAB, F, GW, K, S; = *J. pelocarpus* E. Meyer var. *crassicaudex* Engelmann – C, G; < *J. pelocarpus* – FNA, Y]

Juncus acuminatus Michaux. Cp, Pd, Mt (GA, NC, SC, VA): throughout, in damp soils; common. June-August. ME and N.S. to Ont. and MN, south to n. FL, TX and n. Mexico; British Columbia to CA. [= RAB, C, F, FNA, G, GW, K, S, W, Y]

Juncus anthelatus (Wiegand) R.E. Brooks. Mt (NC, VA), Pd (NC): moist or wet sites; uncommon. July-September. New Brunswick and ME west to MN, south to GA and AR. [= FNA, Y; < *J. tenuis* Willdenow – RAB, G, GW, K, S, W; < *J. tenuis* var. *tenuis* – C; = *J. tenuis* var. *anthelatus* Wiegand – F]

Juncus articulatus Linnaeus, Jointleaf Rush. Mt (VA), Cp (NC): marshes, wet open ground; rare (NC Watch List). July-September. Nearly cosmopolitan; in North America from Newfoundland to AK, south to e. NC (Cape Hatteras, Dare County) and CA. [= RAB, C, FNA, G, K; > *J. articulatus* var. *articulatus* – F; > *J. articulatus* var. *obtusatus* Engelmann – F; = *J. articulatus* ssp. *articulatus* – Y]

Juncus balticus Willdenow *var.* ***littoralis*** Engelmann. Mt (VA): open calcareous wetlands; rare. The species is circumboreal; var. *littoralis* is North American: Labrador west to British Columbia, south to NY (Long Island), NJ, PA, w. VA, OH, IN, MO, and KS. [= F, G, K; = *J. arcticus* Willdenow var. *littoralis* (Engelmann) Boivin – C; < *J. arcticus* Willdenow var. *balticus* (Willdenow) Trautvetter – FNA; = *J. balticus* ssp. *littoralis* (Engelmann) Snogerup – Y]

Juncus biflorus Elliott. Cp, Pd, Mt (GA, NC, SC, VA): pine savannas, pine flatwoods, mesic areas in sandhill-pocosin ecotones, roadsides, low fields in the Piedmont; common (uncommon in the Mountains). June-October. MA to MI and MO, south to TX and FL. The characters used to split this species from *J. longii* and *J. marginatus* (rhizome length and thickness, glomerule number, seed size and shape) are somewhat variable, and intermediates between these three taxa are frequent, particularly in se. United States. Due to this intergradation, *J. biflorus* and *J. longii* are sometimes treated as synonyms or varieties of *J. marginatus*, but Knapp (2004) supports their recognition. Since all three taxa in this group, fitting the typical species descriptions, are found in our area, they are here recognized at the species level. It is interesting to note that most of the plants in our area displaying typical taxonomic characters are found in natural, or undisturbed habitats; many of the confusing intermediates appear to occur in disturbed wetlands (roadside ditches, cleared aeas). Further investigation of these disturbed-area populations is necessary. [= RAB, F, K, W; < *J. biflorus* – C, G (also see *J. longii*); < *J. marginatus* – FNA, GW, Y (also see *J. biflorus* and *J. longii*); = *J. aristulatus* Michaux var. *biflorus* (Elliott) Small– S]

Juncus brachycarpus Engelmann, Short-fruited Rush. Pd (GA, NC, SC, VA), Cp (NC, SC, VA), Mt (GA): wet, sandy soil; rare (NC Watch List). June-September. MA to IL, south to SC, wc. GA, and TX. [= RAB, C, F, FNA, G, GW, K, S, Y]

Juncus brachycephalus (Engelmann) Buchenau. Mt (GA, VA), Pd, Cp (GA): calcareous wetlands. Nova Scotia west to ND, south to MA, OH, and IL; disjunct southward in VA, n. GA, TN, and CO. [= C, F, FNA, G, K, Y]

Juncus brevicaudatus (Engelmann) Fernald, Short-tailed Rush. Mt (NC, VA): bogs and seeps at high elevations; rare (NC Watch List). July-September. Newfoundland to Manitoba south to MN, PA, and in mountains south to NC. [= RAB, C, F, FNA, G, K, W, Y]

Juncus bufonius Linnaeus *var.* ***bufonius***, Toad Rush. Cp, Pd (GA, NC, SC, VA), Mt (NC, VA): wet, open ground, roadsides, dried pools, drawdown shores; common (rare in upper Piedmont, Sandhills, and Mountains). June-November. Cosmopolitan. [= C, F, G, K; < *J. bufonius* – RAB, FNA, GW, S, W, Y]

Juncus caesariensis Coville, New Jersey Rush. Cp (VA), Mt (NC): sphagnous seepages in the Coastal Plain of VA, seeps and bogs at low to moderate elevations in the Mountains of NC; rare (US Species of Concern, NC Rare). July-October. Found in 1992 from a seepage bog in Clay County, NC, and in 1993 from a bog in Henderson County, NC, where associated with northern disjuncts. Rare throughout its range, it is known only from several sites in NJ, MD, VA, NC, and Nova Scotia (Newell & Newell 1994). The scabrid leaf blades and large seeds quickly separate this species from the other long-tailed rushes. It should be looked for along seepage slopes and bogs in the fall-line sandhills and the outer Coastal Plain. [= C, F, FNA, G, K, Y]

Juncus canadensis J. Gay ex Laharpe, Canadian Rush. Cp (GA, NC, SC, VA), Pd, Mt (NC, VA): lake, pond and stream margins, swamps, bogs, seepage slopes, wet meadows, ditches; common (rare in Piedmont and Mountains). July-October. Newfoundland to MN, south to c. peninsular FL, TN, and LA. *J. canadensis* is here treated as a single, polymorphic species. Fernald and others have described up to 5 forms and varieties of *J. canadensis*, based on variation in flower and capsule size

(from 2.5 mm to nearly 4.0 mm), shape of the glomerules (densely flowered and subglobose to few-flowered and turbinate), and structure and size of the inflorescence (congested to open). Further study is necessary to determine whether any of these taxa should be recognized. [= RAB, C, FNA, G, GW, K, S, W, Y; > *J. canadensis* var. *canadensis* – F; > *J. canadensis* var. *euroauster* Fernald – F]

Juncus coriaceus Mackenzie. Cp, Pd, Mt (GA, NC, SC, VA): stream and pond margins, swamps, flatwoods depressions, roadside ditches; common (rare in Mountains). June-September. S. NJ to n. FL, west to e. TX, north in the interior KY, AR, and OK. [= RAB, C, F, FNA, G, GW, K, W, Y; = *J. setaceus* Rostkovius – S, misapplied]

Juncus debilis A. Gray, Weak Rush. Cp, Pd, Mt (GA, NC, SC, VA): marshy shores, stream and pond margins, along puddles in wet, disturbed clearings, ditches; common (uncommon in Piedmont). May-August. RI to MO, south to n. FL and e. TX. [= RAB, C, F, FNA, G, GW, K, S, W, Y]

Juncus dichotomus Elliott. Cp, Pd, Mt (GA, NC, SC, VA): often in disturbed, open, wet areas, ditches, wet meadows; common (rare in western Piedmont and Mountains). June-October. MA to c. peninsular FL, west to OK and TX. The character used to separate *J. platyphyllus* (Wiegand) Fernald from *J. dichotomus* (flat leaf blade vs. terete leaf blade) does not appear to be reliable; leaf blades from culms in the same clump may vary from flat to slightly involute to completely terete. [= FNA, GW, W, Y; > *J. dichotomus* – RAB, F; > *J. platyphyllus* (Wiegand) Fernald – RAB, F; = *J. tenuis* var. *dichotomus* (Elliott) A. Wood – C; > *J. dichotomus* var. *dichotomus* – G, K, S; > *J. dichotomus* var. *platyphyllus* Wiegand – G, K, S]

Juncus diffusissimus Buckley, Diffuse Rush, Slim-pod Rush. Cp, Pd, Mt (GA, NC, SC, VA): low, wet open areas, ditches, margins of ponds and streams; uncommon (rare in Piedmont). May-September. Mostly Coastal Plain from se. VA to n. FL, west to e. and nc. TX; also s. IN to MO, KA, OK, TN, and KY. [= RAB, C, F, FNA, G, GW, K, S, W, Y]

Juncus dudleyi Wiegand, Dudley's Rush. Mt (NC, VA), Pd (VA), Cp (SC, VA): calcareous seepages and fens, river-scours; rare. Labrador to Nunavut, south at least to FL, TX, and CA. First reported for South Carolina by Hill & Horn (1997) and for NC by Tom Govus (pers. comm., 2005). [= F, FNA, K, S, W, Y; = *J. tenuis* Willdenow var. *dudleyi* (Wiegand) F.J. Hermann – C; < *J. tenuis* – G, GW]

Juncus effusus Linnaeus *ssp.* ***solutus*** (Fernald & Wiegand) Hämet-Ahti, Common Rush, Soft Rush. Cp, Pd, Mt (GA, NC, SC, VA): moist soil, marshes, margin of streams, ponds, lakes and swamps, low meadows; common. June-September. Newfoundland to MN, south to FL and Mexico. Ssp. *effusus* is European, and also occurs (allegedly introduced) in the ne. United States. [= Y, Z; < *J. effusus* – RAB, FNA, GW, S, W (also see *J. pylaei*); = *J. effusus* Linnaeus var. *solutus* Fernald & Wiegand – C; > *J. effusus* Linnaeus var. *solutus* Fernald & Wiegand – F, K ; > *J. griscomii* Fernald – F, G; >< *J. effusus* Linnaeus var. *solutus* Fernald & Wiegand – G (also see *J. pylaei*); > *J. effusus* var. *compactus* – G, misapplied; > *Juncus effusus* Linnaeus var. *conglomeratus* (Linnaeus) Engelmann – K]

Juncus elliottii Chapman, Elliott's Rush. Cp (GA, NC, SC, VA), Pd (GA, NC): margins of ponds and lakes, depressions in savannas and flatwoods, wet, disturbed clearings, roadside ditches; uncommon (rare in Piedmont). May-September. Coastal Plain, DE to cen. penin. FL, west to se. TX. Capsules of *J. elliottii* are similar in shape to *J. acuminatus*, but the presence of tubiferous roots, shorter perianth (2.0-2.5 mm long vs. 2.5-3.5 mm) and fewer-flowered glomerules (3-8 flowered vs. 5-many flowered) clearly distinguishes *J. elliottii* from *J. acuminatus*. [= RAB, C, F, FNA, G, GW, S, Y; < *J. elliottii* var. *elliottii* – K]

Juncus filipendulus Buckley, Texas Plains Rush. Mt (GA): prairies, limestone barrens; rare (GA Special Concern). KY, TN, and AL west to OK and TX. [= FNA, GW, K, S, Y]

Juncus georgianus Coville. Pd (GA, NC, SC): shallow depressions in granitic outcrops; rare (NC Watch List). June-August. An endemic of the Southeastern Piedmont, restricted to granitic flatrocks of NC, SC, GA, and ec. AL. [= RAB, FNA, K, S, W, Y]

Juncus gerardii Loiseleur, Blackfoot Rush, Blackgrass. Cp, Mt (VA): {habitat}; rare. [= C, FNA, W; > *J. gerardi* var. *gerardi* – F; = *J. gerardi* – G, orthographic variant; > *J. gerardii* var. *gerardii* – K; > *J. gerardii* ssp. *gerardii* -- Y]

Juncus gymnocarpus Coville, Seep Rush. Mt (GA, NC, SC): bogs, seeps, streambanks; rare. July-September. Local, mountains of e. PA, w. NC, e. TN, nw. SC and ne. GA, Coastal Plain of se. AL, s. MS (Sorrie & Leonard 1999), and n. cen. Panhandle FL. In our area, *J. gymnocarpus* is scattered in mountain bogs and seeps throughout the mountain region; it reaches its most general occurrence in the escarpment gorge region of Transylvania, Macon, and Jackson counties, NC, where it also occurs along streambanks, especially in the vicinity of waterfalls. [= RAB, C, F, FNA, G, GW, K, S, W, Y]

* ***Juncus inflexus*** Linnaeus. Mt (VA): wet meadows, disturbed wet or moist ground; rare, native of Eurasia. Introduced in VA (Virginia Botanical Associates 2006, Kartesz 1999). [= C, F, FNA, G, K, Y]

Juncus longii Fernald. Cp (GA, NC, VA), Pd (GA, NC, SC), Mt? (NC): usually in very wet, often inundated sites, bogs, ditches, rooting in clay or peat; uncommon (NC Watch List). June-August. MD south through VA, NC, SC to MS (Knapp 2004); more extensive distributions are based on misattribution. [= RAB, F, K; < *J. biflorus* – C, G; < *J. marginatus* – FNA, GW, Y (also see *J. biflorus* and *J. longii*); = *J. aristulatus* Michaux var. *aristulatus* – S]

Juncus marginatus Rostkovius. Cp, Pd, Mt (GA, NC, SC, VA): wet meadows, bogs, generally throughout in wet, sandy or peaty soil; common. June-September. Nova Scotia to Ontario, south to FL and TX. [= RAB, C, G, K, S, W; > *J. marginatus* var. *marginatus* – F; > *J. marginatus* var. *setosus* Coville – F; < *J. marginatus* – FNA, GW, Y (also see *J. biflorus* and *J. longii*); > J. marginatus – G; J. setosus (Coville) Small – G]

Juncus megacephalus M.A. Curtis, Large-headed Rush. Cp (GA, NC, SC, VA): brackish and freshwater marshes, bogs, ditches, wet, open places; uncommon. June-August. Coastal Plain, VA to s. FL, west to se. TX; e. MD (Sorrie, pers. comm.). [= RAB, C, F, FNA, G, GW, K, S, Y]

Juncus militaris Bigelow, Bayonet Rush. Cp (NC): lakeshores; rare. Nova Scotia to MD, DE, and ne. PA; inland near the Great Lakes; disjunct at Phelps Lake, NC (Sorrie, pers.comm, 2005). [= C, F, FNA, G, K, Y]

Juncus nodosus Linnaeus. Mt (VA): {habitat}; rare. Newfoundland to British Columbia, south to w. VA, WV, IN, MO, TX, and CA. [= C, F, FNA, G, Y; > *J. nodosus* var. *nodosus* – K] {add to synonymy}

Juncus pelocarpus E. Meyer. Cp (VA): sea-level fens; rare. Labrador west to MN, south to DE, e. VA, n. IN. [= K; = *J. pelocarpus* var. *pelocarpus* – C, G; > *J. pelocarpus* var. *pelocarpus* – F; < *J. pelocarpus* – FNA, Y (also see *J. abortivus*)]

Juncus polycephalus Michaux, Many-headed Rush. Cp (GA, NC, SC): sandy pond margins, ditches, savannas; uncommon. July-September. Coastal plain, NC to s. FL, west to e. TX; TN. [= RAB, F, FNA, GW, K, S, Y]

Juncus pylaei Laharpe, Common Rush. Cp, Pd, Mt? {NC, SC, VA}: moist soil, marshes, margin of streams, ponds, lakes and swamps, low meadows; common {additional checking of herbarium collections needed to determine actual range of this variety in our area; var. *solutus* as well}. June-September. Throughout eastern North America, south to NC. [= C, K, Y, Z; < *J. effusus* – RAB, FNA, GW, S, W; > *J. effusus* var. *costulatus* St. John – F; > *J. effusus* Linnaeus var. *pylaei* (Laharpe) Fernald & Wiegand – F; < *J. effusus* Linnaeus var. *solutus* Fernald & Wiegand – G]

Juncus repens Michaux, Creeping Rush. Cp (GA, NC, SC, VA), Pd, Mt (GA): streams, ponds, lakes, ditches, wet depressions in flatwoods, cypress savannas; common (rare in Piedmont and Mountains). June-October. DE to s. FL, west to TX, north into OK and TN. This species commonly forms dense mats – a useful field character. [= RAB, C, F, FNA, G, GW, K, S, Y]

Juncus roemerianus Scheele, Black Needle Rush. Cp (GA, NC, SC, VA): coastal tidal marshes, forming dense stands at and above mean high tide, above the *Spartina alterniflora* zone; common. January-June; May-October. MD to s. FL, west to se. TX. See Eleuterius (1977) for additional information on this species. [= RAB, C, F, FNA, G, GW, K, S, Y]

Juncus scirpoides Lamarck *var.* ***compositus*** R.M. Harper. Cp (GA, NC, SC, VA): roadsides, wet, open, disturbed areas, ?; uncommon. June-October. Coastal Plain: NC, GA, FL, AL, MS, LA, SC, TX, VA. [= S; < *J. scirpoides* – RAB, FNA, GW, K, Y; >< *J. scirpoides* -- K; <? *J. scirpoides* var. *meridionalis* Buchenau – F, application uncertain; > *J. glomeratus* Batson – K, nomen nudum]

Juncus scirpoides Lamarck *var.* ***scirpoides***. Cp, Pd, Mt (GA, NC, SC, VA): wet, open, disturbed areas, ditches, sandhill pocosin ecotones and seepage bogs, savannas and wet pine flatwoods, wet meadows; common (rare in Mountains). June-October. S. NY to s. FL, mostly Coastal Plain and Piedmont; west to TX; IN to MI, MO, OK. [= F, S; < *J. scirpoides* – RAB, C, FNA, G, GW, K, W, Y]

Juncus secundus Beauvois ex Poiret. Pd, Mt (GA, NC, SC, VA), Cp (VA): dry fields, rock outcrops; rare (NC Watch List). June-September. ME to IN, south to e. OK, n. AL, and n. GA. [= RAB, C, F, FNA, G, K, S, W, Y]

Juncus subcaudatus (Engelmann) Coville & Blake, Somewhat-tailed Rush. Mt (GA, NC, SC, VA), Pd, Cp (VA): bogs, mossy woods and other wet places; common. July-October. Nova Scotia to NY, southwest to MO and southeast to GA. *J. subcaudatus* is one of the more difficult rushes to identify. Although it is grouped with *J. canadensis*, *J. brevicaudatus* and the other long-tailed rushes, its seeds lack distinct, long appendages. In general appearance it matches *J. acuminatus* quite well; mature seed size and mature capsule size (*J. subcaudatus* capsules are generally well exserted above the perianth, while *J. acuminatus* capsules are equal to only slightly exserted above the capsule) need to be examined in order not to confuse the two taxa. [= RAB, C, FNA, G, W, Y; > *J. subcaudatus* var. *subcaudatus* – F, K]

Juncus tenuis Willdenow, Path Rush. Cp, Pd, Mt (GA, NC, SC, VA): dry or moist soil along roadsides and paths, fields; common (uncommon in se. Coastal Plain). June-September. Labrador west to AK, south to FL, TX, CA. *J. tenuis* as it is here treated includes *J. tenuis* var. *williamsii* Fernald, which has a more congested inflorescence with arched to recurved inflorescence branches. [= FNA, Y; < *J. tenuis* – RAB, G, GW, K, S, W; < *J. tenuis* var. *tenuis* – C; > *J. tenuis* var. *tenuis* – F; > *J. tenuis* var. *williamsii* Fernald – F]

Juncus torreyi Coville, Torrey's Rush. Mt (GA, VA), Pd (VA), {NC}. June-September. New Brunswick west to British Columbia, south to GA, TX, CA, and n. Mexico. [= FNA, C, F, G, GW, K, S, W, Y]

Juncus trifidus Linnaeus, Highland Rush. Mt (NC, VA): rock crevices at high elevations, on greenstone, mica scist, amphibolite, and hornblende gneiss; rare (NC Endangered). June-September. The species is circumboreal, occurring in arctic-alpine situations in n. Europe and n. North America where it ranges from Newfoundland to Québec, south to s. New England and NY; disjunct in VA (Stony Man, Page County) and NC (Craggy Pinnacle, Craggy Dome, and Craggy Gardens, Buncombe County; Eagle Cliff, Mitchell County; Three Top Mountain, Ashe County), and WV (North Fork Mountain, Pendleton County). As with many circumboreal species of polymorphic nature, there is disagreement over the recognition of infraspecific taxa. Var. *monanthos* (Jacquin) Bluff & Fingerhuth or ssp. *monanthos* (Jacquin) Ascherson & Graebner has often been applied to e. North American *J. trifidus*, but should apply (if considered valid at all) only to *J. trifidus* of limestone areas of Europe. Although Hämet-Ahti (1980) correctly showed that Appalachian *J. trifidus* (from acidic and mafic gneisses and schists) does not belong to *J. monanthos* (*J. trifidus* ssp. *monanthos, J. trifidus* var. *monanthos)*, her treatment of Appalachian plants as ssp. *carolinianus* Hämet-Ahti has been controversial. This treatment follows Clemants (1990), who concludes that the primarily vegetative characters used to separate Appalachian plants from the European (blade lengths and relative positions) are too variable to warrant recognition of subspecies or varieties in the taxon. Further study is warranted. [= Y; < *J. trifidus* – FNA, S; > *J. trifidus* var. *monanthos* (Jacquin) Bluff & Fingerhuth – RAB, F, G, W, misapplied; > *J. trifidus* ssp. *carolinianus* Hämet-Ahti – C, K]

Juncus trigonocarpus Steudel. Cp (GA, NC, SC), Pd (GA, NC): seepage slopes, bogs, along stream margins, ditches; common, rare in Piedmont. July-October. Coastal plain, NC to FL Panhandle, west to e. TX. Young *J. trigonocarpus* and *J. canadensis* are often confused; once mature, however, the two can usually be separated by capsule color alone. Although *J. canadensis* capsules redden, they never approach the dark reddish-purple tone of *J. trigonocarpus*. Seed and capsule size are also distinct for the two taxa. [= RAB, FNA, GW, K, S, Y]

Juncus validus Coville *var.* ***validus***, Vigorous Rush. Cp (GA, NC, SC, VA), Pd (GA, SC), Mt (GA): stream and pond margins, roadside ditches, wet, open, often disturbed ground; uncommon. July-September. NC to n. FL, west to TX, OK and MO. Var. *fascinatus* M.C. Johnston is endemic to TX. [= FNA, K, Y; < *J. validus* – RAB, C, F, G, GW, S, W]

* *Juncus acutus* Linnaeus ssp. *leopoldii* (Parlatore) Snogerup. Cp (GA): {habitat unknown}; rare. Reported for se. GA by Jones & Coile (1988) and Kartesz (1999), but not by FNA. {investigate} [= FNA, K, Y] {not keyed, pending verification}

Juncus brachyphyllus Wiegand. Wet sandy areas. MO and KS, south to TX; MT, ID, and WA south to CA; disjunct in the Coastal Plain of w. TN. [= FNA, C, K, Y]

Juncus compressus Jacquin. Disturbed ground, ditches, in saline or alkaline soils. Nova Scotia to Ontario, south to MD, PA, w. NY, MI, WS, and sporadically distributed westward in high elevations. [= FNA, C, F, G, K] {add to synonymy; not yet keyed}

Juncus filiformis Linnaeus, Thread Rush. Bogs, wet acid areas. Circumboreal, south in North America to e. PA, w. PA, WV, n. MI, and n. MN. [= C, F, FNA, G, K]

Juncus interior Wiegand. Prairies, disturbed sites. OH west to Saskatchewan, south to e. TN, AL, LA, TX, and NM. Also reported for VA and NC (Kartesz 1999); the NC report is based on a misidentified specimen. {investigate} [= FNA, G, S, W, Y; > *J. interior* var. *interior* – K; < *J. tenuis* Willdenow var. *tenuis* – C; < *J. tenuis* – GW]

Juncus nodatus Coville. Shallow water, marshes, sloughs, savannas, bogs. KY west to KS, south to TN, AL, FL, LA, and TX. [= FNA, C, G, GW, K, Y; ? *J. robustus*, preoccupied] {synonymy incomplete}

Luzula A.P. de Candolle 1805 (Wood-rush)

A genus of about 75-115 species, cosmopolitan. References: Coffey Swab in FNA (2000); Kirschner et al. (2002a)=Z; Balslev in Kubitzki (1998b). Key adapted in part from Coffey Swab in FNA (2000), C, and F.

1 Flowers borne singly or in small clusters of (1-) 2-4 (-8); inflorescences branched, unbranched, or dichasial.
  2 Flowers borne in small clusters of (1-) 2-4 (-8); perianth white to pink; inflorescences dichasial; seeds lacking an appendage (or with a inconspicuous appendage); [alien species, naturalized north of our area]; [subgenus *Luzula*, section *Anthelaea*] ..... ***[L. luzuloides ssp. luzuloides]***
  2 Flowers borne singly; perianth tan to brown (the margins of the segments often translucent); inflorescences erect or lax, branching or not; seeds with a conspicuous appendage; [native species, widespread in our area]; [subgenus *Pterodes*].
    3 Inflorescences simple, with an occasional pedicel branching from the base of a flower; apical appendages of seeds 0.6-1.5 (-2.1) mm long; seed/appendage length ratio 0.8-1.7 ..... ***L. acuminata** var. **acuminata***
    3 Inflorescences usually branching, the pedicels commonly paired; apical appendages of seeds 0.4-1.1 mm long; seed/appendage length ratio 1.0-2.8 ..... ***L. acuminata** var. **carolinae***
1 Flowers borne in dense glomerate clusters (glomerules); inflorescences spikelike or umbellate; [subgenus *Luzula*, section *Luzula*].
  4 Inflorescence branches divergent, at least some widely spreading; glomerules capitate to broadly ovoid, not cylindric ..... ***L. echinata***
  4 Inflorescence branches erect, none widely spreading; glomerules often cylindric (less commonly merely capitate).
    6 Seeds 0.9-1.3 mm long; caruncle 0.5-0.7 mm long; plants producing several basal bulblets (white swollen leaf bases) ..... ***L. bulbosa***
    6 Seeds 1.1-1.7 mm long; caruncle 0.2-0.5 mm long; plants not producing basal bulblets ..... ***L. multiflora** var. **multiflora***

Luzula acuminata Rafinesque *var.* ***acuminata***. Mt, Pd (NC, SC, VA): moist forests; common. April-August. Newfoundland west to Manitoba, south to SC and AR. [= RAB, C, F, FNA, G, GW, K; = *Juncoides saltuense* (Fernald) Small – S; < *L. acuminata* – W; = *L. acuminata* ssp. *acuminata* – Z]

Luzula acuminata Rafinesque *var.* ***carolinae*** (S. Watson) Fernald. Mt, Pd, Cp (GA, NC, SC, VA): moist forests; common. April-August. MA, NY, PA, and se. OH south to n. FL and AR. Perhaps better treated at the species level. [= RAB, C, F, FNA, G, GW, K; = *Juncoides carolinae* (S. Watson) Kuntze – S; < *L. acuminata* – W; = *L. acuminata* ssp. *carolinae* (S. Watson) Z. Kaplan – Z]

Luzula bulbosa (Wood) Smyth & Smyth. Pd, Mt (GA, NC, SC, VA), Cp (NC, VA): dry forests and fields; common. March-August. MA, PA, IN, and NE south to n. FL, LA, and c. TX. [= RAB, C, F, FNA, GW, K, Z; = *L. campestris* (Linnaeus) A.P. de Candolle var. *bulbosa* Wood – G; = *Juncoides bulbosum* – S; < *L. multiflora* – W]

Luzula echinata (Small) F.J. Hermann. Mt, Pd, Cp (GA, NC, SC, VA): forests, bogs; common. Se. MA, se. NY PA, WV, and IA south to GA, AL, MS, and e. TX. March-August. [= RAB, C, FNA, GW, K, Z; > *L. echinata* var. *echinata* – F; > *L. echinata* var. *mesochorea* F.J. Hermann – F; = *L. campestris* (Linnaeus) A.P. de Candolle var. *echinata* (Small) Fernald & Wiegand – G; = *Juncoides echinatum* Small – S; < *L. multiflora* – W]

Luzula multiflora (Ehrhart) Lejeune *var.* ***multiflora***. Mt, Pd, Cp (VA), {NC?, SC?}: forests; common. March-August. Newfoundland and Ontario, south to VA, KY, and MO. [= F; < *L. multiflora* – RAB, C; = *L. campestris* (Linnaeus) A.P. de Candolle var. *multiflora* (Ehrhart) Celak – G; = *L. multiflora* ssp. *multiflora* var. *multiflora* – K; = *L. multiflora* ssp. *multiflora* – FNA, Z; < *L. multiflora* – W]

* *Luzula luzuloides* (Lamarck) Dandy & Wilmott ssp. *luzuloides*, is a native of Europe, naturalized in ne. North America as far south as se. PA (Rhoads & Klein 1993). It may occur in our area. [= FNA, Z; < *L. luzuloides* – C, F, K]

JUNCAGINACEAE L.C. Richard 1808 (Arrowgrass Family)

A family of 3-4 genera and 20 species, of temperate and boreal regions of the Old and New World. References: Haynes & Hellquist in FNA (2000); Thieret (1988); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

Triglochin Linnaeus 1753 (Arrowgrass)

A genus of about 12 species, cosmopolitan. References: Haynes & Hellquist in FNA (2000); Thieret (1988)=Z; Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

1 Pistils 6, all fertile; fruits 2-4.5 mm long; central axis between the carpels not winged ..... ***[T. maritima]***
1 Pistils 6, 3 fertile and 3 sterile; fruits **either** 7-8.3 mm **or** 1-2 mm long; central axis between broadly winged.
  2 Fruits elongate, 7-8.3 mm long; tepals 6; [of PA northward] ..... ***[T. palustris]***

2 Fruits globose, 1-2 mm long; tepals 3; [of DE and MD southward ..... ***T. striata***

Triglochin striata Ruiz & Pavón, Southern Arrowgrass. Cp (GA, NC, SC, VA): brackish to nearly freshwater marshes; uncommon (VA Watch List). May-October. The species has an extensive range, occurring in tropical Central and South America, Africa, and Australia; in North America, it ranges from MD and DE south to FL and west to LA, and also on the west coast in CA and OR. [= F, FNA, G, K; = *T. striatum* – RAB, C, GW, S, Z, orthographic variant]

Triglochin maritima Linnaeus. Brackish coastal habitats and inland bogs. Circumboreal, south in North America to MD, DE, OH, NE, NM, Mexico; also Patagonia. [= F, FNA, G, K; = *T. maritimum* – C, Z, orthographic variant]

Triglochin palustris Linnaeus. Brackish coastal habitats and inland bogs. Circumboreal, south in North America to PA, IN, IA, NE, and NM. [= F, FNA, G, K; = *T. palustre* – C, Z, orthographic variant]

LILIACEAE A.L. de Jussieu 1789 (Lily Family)

As here interpreted narrowly, the Liliaceae constitutes about 11 genera and 550 species, of the Northern Hemisphere. There has been much recent investigation and re-interpretation of evidence regarding the upper-level taxonomy of the Liliales, with strong suggestions that the broad Liliaceae recognized by Cronquist (1981) is artificial and polyphyletic. Cronquist (1993) himself concurs, at least to a degree: "we still await a comprehensive reorganization of the lilies into several families more comparable to other recognized families of angiosperms." Dahlgren & Clifford (1982) and Dahlgren, Clifford, & Yeo (1985) synthesized an early phase in the modern revolution of monocot taxonomy. Since then, additional research, especially molecular (Duvall et al. 1993, Chase et al. 1993, Bogler & Simpson 1995, and many others), has strongly validated the general lines (and many details) of Dahlgren's arrangement. The most recent synthesis (Kubitzki 1998a) is followed as the basis for familial and generic taxonomy of the lilies and their relatives (see summary below). References: Angiosperm Phylogeny Group (1998, 2003); Tamura in Kubitzki (1998a). [also see *AGAVACEAE, ALLIACEAE, ALSTROEMERIACEAE, AMARYLLIDACEAE, ASPARAGACEAE, COLCHICACEAE, HEMEROCALLIDACEAE, HOSTACEAE, HYACINTHACEAE, HYPOXIDACEAE, MELANTHIACEAE, NARTHECIACEAE, RUSCACEAE, SMILACACEAE, THEMIDACEAE, TOFIELDIACEAE, TRILLIACEAE*]

Our "liliaceous" genera (members of orders placed in the Lilianae) are therefore divided as shown below, largely following Kubitzki (1998a) and some more recent molecular analyses.

ALISMATALES
- TOFIELDIACEAE: *Harperocallis, Pleea, Tofieldia, Triantha.*

LILIALES
- ALSTROEMERIACEAE: *Alstroemeria.*
- COLCHICACEAE: *Colchicum, Uvularia.*
- LILIACEAE: *Clintonia, Erythronium, Lilium, Medeola, Prosartes, Streptopus, Tricyrtis, Tulipa.*
- MELANTHIACEAE: *Amianthium, Anticlea, Chamaelirium, Helonias, Schoenocaulon, Stenanthium, Veratrum, Toxicoscordion, Xerophyllum, Zigadenus.*
- SMILACACEAE: *Smilax.*
- TRILLIACEAE: *Trillium.* (or to be included in MELANTHIACEAE)

ASPARAGALES
- AGAVACEAE: *Camassia, Manfreda, Schoenolirion, Yucca.* (or to be included in ASPARAGACEAE)
- ALLIACEAE: *Allium, Ipheion, Nothoscordum.*
- AMARYLLIDACEAE: *Crinum, Galanthus, Hymenocallis, Leucojum, Lycoris, Narcissus, Sternbergia, Zephyranthes.* (or to be included in ALLIACEAE)
- ASPARAGACEAE: *Asparagus.*
- HEMEROCALLIDACEAE: *Hemerocallis.* (or to be included in XANTHORRHOEACEAE)
- HOSTACEAE: *Hosta.* (or to be included in ASPARAGACEAE)
- HYACINTHACEAE: *Hyacinthoides, Hyacinthus, Muscari, Ornithogalum.* (or to be included in ASPARAGACEAE)
- HYPOXIDACEAE: *Hypoxis.*
- IRIDACEAE: *Alophia, Calydorea, Crocus, Crocosmia, Gladiolus, Herbertia, Iris, Nemastylis, Sisyrinchium.*
- ORCHIDACEAE: *Aplectrum, Arethusa, Bletilla, Calopogon, Cleistes, Coeloglossum, Corallorhiza, Cypripedium, Epidendrum, Epipactis, Galearis, Goodyera, Habenaria, Hexalectris, Isotria, Liparis, Listera, Malaxis, Platanthera, Pogonia, Ponthieva, platythelys, Pteroglossaspis, Sacoila, Spiranthes, Tipularia, Triphora, Zeuxine.*
- RUSCACEAE: *Convallaria, Liriope, Maianthemum, Nolina, Polygonatum.* (or to be included in ASPARAGACEAE)
- THEMIDACEAE: *Dichelostemma.* (or to be included in ASPARAGACEAE)

DIOSCOREALES
- BURMANNIACEAE: *Apteria, Burmannia.*
- DIOSCOREACEAE: *Dioscorea.*
- NARTHECIACEAE: *Aletris, Lophiola, Narthecium.*

PANDANALES
- STEMONACEAE: *Croomia.*

1 Leaves basal; flowers on a leafless scape; tepals yellow or white.
  2 Flowers in an umbel at the summit of a leafless scape; fruit a berry; [subfamily *Medeoloideae*] ..... ***Clintonia***
  2 Flowers solitary and scapose; tepals yellow or white; fruit a capsule; [subfamily *Lilioideae*, tribe *Tulipeae*] ..... ***Erythronium***
1 Leaves on a stem; flowers not scapose; tepals orange, red, rose, yellow, or white.
  3 Leaves whorled at at least 1 node.

4 Leaves occurring at several nodes, these variously whorled and/or alternate; flowers orange, red, or yellow; [subfamily *Lilioideae*, tribe *Lilieae*] ..... ***Lilium***
4 Leaves occurring in a single whorl, with fertile plants with a second whorl of leaflike bracts subtending the flowers; flowers yellow; [subfamily *Medeoloideae*] ..... ***Medeola***
3 Leaves alternate at all nodes.
5 Leafy stem branched; fruit a berry.
6 Stems brownish, wiry; inflorescence terminal ..... ***Prosartes***
6 Stems green, rather succulent; inflorescence axillary ..... ***Streptopus***
5 Leafy stem unbranched; fruit a capsule.
7 Leaves at 1-6 nodes; flowers cup-shaped, the tepals incurved-erect; [subfamily *Lilioideae*, tribe *Tulipeae*] ..... ***[Tulipa]***
7 Leaves at 7 or more nodes; flowers with tepals recurved.
8 Flowers orange, red, or yellow (rarely white); leaves unspotted ..... ***Lilium***
8 Flowers whitish or lavender with darker spots; leaves often dark-spotted ..... ***[Tricyrtis]***

Clintonia Rafinesque 1819

A genus of 5 species, of temperate to subarctic e. Asia and North America. References: Utech in FNA (2002a); Tamura in Kubitzki (1998a).

1 Flowers yellow; berry blue (rarely to whitish-blue); leaf margins glabrous or slightly ciliate; [mostly of high elevations] ..... ***C. borealis***
1 Flowers white (often marked with purple); berry black; leaf margins copiously retrorsely ciliate, the cilia 2-4 mm long; [plants of middle elevations] ..... ***C. umbellulata***

Clintonia borealis (Aiton) Rafinesque, Bluebead-lily. Mt (GA, NC, VA): spruce-fir forests, northern hardwood forests, less commonly in red oak forests; common (GA Special Concern). Late May-June; July-September. Labrador west to Manitoba, south to NJ, PA, and n. IN, and in the mountains to w. NC, e. TN, and n. GA (Jones & Coile 1988). [= RAB, C, F, FNA, G, K, S, W]

Clintonia umbellulata (Michaux) Morong, Speckled Wood-lily. Mt (GA, NC, SC, VA): red oak and other oak forests, mesic to dry ridges and slopes, less commonly in northern hardwood forests, generally at lower elevations than *C. borealis*, though the two species can co-occur; common. Mid May-June; August-October. An Appalachian endemic: c. NY west to s. OH, south to n. GA (Jones & Coile 1988). *Clintonia alleghaniensis* Harned, differing from *C. umbellulata* in its ultramarine blue berry (vs. black) is known from a number of sites in VA, MD, and WV. It has been variously interpreted as a species, a hybrid of *C. borealis* and *C. umbellulata*, or merely an odd form of *C. umbellulata*; it needs further study. [= RAB, C, F, FNA, G, K, W; = *Xeniatrum umbellulatum* (Michaux) Small – S; > *C. alleghaniensis* Harned]

Erythronium Linnaeus 1753 (Trout Lily)

A genus of about 25 species, north temperate and subarctic, of North America and Eurasia (especially diverse in w. North America). References: Parks & Hardin (1963)=Z; Mathew (1992)=Y; Allen & Robertson in FNA (2002a); Tamura in Kubitzki (1998a).

Identification notes: Stolons are white shoots produced from the bulb. Most run horizontally, either underground or along the ground surface but beneath leaf litter. Flowering individuals often produce no stolons. The stolon characters in the key below are those of non-flowering individuals and refer to horizontal stolons only.

1 Perianth white ..... ***E. albidum***
1 Perianth yellow.
2 Petals lacking auricles at base; capsule and ovary distinctly indented (umbilicate) at apex (or rarely truncate in *E. umbilicatum* ssp. *monostolum*, or the ovary when young not yet displaying the apical indentation); mature capsules usually reclining on ground, with the apex downward; stolons 0-1 per bulb; anthers usually lavender, brown, cinnamon, or purple (sometimes yellow).
3 Horizontal stolons 1 per bulb; flecking on perianth segments slight to strong; perianth margins slightly irregular (though not auricled); stigma lobes long; pale spot on adaxial side of perianth segments always present, small to large, usually pale yellow; [at high elevations in the Southern Appalachians] ..... ***E. umbilicatum ssp. monostolum***
3 Horizontal stolons 0 per bulb; flecking on perianth segments absent to slight; perianth margins entire, smooth; stigma lobes short; pale spot on adaxial side of perianth segments usually present, small to medium, usually white; [of lower to mid elevations, widespread in our area] ..... ***E. umbilicatum ssp. umbilicatum***
2 Petals with auricles at base; capsule and ovary truncate, rounded, apiculate, or beaked at apex; mature capsules usually held well off ground, the apex oriented horizontally or ascending; stolons usually (1-) 2-5 per bulb; anthers usually yellow (rarely brown or lavender).
4 Capsule distinctly beaked at the apex; petals with well-developed auricles at the base, these encircling a filament ..... ***[E. rostratum]***
4 Capsule truncate, rounded, or apiculate at the apex; petals with small auricles at the base, which do not encircle a filament.
5 Capsule apiculus absent or poorly developed ..... ***E. americanum ssp. americanum***
5 Capsule apiculus well developed ..... ***E. americanum ssp. harperi***

Erythronium albidum Nuttall, White Trout Lily, Blonde Lilian. Mt (GA, VA), Pd (VA): rich, mesic forests, in very nutrient-rich alluvial soils; rare (VA Rare). March-April. S. Ontario west to MN, south to n. VA, nw. GA, KY, sc. TN, MO, and OK. [= C, K, S, W, Y; = *E. albidum* var. *albidum* – F, G]

Erythronium americanum Ker-Gawler *ssp.* ***americanum***, American Trout Lily. Pd (NC, SC, VA), Mt, Cp (NC, VA): moist bottomland or slope forests, especially over mafic rocks; common in VA, much rarer in NC (NC Watch List). February-

April; April-May. New Brunswick west to Ontario and MN, south to sc. NC, c. TN, AR, and OK. It is much rarer than *E. umbilicatum* in NC. *E. americanum* is a tetraploid (2n = 48); Parks & Hardin suggest the possibility that it is an allotetraploid involving *E. rostratum* and *E. umbilicatum* as parents. *E. americanum* is larger-flowered, more graceful, and later-blooming (by 1-2 weeks) than *E. umbilicatum* ssp. *umbilicatum*, where they co-occur. [= FNA, GW, K, Y, Z; < *E. americanum* – RAB, F, G, S (also see *E. umbilicatum*); < *E. americanum* – C, W]

Erythronium americanum Ker-Gawler *ssp.* ***harperi*** (W. Wolf) Parks & Hardin, Harper's Trout Lily. Mt (GA): moist forests; rare. Ne. TN and nc. TN south to extreme se. TN, nw. GA, and nc. AL. [= FNA, GW, K, Y, Z; < *E. americanum* – S]

Erythronium umbilicatum Parks & Hardin *ssp.* ***monostolum*** Parks & Hardin, Southern Appalachian Trout Lily. Mt (NC): high elevation coves, slopes, and grassy balds; uncommon. March-May; April-June. Ssp. *monostolum* is endemic to the high mountains of NC and TN. It approaches the VA border and should be sought, especially in the Grayson Highlands area. *E. umbilicatum* ssp. *monostolum* is a diploid (2n = 24). [= FNA, GW, K, Y, Z; < *E. americanum* – RAB, F, G, S; < *E. umbilicatum* – C, W]

Erythronium umbilicatum Parks & Hardin *ssp.* ***umbilicatum***, Dimpled Trout Lily. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist bottomland or slope forests, or in rather dry upland habitats; common (rare in FL). February-April (May?); April-June. VA and e. WV south through NC, SC, and e. TN to c. GA, e. AL, and Panhandle FL. *E. umbilicatum* ssp. *umbilicatum* is a diploid (2n = 24). Mathew (1992) suggests the possibility that an earlier name, *E. nuttallianum* Roemer & Schultes, may apply to this taxon; the two locations mentioned on the type, Pennsylvania and Albany, NY, are outside the known range of the species, however. [= FNA, GW, K, Y, Z; < *E. americanum* – RAB, F, G, S; < *E. umbilicatum* – C, W, WH]

Erythronium rostratum W. Wolf, Beaked Trout Lily. C. TN, MO, and se. KS, south to c. AL, wc. LA, and se. OK. [= FNA, GW, K, Y, Z; < *E. americanum* – S]

Lilium Linnaeus 1753 (Lily)

A genus of about 110 species, of temperate northern hemisphere (especially e. Asia). Many taxonomic problems remain in this genus of showy ornamentals. References: Adams & Dress (1982)=Z; Skinner & Sorrie (2002)=X; Wherry (1946)=Y; Skinner in FNA (2002a); Henry (1946); Tamura in Kubitzki (1998a).

1 Dark bulblets produced in many leaf axils; [exotic] ..... ***L. lancifolium***
1 Dark bulblets never produced; [native (except *L. philippinense*), though some species also cultivated].
  2 Flowers white; leaves narrowly linear; [exotic] ..... ***L. philippinense***
  2 Flowers orange or yellow; leaves lanceolate, oblanceolate, or obovate; [native].
    3 Flowers erect, facing upwards; tepals clawed.
      4 Leaves all alternate; [of the Coastal Plain] ..... ***L. catesbaei***
      4 Leaves (at least some of them) whorled or verticillate; [of the Mountains] ..... ***L. philadelphicum*** *var.* ***philadelphicum***
    3 Flowers nodding or declined, facing downwards or to the side; tepals narrowed to the base, but not clawed.
      5 Leaves oblanceolate to obovate, alternate and whorled, in many plants 50% or more of nodes bearing a single leaf; flowers 1-4 (rarely more), nodding to pendant, fragrant ..... ***L. michauxii***
      5 Leaves lanceolate or narrowly elliptic, not broader distally, alternate and whorled, in most plants 10-30% of nodes bearing a single leaf; flowers 1-30+, oriented variously, not fragrant.
        6 Flowers at maturity campanulate (tepals with somewhat recurved tips); style and stamens included or barely exserted.
          7 Flowers 3-4 cm in diameter; pistil 3-4 cm long; tepals 3-5.5 cm long, deep red, mucronate by extension of the midrib, reflexed < 45 degrees from the flower axis, the terminal third of the tepals generally gently incurved; anthers 4-6 mm long, completely included within the perianth when viewed from the side; [high elevations in the Blue Ridge of w. NC, ne. TN, and sw. VA] ..... ***L. grayi***
          7 Flowers 4.5-9 cm in diameter; pistil 4-6 cm long; tepals 6-8 cm long, yellow, orange to brick-red, acuminate, reflexed 60-120 degrees from the flower axis; anthers 5-10 mm long, exserted to fully included within the perianth when viewed from the side; [low to moderate elevations, more widespread].
            8 Perianth yellow (rarely orange to red); mid-stem leaves 5-10× as long as wide ..... ***L. canadense*** *var.* ***canadense***
            8 Perianth orange to red; mid-stem leaves 2-5× as long as wide ..... ***L. canadense*** *var.* ***editorum***
        6 Tepals at maturity recurved fully to form a circular shape; flowers pendant to nodding; style and stamens long-exserted.
          9 Style reddish, more-or-less the same color as the tepals; [west of the Blue Ridge] ..... ***L. michiganense***
          9 Style pale green, strongly contrasting with tepals; [Blue Ridge and eastward and southward].
            10 Leaves 7-26 cm long, oriented horizontally and with arching (downward) tips; leaf whorls 6-24; plants 1.2-2.8 m tall; infloresecences (1-) 5-22 flowered, tepals orange to reddish ..... ***L.superbum***
            10 Leaves 2-16 cm long, ascending or +- horizontal but tips not arched; leaf whorls 1-12; plants 0.6-2.0 m tall; inflorescences 1-4 (-7) flowered, tepals yellow to orange (to dusky red).
              11 Leaf whorls 1-5; petals yellow to yellow-orange; [of East Gulf Coastal plain pitcher-plant bogs and relatively open blackwater baygalls and streamheads in nw. FL and sw. AL] ..... ***L. iridollae***
              11 Leaf whorls 1-12; petals orange to dusky red; margins of tree-shrub streamheads in the Coastal Plain of se. VA, c. NC, and c. SC] ..... ***L. pyrophilum***

Lilium canadense Linnaeus *var.* ***canadense***, Yellow Canada Lily. Mt (NC, VA): wet meadows; uncommon (rare in NC). June-July; late July-September. Apparently ranging from New Brunswick to NC, mostly east of or in the Appalachians; the range is obscured by different interpretations of var. *canadense* and var. *editorum*, by spread from cultivation, and by collections of cultivated plants not clearly so indicated. Some of our plants are definitely var. *canadense*. [= F; < *L. canadense* – RAB, C, FNA, G, GW, S; = *L. canadense* ssp. *canadense* – K, W, Z; = *L. canadense* ssp. *typicum* – Y]

Lilium canadense Linnaeus *var.* ***editorum*** Fernald, Red Canada Lily. Mt, Pd (GA, NC, SC, VA): wet meadows, forest openings; uncommon (rare in GA, NC, and SC). June-July; late July-September. According to Adams & Dress (1982), who emphasize tepal color in distinguishing the infraspecific taxa, ranging from New Brunswick west to s. Ontario, south (mostly in and west of the Appalachians) to n. GA and n. AL. Wherry (1946) and Fernald (1950) emphasize leaf shape, and secondarily flower color, restricting var. *editorum* to a range from PA west to s. IN, south to AL. There has been considerable confusion between *L. canadense* var. *editorum* and *L. grayi*, and populations in sw. VA appear to show some intergradation between the two. [= F; < *L. canadense* – RAB, C, FNA, G, GW, S; = *L. canadense* ssp. *editorum* (Fernald) Wherry – K, W, Y, Z]

Lilium catesbaei Walter, Pine Lily, Catesby's Lily, Leopard Lily. Cp (FL, GA, NC, SC, VA): pine savannas, sandhill seeps; common (uncommon in GA, NC, and SC, rare in VA). Mid June-mid September; September-November. Se. NC south to FL and west to LA, on the Coastal Plain. [= GW, S, WH; > *L. catesbaei* var. *catesbaei* – RAB; > *L. catesbaei* var. *longii* Fernald – RAB, C, F, G; > *L. catesbaei* ssp. *catesbaei* – K; > *L. catesbaei* ssp. *longii* (Fernald) Wherry – K, Y; > *L. catesbaei* ssp. *typicum* – Y]

Lilium grayi S. Watson, Gray's Lily, Roan Lily. Mt (NC, VA): bogs, seepages, grassy balds, moist forests, and wet meadows, at medium to high elevations; rare. June-July; August-September. A Southern Appalachian endemic: sw. VA, nw. NC, and ne. TN. Clearly related to *L. canadense* (especially through the somewhat intermediate *L. canadense* var. *editorum*), *L. grayi* appears to be adapted for pollination by Ruby-throated Hummingbirds (Adams & Dress 1982). See *L. canadense* var. *editorum* for additional comments. The two most important strongholds for this rare lily (each with thousands of individuals) are the Roan Mountain massif (Avery and Mitchell counties, NC and Carter County, TN), where it was first found, and Long Hope Valley (Watauga and Ashe counties, NC). Otherwise, it tends to occur in very small, isolated populations in bogs, wet pastures, and seeps. In addition to the characters in the key, *L. grayi* can be distinguished in sterile condition from the 2 more common species of the Mountains by leaves, which are widest near the midpoint, typically 4-6× as long as wide (vs. distinctly wider towards the apex in *L. michauxii*, and widest near the midpoint but typically 10× or more as long as wide in *L. superbum*). Certainly one of our most beautiful wild plants! [= RAB, C, F, G, K, S, W, Y, Z]

Lilium iridollae M.G. Henry, Panhandle Lily, Pot-o'-gold Lily. Cp (AL, FL): bogs; rare. Panhandle FL west to s. AL. [= FNA, GW, WH; < *L. iridollae* – K (also see *L. pyrophilum*)] {not yet keyed}

* ***Lilium lancifolium*** Thunberg, Tiger Lily. Pd (NC, VA): disturbed areas, trash heaps; rare, native of Asia. The more familiar name, *L. tigrinum*, must be rejected in favor of the older *L. lancifolium* (Ingram 1968). [= C, FNA, K; = *L. tigrinum* Ker-Gawler – F, G]

Lilium michauxii Poiret, Carolina Lily. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry upland forests, ridges, slopes, and ridges; common (uncommon in Coastal Plain, rare in FL). July-August; September-October. S. VA, e. TN, n. AL, c. MS, and e. LA south to s. SC, panhandle FL, s. AL, s. MS, and s. LA. [= C, F, FNA, G, GW, K, W, WH, X, Y, Z; < *L. michauxii* – RAB (also see *L. pyrophilum*); = *L. carolinianum* Michaux – S]

Lilium michiganense Farwell, Michigan Lily. Mt (GA): wet prairies and calcareous flatwoods; rare. Ontario and MN south to e. TN, KY, nw. GA, AL, AR, and e. OK. [= C, F, FNA, K; < *L. superbum* – G; = *L. canadense* Linnaeus ssp. *michiganense* (Farwell) Boivin & Cody]

Lilium philadelphicum Linnaeus *var.* ***philadelphicum***, Wood Lily. Mt (GA, NC, VA): grassy balds, moist to wet meadows (especially in thin soils over rock), open woodlands; rare. June-July; August-October. The species ranges from ME west to British Columbia, south to NC, nw. GA (Jones & Coile 1988), KY, IL, IA, NE, and NM. Var. *philadelphicum*, distinguished by the leaves whorled at 3-6 nodes, 10-15 (-25) mm wide, the capsule 2.5-3.5 (-5) cm long, is eastern and mainly Appalachian, ranging from ME and s. Ontario south to NC, GA, and KY. Var. *andinum* (Nuttall) Ker-Gawler, distinguished by the leaves whorled at 1-2 nodes, 3-10 mm wide, the capsule 4-8 cm long, is western, ranging from OH, MN, and British Columbia south to NM. [= C, F, G, K; < *L. philadelphicum* – RAB, FNA, S, W; = *L. philadelphicum* ssp. *philadelphicum* – Y]

* ***Lilium philippinense*** Baker, Philippine Lily. Cp (FL, NC): escaped from cultivation; rare, native of the Philippines. July-August. This species is introduced at various locations in the Southeast, including Florida and Louisiana (Kartesz 1999), and has been documented from Richmond Co. NC (Sorrie, pers. comm.). In North America there has been confusion between this species and *L. formosanum* A. Wallace. [= FNA, K, WH]

Lilium pyrophilum M.W. Skinner & Sorrie, Sandhills Bog Lily. Cp (NC, SC, VA): peaty seepage bogs in the Sandhills and peaty swamp margins in the upper Coastal Plain; rare. Late July-mid August. See Skinner & Sorrie (2002) for detailed information on this species. Superficially, this plant is somewhat similar to *L. michauxii*, in its one to several, nodding flowers with recurved tepals, relatively few whorls of leaves, and relatively few leaves per whorl. In addition to the character used in the key, this plant differs from *L. michauxii* in the following ways: flowers not fragrant or only slightly so (vs. flowers strongly fragrant), leaves generally widest near the middle (vs. widest towards the tip), leaves only slightly paler below and lacking a pronounced waxy sheen (vs. leaves strongly bicolored, the lower surface much paler and with a waxy sheen), and habitat in sphagnous, peaty bogs (vs. in xeric to mesic, sandy to loamy soils). [= FNA, X; < *L. michauxii* – RAB (misapplied to these plants); < *L. iridollae* M.G. Henry – K, misapplied]

Lilium superbum Linnaeus, Turk's-cap Lily, Lily-royal. Mt (GA, NC, VA), Pd (GA, NC, VA), Cp (FL, GA, NC, SC, VA): cove forests and moist forests, moist ravines, blackwater stream swamps; common (rare in Piedmont, rare in NC Coastal Plain, rare in FL). July-August; September-October. MA and s. NY south to ne. NC, panhandle FL, and c. MS, southwards primarily in the Appalachians, but extending across the Piedmont to the Coastal Plain of VA and ne. NC, and with a similarly odd extension south of the southern terminus of the Appalachians into the Coastal Plain of GA, w. FL, AL, and MS. The plants of blackwater swamps of se. VA and ne. NC are very narrow-leaved and yellow-tepaled; this form, atypical in habitat, range, and morphology has been referred to as "*Lilium* species 1" (Weakley 1993). Further study is needed to determine whether it is a distinct taxon (species, or variety of *L. superbum*) or only a form. [= C, F, FNA, GW, K, S, W, WH, X, Y, Z; < *L. superbum* – G (also see *L. michiganense*)]

Medeola Linnaeus 1753 (Indian Cucumber-root)

A monotypic genus, an herb of eastern North America. References: Utech in FNA (2002a); Tamura in Kubitzki (1998a).

Identification notes: *Medeola* is sometimes mistaken (when sterile) for *Isotria*; *Medeola* has a wiry stem, floccose-pubescent, *Isotria* a fleshy, glabrous stem.

Medeola virginiana Linnaeus, Indian Cucumber-root. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests, usually with acidic soils; common (rare in FL). Mid April-mid June; September-October. Québec and Ontario west to MN, south to GA, panhandle FL and LA. The tuber is white, crisp, tasting cucumber-like, usually about 5 cm long and 5 mm in diameter. Bell (1974) describes patterns of vegetative growth. Flowering plants have a second, smaller whorl of leaves; the flowers are borne on recurved pedicels beneath the top whorl of leaves. In fruit, however, the pedicels are ascending or erect, bringing the fruits above the top whorl. When the berries are ripe, the leaves of the upper whorl become scarlet at the base, presumably acting as an attractant to animals. [= RAB, C, F, FNA, G, GW, K, S, W, WH]

Prosartes D. Don 1839 (Fairybells, Mandarin)

A genus of 6 species, of temperate e. North America, w. North America, and e. Asia. Dahlgren, Clifford, & Yeo (1985) suggest that American species of *Disporum* are generically distinct from Asiatic species and should be segregated in the genus *Prosartes*, a distinction made as long ago as 1839. Asian *Disporum* species lack the distinctly reticulate venation of our plants, have strictly glabrous foliage (vs. pubescent), have spurred tepals (vs. unspurred), blue or black berries (vs. red or straw-colored), tripartite stigma (vs. not), and other differences (Jones 1951). Further study of generic limits by Shinwari et al. (1994) shows that the separation into *Prosartes* of the American species often assigned to *Disporum* is clearly warranted, based on morphological and karyological grounds. *Prosartes* is much more closely related to *Streptopus* than to (Asian) *Disporum*; (Asian) *Disporum* is more closely related to *Uvularia*. References: Johnson (1968)=Z; Shinwari et al. (1994)=Y; Jones (1951); Tamura, Utech, & Kawano (1992); Utech in FNA (2002a); Tamura in Kubitzki (1998a).

1 Fruit glabrous, ellipsoid, weakly triangular in cross-section, the surface smooth and shiny, red when ripe; tepals greenish, unspotted; leaves relatively many, small, and moderately spreading relative to the stem; leaf glabrous on the surface above (except for sparsely pubescent on the midrib and main veins), densely pubescent on the midrib below, sparsely pubescent on the surface below; leaf pubescence weak, often twisted or curled apically (as seen at 10-20× magnification), the leaf therefore very soft to the touch ..... ***P. lanuginosa***
1 Fruit pubescent, strongly 3-lobed (or 1- or 2-lobed by abortion), the surface textured and dull, whitish-tan when ripe; tepals whitish, spotted with purple; leaves relatively few, large, and widely spreading relative to the stem; leaf sparsely pubescent on the surface and veins above and below; leaf pubescence stiff, generally straight and perpendicular to the surface (as seen at 10-20× magnification), the leaf therefore slightly rough to the touch ..... ***P. maculata***

Prosartes lanuginosa (Michaux) D. Don, Yellow Mandarin, Yellow Fairybells. Mt (GA, NC, SC, VA), Pd (VA): deciduous forests, especially coves; common. April-May; August-September. Primarily an Appalachian species: NY and s. Ontario south to n. GA (Jones & Coile 1988) and AL. [= FNA, K, Y; = *Disporum lanuginosum* (Michaux) Nicholson – RAB, C, F, G, S, W, Z]

Prosartes maculata (Buckley) A. Gray, Spotted Mandarin, Nodding Mandarin. Mt (GA, NC, VA): nutrient-rich deciduous forests, especially cove forests; rare (NC Watch List, VA Rare). April-May; July-August. AL, n. GA, KY, MI, w. NC, OH, TN, w. VA, and WV; its distribution is rather fragmented, and the species is considered rare or uncommon in every state in its range. The fruits are more reminiscent of *Uvularia* than of *Prosartes lanuginosa*. [= FNA, K, Y; = *Disporum maculatum* (Buckley) Britton – RAB, C, F, G, S, W, Z]

Streptopus Michaux 1803 (Twisted-stalk)

A genus of about 7 species, temperate to subarctic in Europe, e. Asia, and North America. References: Utech in FNA (2002a); Fassett (1935)=Z; Tamura in Kubitzki (1998a).

1 Leaf margins and nodes not coarsely ciliate; leaves strongly cordate-clasping; fruit ellipsoid ..... ***S. amplexifolius** var. **amplexifolius***
1 Leaf margins and nodes coarsely ciliate; leaves sessile to somewhat cordate-clasping (especially the lower leaves of robust individuals); fruit globose ..... ***S. lanceolatus** var. **lanceolatus***

Streptopus amplexifolius (Linnaeus) A.P. de Candolle *var.* ***amplexifolius***, White Mandarin, Pagoda-bells. Mt (NC, VA): moist forests and seepages at high elevations; rare. Late April-early June; late July-September. The species is circumboreal, the range fragmented. Fassett recognized seven varieties, the plants in our area being var. *americanus*. The species ranges from Greenland and Labrador to MN, south (in the mountains and disjunctly) to NC, and in the west from AK (and Kamchatka) south to NM and AZ, in Japan, and in the Alps in Europe. [= K; < *S. amplexifolius* – RAB, FNA, W; > *S. amplexifolius* var. *americanus* J.A. & J.H. Schultes – C, F, G, Z; < *Tortipes amplexifolius* (Linnaeus) Small – S]

Streptopus lanceolatus (Aiton) Reveal var. ***lanceolatus***, Eastern Rose Mandarin, Eastern Twisted-stalk. Mt (GA, NC, VA): moist forests at high elevations; uncommon (rare in GA). Late April-early June; late July-September. Fassett (1935) recognized four varieties in *S. roseus*. Reveal (1993c) determined that the correct name for the species widely known as *S. roseus* is *S. lanceolatus* (Aiton) Reveal, and he transferred Fassett's varieties. Fassett (and Reveal) considered *S. lanceolatus* var. *lanceolatus*

[*S. roseus* var. *perspectus* Fassett] to range from s. Labrador west to MI, south to NJ and PA, and in the mountains to w. NC, e. TN, and ne. GA (Jones & Coile 1988). *S. lanceolatus* var. *longipes* (Fernald) Reveal [*S. roseus* var. *longipes* (Fernald) Fassett] is midwestern, from s. Ontario and nw. PA west to MI, WI, MN, and s. Manitoba. Var. *curvipes* (Vail) Fassett is western, ranging from AK to se. British Columbia and nw. OR. Var. *roseus* was considered to be a Southern Appalachian endemic, differing from var. *perspectus* only in having the pedicel-peduncles entirely glabrous (vs. ciliate with few to many multicellular hairs). The number of hairs on the peduncles varies constantly, and recognition of two varieties in e. North America does not appear warranted; all of our material is then *S. lanceolatus* var. *lanceolatus* [*S. roseus* var. *roseus* (in a broader sense)], which does differ significantly from the more western varieties. [< *S. roseus* – RAB, S, W; > *S. roseus* var. *roseus* – C, F, G, Z; > *S. roseus* var. *perspectus* Fassett – C, F, G, Z; < *S. lanceolatus* – FNA; > *S. lanceolatus* var. *lanceolatus* – K; > *S. lanceolatus* var. *roseus* (Michaux) Reveal – K]

Tricyrtis Wallich 1826 (Toadlily)

A genus of about 18 species, of e. Asia. References: Tamura in Kubitzki (1998a).

* *Tricyrtis hirta* (Thunberg) Hooker, Toadlily, native of e. Asia, is cultivated as an ornamental and may escape or persist, as in se. PA (Rhoads & Klein 1993). [= K]

Tulipa Linnaeus 1753 (Tulip)

A genus of about 150 species, of temperate Eurasia (especially w. and c. Asia). References: Tamura in Kubitzki (1998a); Straley & Utech in FNA (2002a).

* *Tulipa sylvestris* Linnaeus, Tulip, Dutch-lily, is very commonly cultivated and is "occasionally naturalized in moist meadows, fields and roadsides" in se. PA (Rhoads & Klein 1993) and MD (Kartesz 1999). [= FNA, K]

MARANTACEAE Petersen in Engler & Prantl 1888 (Arrowroot Family)

A family of about 31 genera and 550 species, herbs and vines, nearly pantropical (absent from Australia), and rarely extending ino subtropical and warm temperate regions. References: Kennedy in FNA (2000); Andersson in Kubitzki (1998b).

Thalia Linnaeus 1753 (Thalia)

A genus of 6-7 species, in subtropical and tropical America. References: Kennedy in FNA (2000); Andersson in Kubitzki (1998b).

1 Flowers crowded on the rachis, the zigzag internodes 2-3 mm long; leaves pilose at the base on the upper surface; bracts of the inflorecence white-pruinose ..... ***Th. dealbata***
1 Flowers separated on the rachis, thye zigzag internodes 5-10 mm long; leaves glabrous at the base on the upper surface; bracts of the inflorescence green or purple, not pruinose ..... ***Th. geniculata***

Thalia dealbata Fraser ex Roscoe, Powdery Thalia, Powdery Alligator-flag. Cp (AL, GA, KY, LA, MS, SC): swamp forests, wet ditches, brackish marshes; rare. May-September; June-October. Ne. SC south to GA, west to TX and OK, north in the Mississippi Embayment to w. KY, s. IL, and se. MO. [= RAB, FNA, GW, K, S]

Thalia geniculata Linnaeus, Lilies, Bent Thalia, Bent Alligator-flag. Cp (AL, FL, LA): ponds, sloughs, marshes; rare. AL, FL, LA, south through the New World tropics. [= FNA, GW, K, S, WH]

MAYACACEAE Kunth 1840 (Bogmoss Family)

A family of a single genus and 4-10 species, of tropical to warm temperate America and Africa. References: Faden in FNA (2000); Thieret (1975); Stevenson in Kubitzki (1998b).

Mayaca Aublet 1775 (Bogmoss)

A genus of 4-10 species, of tropical to warm temperate America and Africa. References: Thieret (1975)=Z; Faden in FNA (2000); Stevenson in Kubitzki (1998b).

Mayaca fluviatilis Aublet, Bogmoss. Cp (FL, GA, NC, SC): marshes, streams, swamp forests, shores of natural lakes, seepage areas, in saturated soil or variously submersed; common. May-July. Se. NC south to c. peninsular FL, west to se. TX; West Indies; Central America to South America. The two species previously recognized appear to be only different growth

forms, induced by different hydrologic conditions. [= FNA, GW, K, WH, Z; > *M. aubletii* Michaux – RAB, S; > *M. fluviatilis* – RAB, S]

MELANTHIACEAE Batsch 1802 (Bunchflower Family)

A family of about 16 genera and 170 species, mostly temperate and northern hemisphere, but extending into South America. Further modifications of the circumscription of the Melanthiaceae (and re-assignments of genera) may be needed; see Zomlefer et al. (2001) and Tamura et al. (2004). References: Dahlgren, Clifford, & Yeo (1985); Zomlefer (1997a)=Z; Zomlefer (1996, 2003); Tamura in Kubitzki (1998a); Zomlefer et al. (2001).

1 Leaves 3, whorled at the summit of the stem ..... ***[Trillium in TRILLIACEAE]***
1 Leaves many, not whorled at the summit of the stem.
  2 Leaves 1-2 mm wide, linear, stiff, sclerified ..... ***Xerophyllum***
  2 Leaves 3-150 mm wide, linear, obovate, or oblanceolate, not notably stiff.
    3 Flowers pink ..... ***Helonias***
    3 Flowers white, cream, yellowish, or greenish, or brownish.
      4 Inflorescence a panicle.
        5 Inflorescence axes scurfy-pubescent; seeds winged; leaves **either** linear **or** broader, < 14 cm wide ..... ***Veratrum***
        5 Inflorescence axes glabrous; seeds not winged (though sometimes angled); leaves linear, < 2 cm wide.
          6 Leaves strongly keeled, (5-) 10-20 mm wide; plant colonial, from thick, hard, horizontal, short-creeping rhizomes covered with fibrous old leaf bases; inner tepals (petals) 7-17 mm long, distinctly clawed, acute-acuminate at the tip, bearing 2 glands well above the base ..... ***Zigadenus***
          6 Leaves slightly or not at all keeled, 2-12 mm wide; plant solitary, from a bulbous or semibulbous base; inner tepals (petals) 3-6 or 7-12 mm long, clawed or not, bearing either a single (sometimes obscure to essentially invisible) gland near the base or a bilobed gland well above the base.
            7 Inner tepals (petals) 7-12 mm long, clawed, with a single bilobed gland borne well above the base; [of calcareous habitats in the Mountains] ..... ***Anticlea***
            7 Inner tepals 3-10 mm long, not clawed, with a single, unlobed gland borne near the base (this often difficult or impossible to see, consisting only of a greenish line at the very base of the tepal); [of acid habitats of the Mountains, Piedmont, and Coastal Plain] ..... ***Stenanthium***
      4 Inflorescence a spike or raceme.
        8 Leaves obovate, distinctly wider towards the rounded tip, 15-60 cm wide ..... ***Chamaelirium***
        8 Leaves linear, with parallel margins, 2-23 mm wide.
          9 Inflorescence a spike ..... ***Schoenocaulon***
          9 Inflorescence a raceme.
            10 Basal leaves many, 4-23 mm wide; capsule 5-7 mm long, 5-7 mm wide; bulb broadly ovoid ..... ***Amianthium***
            10 Basal leaves 1-3, 2-7 mm wide; capsule 7-9 mm long, 3-4 mm wide; bulb cylindrical ..... ***Stenanthium densum***

Amianthium A. Gray 1837 (Fly-poison)

A monotypic genus, an herb of temperate e. North America. Zomlefer et al. (2001) confirm that *Amianthium* should be treated as a monotypic genus. *Amianthium* has a chromosome number of 2n=32 (Zomlefer & Smith 2002). Like *Zigadenus*, containing very toxic alkaloids. References: Zomlefer (1997a)=Z; Zomlefer & Judd (2002)=Y; Utech in FNA (2002a); Tamura in Kubitzki (1998a).

Amianthium muscitoxicum (Walter) A. Gray, Fly-poison. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): mesic forests, pine savannas, meadows; common (uncommon in FL). May-July; July-September. S. NY, PA, MO, and OK, south to Panhandle FL, MS, and AR. [= FNA, K, Y; = *A. muscaetoxicum* – RAB, C, F, G, GW, W, WH, orthographic variant; = *Chrosperma muscaetoxicum* (Walter) Kuntze – S; = *Zigadenus muscitoxicus* (Walter) Regel – Z]

Anticlea Kunth 1843 (Death-camas)

A genus of about 15 species, of North America south to Guatemala, and e. Asia. *Anticlea* has a chromosome number of 2n=32 (Zomlefer & Smith 2002). References: Zomlefer (1997a)=Z; Zomlefer & Judd (2002)=Y; Zomlefer et al. (2001); Schwartz in FNA (2002a).

Anticlea glauca Kunth, White Death-camas. Mt (NC, VA): limestone and dolostone woodlands, glades, cliffs, and outcrops; rare (NC Rare, VA Watch List). July-August; September-October. *A. glauca* is the more eastern component of a complex variously treated as two species or a single variable species, with or without recognized varieties or subspecies. *A. elegans* (in the broadest sense) ranges from Québec and NY west to AK, south to n. OH, n. IN, n. IL, MO, IA, NM, AZ, and n. Mexico; disjunct in the mountains of VA and NC. Two taxa have often been recognized, at the specific, subspecific, or varietal level. The more eastern taxon (epithet "*glauca*" – see synonymy below) ranges from New Brunswick west to ND, south to NC, TN, and MO, and is distinguished by glaucous foliage, paniculate inflorescence, and tepals often purplish or brownish basally. The more western taxon (epithet "*elegans*"), occurring east to the MN and MO, has the foliage greener, the inflorescence often only racemose, and the tepals yellow. [< *Anticlea elegans* (Pursh) Rydberg – Y; = *Zigadenus elegans* Pursh ssp. *glaucus*

(Nuttall) Hultén – K; = *Z. glaucus* Nuttall – RAB, F, W, Z; = *Z. elegans* var. *glaucus* (Nuttall) Preece – C; < *Z. elegans* – FNA; = *Zygadenus glaucus* – G, orthographic variant; < *Anticlea chlorantha* (Richardson) Rydberg – S, misapplied]

Chamaelirium Willdenow 1808 (Devil's-bit)

A monotypic genus, an herb of temperate e. North America. Perhaps better placed in the segregate family Chionigraphidaceae. References: Zomlefer (1997a)=Z; Tamura in Kubitzki (1998a); Utech in FNA (2002a).

Chamaelirium luteum (Linnaeus) A. Gray, Devil's-bit. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist slopes, bottomlands, wet savannas; common (rare in Coastal Plain). March-May; September-November. MA west to Ontario, OH, s. IN, and AR, south to FL and LA. The ecological amplitude and morphologic variability of this species is surprising; it needs additional, more careful, study. *Ch. obovale* Small (or other previously unnamed entities) may warrant recognition at some level. [= RAB, C, F, FNA, G, GW, K, W, WH, Z; > *Ch. luteum* – S; > *Ch. obovale* Small – S]

Helonias Linnaeus 1753 (Swamp Pink)

A monotypic genus, an herb of temperate e. North America. Although *Helonias* has traditionally been considered a monotypic genus, Takahashi & Kawano (1989) have suggested that the closely related *Heloniopsis* and *Ypsilandra* (both of e. Asia) may be congeneric. Perhaps better to be placed in the segregate family Heloniadaceae. References: Zomlefer (1997a)=Z; Utech in FNA (2002a); Tamura in Kubitzki (1998a).

Helonias bullata Linnaeus, Swamp Pink. Mt (GA, NC, SC, VA), Cp (DE, MD, NJ, VA): bogs, usually under dense shrubs in peaty soils, in the VA Coastal Plain in acidic sandy seepage swamps; rare. April-May; June-July. S. NY and NJ to e. VA on the Coastal Plain, and from w. VA through w. NC to nw. SC and ne. GA (Jones & Coile 1988) in the Blue Ridge Mountains. The flowering scape elongates markedly in fruit, reaching 1 m in height. [= RAB, C, F, FNA, GW, G, K, S, W, Z]

Schoenocaulon A. Gray 1837 (Feathershank)

A genus of about 24 species of s. North America, Central America, and n. South America. *Schoenocaulon* has a chromosome number of 2n=16 (Zomlefer & Smith 2002). References: Zomlefer et al. (2006)=Z; Zomlefer (1997a); Tamura in Kubitzki (1998a); Frame in FNA (2002a).

Schoenocaulon dubium (Michaux) Small, Florida Feathershank. Cp (FL, GA): dry pine savannas, sandhills, scrub; uncommon (rare in GA). S. GA and n. peninsular FL south to s. peninsular FL. [= FNA, K, S, WH, Z]

Stenanthium (A. Gray) Kunth 1843 (Featherbells, Featherfleece)

A genus of about 4 species, herbs of e. North America. *Stenanthium*, as redefined by Zomlefer & Judd (2002), has a chromosome number of 2n=20, excludes a w. North American and an e. Asian species previously included, and includes some taxa formerly placed in *Zigadenus* (Zomlefer & Smith 2002). References: Zomlefer & Judd (2002)=Y; Zomlefer (1997a)=Z; Wofford (2006); Utech in FNA (2002a); Schwartz in FNA (2002a); Tamura in Kubitzki (1998a). Key adapted in part from F, the taxa and key needing further evaluation and (probably) alteration.

1 Tepals obovate, the tip rounded-obtuse.
  2 Inflorescence a raceme; flowers all bisexual; plants 3-10 dm tall; flowering April-early June; [of the Coastal Plain (in our area)] ..... ***S. densum***
  2 Inflorescence a panicle of racemes; lower flowers of the inflorescence branches bisexual and fertile, the upper staminate or superficially perfect but the pistils nonfunctional (not producing fruits); plants 5-20 dm tall; flowering July-August; [of the Mountains of NC and VA and Coastal Plain of GA westward to LA] ..... ***S. leimanthoides***
1 Tepals lanceolate, the tip acute-acuminate.
  3 Inflorescence a diffuse panicle up to 3 dm wide, the terminal racemose portion reduced or absent; flowers on mid-portion of lateral branches with pedicels 1.6-4 mm long, spaced 8-15 mm apart; uppermost non-bracteal stem leaf 4-14 cm above ground level; flowering mid September-mid October; [of sandstone rockhouses of the Cumberland Plateau] ..... ***S. diffusum***
  3 Inflorescence branched but not diffuse, typically up to 1.5 dm wide, the terminal racemose portion present and up to 3 dm long; flowers on mid-portion of lateral branches with pedicels 0.3-1.1 mm long, generally spaced 3-7 mm apart; uppermost non-bracteal stem leaf 22-66 cm above ground level; flowering May-late August; [of various wet to dry habitats, widespread in our area].
    4 Larger leaves to 30 mm wide, thin and membranous-translucent, not strongly ribbed; panicle dense, the branches stiffly ascending, the flowers crowded; perianth 5-10 mm long, greenish; capsules oblong or subcylindric, 9-10 mm long, erect; seeds 5-8 mm long; leaves distributed all along the stem, nearly as dense just below the panicle as at the base; plant to 2.2 m tall and the stem to 2 cm in diameter near its base; [of bogs and wet meadows] ..... ***S. gramineum*** *var.* ***robustum***
    4 Larger leaves to 15 mm wide, firm to coriaceous, strongly ribbed; panicle diffuse, the branches ascending, spreading, or drooping, the flowers scattered; perianth 3-8 (-10) mm long, whitish; capsules ovoid to urceolate, 6-9 mm long, deflexed; seeds 5-5.5 mm long; leaves mainly near the base, rapidly reduced upwards; plant to 1.9 m tall and the stem to 1 cm in diameter near its base; [of dry to moist upland forests].

5 Perianth 5-10 mm long; plant to 1.9 m tall, the stem 4-10 mm in diameter near the base.....***S. gramineum** var. **gramineum***
5 Perianth 3-4.5 (-5.0) mm long; plant to 1.0 m tall, the stem 1.5-5 mm in diameter near the base.....***S. gramineum** var. **micranthum***

Stenanthium densum (Desrousseaux) Zomlefer & Judd, Crow-poison. Cp (FL, GA, NC, SC, VA): pine savannas, pine flatwoods; common (rare in VA). April-early June; late May-July. Se. VA south to c. peninsular FL and west to se. TX, on the Coastal Plain. See *Z. leimanthoides* for discussion of the taxonomy of the 2 species. *Z. densus* is superficially very similar to *Amianthium muscitoxicum*; *Z. densus* has a conical capsule, 2× or more as long as broad (vs. about 1× as long as broad), a bladeless purple sheath, 3-8 cm long, enclosing the leaves at the base (vs. sheath absent, all leaves with blades), and basal leaves usually 1-3 in number, 3-6 (-10) mm wide (vs. mostly 4 or more in number, mostly 7-10 mm wide). [= Y; = *Zigadenus densus* (Desrousseaux) Fernald – RAB, C, GW, K, Z; < *Zigadenus densus* (Desrousseaux) Fernald – FNA, WH (also including *S. leimanthoides*); = *Zygadenus densus* – G (an orthographic variant); *Tracyanthus angustifolius* (Michaux) Small – S]

Stenanthium diffusum Wofford, Rockhouse Featherbells. Mt (TN): sandstone rockhouses; rare. Mid-September-mid-October. Endemic to the Cumberland Plateau of ne. TN (known from Fentress, Morgan, Pickett, Scott counties). See Wofford (2006).

Stenanthium gramineum (Ker-Gawler) Morong *var.* ***gramineum***, Common Featherbells. Cp (FL, GA, NC, VA), Pd (GA, NC, VA), Mt (NC): moist forests, grassy balds, to 1700m in elevation; uncommon (rare in FL). July-early September; August-October. PA west to IL and MO, south to ne. NC, Panhandle FL, and TX. [= F, K; < *S. gramineum* – RAB, C, FNA, G, S, W, WH, Z]

Stenanthium gramineum (Ker-Gawler) Morong *var.* ***micranthum*** Fernald, Small Featherbells. Mt (GA, NC, SC, VA), Pd (GA, NC, VA): dry upland forests and woodlands; uncommon. July-early September; August-October. W. VA and TN south to n. AL. [= F, K; < *S. gramineum* – RAB, C, FNA, G, S, W, Z]

Stenanthium gramineum (Ker-Gawler) Morong *var.* ***robustum*** (S. Watson) Fernald, Giant Featherbells, Bog Featherbells. Mt (NC, VA?): wet meadows, bogs; rare (NC Watch List). July-early September; August-October. PA south to w. NC. [= F, K; = *S. robustum* S. Watson – S; < *S. gramineum* – RAB, C, FNA, G, W, Z]

Stenanthium leimanthoides (A. Gray) Zomlefer & Judd, Pinebarrens Death-camas. Mt (NC, VA), Cp (FL, GA): high elevation rock outcrops, shrub balds, seepage areas at high elevations, in the Coastal Plain in sandhill bogs and wet pine savannas; rare. July-August; September-October. As currently interpreted, with a peculiar and disjunct range, occurring on the Coastal Plain of se. NY (Long Island), NJ, and DE, in the mountains from WV and VA south through w. NC to (allegedly) AL, and on the Gulf Coastal Plain, from s. GA to LA. Unpublished studies involving (primarily) Gulf Coast populations of *S. leimanthoides* have questioned its distinctness from *S. densum*. Our plants seem very distinct in many ways. Perhaps inflorescence characters do not reliably distinguish the two taxa and so-called *S. leimanthoides* of the Gulf Coast is a paniculate form of *Z. densus* (the real distinguishing characters not at present clear). *S. leimanthoides* in the east follows much the same phytogeographic patterns as *Kalmia buxifolia* and *Xerophyllum asphodeloides*; the 3 species occurring together in the Pine Barrens of the s. NJ Coastal Plain and at 1900 m elevation on the summit of Grandfather Mountain, Avery County, NC! [= Y; = *Zigadenus leimanthoides* A. Gray – RAB, C, F, GW, K, W, Z; < *Zigadenus densus* (Desrousseaux) Fernald – FNA, WH; = *Zygadenus leimanthoides* – G (an orthographic variant); = *Oceanoros leimanthoides* (A. Gray) Small – S]

Veratrum Linnaeus 1753 (White-hellebore)

A genus of about 55 species, herbs of temperate Northern Hemisphere. *Veratrum* is here interpreted broadly, including *Melanthium*, following the molecular phylogeny work of Zomlefer et al. (2003). References: Zomlefer (1997)=Z; McNeal & Shaw in FNA (2002a); Bodkin & Utech in FNA (2002a); Tamura in Kubitzki (1998a); Zomlefer et al. (2003).

1 Leaves all linear, 1-2 (-3) cm wide; tepals greenish white to creamy white (sometimes fading brownish); [section *Fuscoveratrum*]..... ***V. virginicum***
1 Leaves (at least the basal) oblanceolate to obovate or elliptic, 3-15 cm wide (the upper leaves sometimes linear); tepals yellowish green, green, or maroon.
  2 Leaves strongly plicate, 6-15 cm wide; tepals pubescent, 8-13 mm long, 3-5 mm wide, with a conspicuous pair of glands near the base of the tepal blade (these sometimes more or less fused); filament free from the tepals; [section *Veratrum*]..... ***V. viride***
  2 Leaves not at all to slightly plicate, 3-14 cm wide; tepals glabrous, 4-9 mm long, 1-3 mm wide (3-5 mm wide in *V. latifolium*), with either conspicuous (*V. latifolium*) or diffuse (*V. parviflorum* and *V. woodii*) glands; filament fused to the basal claw of the tepal; [section *Fuscoveratrum*].
    3 Tepals 3-5 mm wide, the blade of the tepal abruptly narrowed to a claw, the blade nearly as wide as long, with undulate margins, and 2 conspicuous succulent glands; leaves 1-7 cm wide..... ***V. latifolium***
    3 Tepals 1-3 mm wide, the blade gradually narrowed to the base, the blade much longer than wide, with entire margins, and with diffuse glandular areas; leaves 3-12.5 cm wide.
      4 Tepals pale to olive green, 4-7 mm long; ovaries glabrous; leaves 4.5-14 cm wide; [common, of the Mountains in our area]..... ***V. parviflorum***
      4 Tepals dark maroon, 6-9 mm long; ovaries densely pubescent; leaves 3-10 cm wide; [rare disjunct in our area]..... ***V. woodii***

Veratrum latifolium (Desrousseaux) Zomlefer, Crisped Bunchflower. Mt (GA, NC, SC, VA), Pd, Cp (NC, SC, VA): moist forests; uncommon (rare in Coastal Plain and Piedmont) (GA Special Concern). July-August; September-October. An Appalachian endemic: CT south to NC and SC. [= Z; = *Melanthium hybridum* Walter – RAB, C, F, G, W, misapplied; = *Melanthium latifolium* Desrousseaux – FNA, K, S]

Veratrum parviflorum Michaux, Mountain Bunchflower. Mt (GA, NC, SC, VA): moist to rather dry forests, up to at least 1700m; common. July-early September; August-October. A Southern Appalachian endemic: WV and KY south to VA, NC, n. GA, and TN. [= RAB, C, G, W, S, Z; = *Melanthium parviflorum* (Michaux) S. Watson – F, FNA, K]

Veratrum virginicum (Linnaeus) Aiton, Bog Bunchflower, Virginia Bunchflower. Cp (FL, GA, NC, SC, VA), Mt, Pd (NC, SC, VA): savannas, bogs, seepage bogs, wet forests; uncommon (rare in FL and SC). June-August; August-October. Widespread in e. North America. This species is superficially quite similar to *Zigadenus glaberrimus*, which, in addition to characters given in the family key, has the stem glabrous (vs. pubescent in *M. virginicum*). [= WH, Z; = *Melanthium virginicum* Linnaeus – RAB, C, F, FNA, G, GW, K, W; > *Melanthium dispersum* Small – S; > *Melant\hium virginicum* – S]

Veratrum viride Aiton, White-hellebore, Indian Poke, Green Hellebore, Cornhusk Lily. Mt (GA, NC, VA), Pd (VA): seeps, streambanks, wet boulderfields; common (GA Special Concern). June-August; July-September. Québec and Ontario south in the mountains to NC, TN, and ne. GA. The closely related *V. eschscholtzii* A. Gray, sometimes treated as *V. viride* ssp. *eschscholtzii* (A. Gray) A. & D. Löve or *V. viride* var. *eschscholtzii* (A. Gray) Breitung, is western, ranging from AK to OR. This plant is strongly poisonous; an insecticide was formerly manufactured from the roots. [= RAB, C, F, G, GW, S, W, Z; < *V. viride* – K; = *V. viride* var. *viride* – FNA; *V. viride* ssp. *viride*]

Veratrum woodii J.W. Robbins ex Wood, Ozark Bunchflower, Wood's False-hellebore. Mt (GA, NC), Cp (FL, GA): circumneutral soil of woodlands over mafic rocks (such as amphibolite) or other calcareous substrates, hammocks; rare. July; September. Primarily Ozarkian, but extending in scattered populations eastwards as far as FL Panhandle (Gadsden and Liberty counties), sw. GA, nw. GA, sc. TN, and sw. NC (Polk County). [= C, F, G, Z; = *Melanthium woodii* (J.W. Robbins ex Wood) Bodkin – FNA, K; > *V. intermedium* Chapman – S]

Xerophyllum Michaux 1803 (Turkeybeard, Beargrass)

A genus of 2 species, rather woody herbs of temperate North America. The other species in the genus is the western beargrass, *X. tenax* (Pursh) Nuttall, widely distributed in the western Cordillera. Perhaps better placed in the segregate family Xerophyllaceae. References: Zomlefer (1997)=Z; Utech in FNA (2002a); Tamura in Kubitzki (1998a).

Xerophyllum asphodeloides (Linnaeus) Nuttall, Turkeybeard, Beargrass, Mountain-asphodel. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): dry ridges and slopes in the mountains, primarily in dry, strongly acidic sites which burn periodically, such as pine/heath woodlands and forests, heath balds, and xeric oak forests, most of the populations in the Blue Ridge Escarpment, often associated with *Pinus rigida* or *P. pungens*, disjunct to similar sites on quartzite monadnocks of the upper Piedmont; uncommon (GA Rare, NC Watch List, SC Rare). May-June; July-August. In two disjunct areas; the Coastal Plain of s. NJ and DE, and the Southern Appalachians from w. VA south to e. TN, w. NC, nw. SC, and ne. GA. Sterile plants resemble tussocks of a bunchgrass, but the leaf bases are white and flattened and are obviously not those of a grass. The leaves remain green throughout the winter. [= RAB, C, F, FNA, G, K, W, Z]

Zigadenus Michaux 1803 (Death-camas)

As redefined, a monotypic genus of se. North America. A molecular systematics study by Zomlefer et al. (2001) gives strong support to a treatment recognizing *Zigadenus* as monotypic (*Zigadenus glaberrimus*), *Anticlea* (including for our area the former *Zigadenus elegans* ssp. *glaucus*), *Stenanthium* (including for our area *Stenanthium* spp. and the former *Zigadenus densus* and *Z. leimanthoides*). *Zigadenus* (as redefined) has a tentatively reported chromosome number of 2n=52 (Zomlefer & Smith 2002). References: Zomlefer (1997)=Z; Tamura in Kubitzki (1998a); Zomlefer et al. (2001); Schwartz in FNA (2002a). [also see *Anticlea, Stenanthium*]

Zigadenus glaberrimus Michaux, Large Death-camas, Snakeroot. Cp (FL, GA, NC, SC, VA): sandhill seepage bogs, pine savannas, pocosin edges; common (rare in VA). Late June-early September; August-November. Se. VA south to Panhandle FL, west to se. TX, on the Coastal Plain. [= RAB, C, F, FNA, GW, K, WH, Z; = *Zygadenus glaberrimus* – G, S (an orthographic variant)]

NAJADACEAE A.L. de Jussieu 1789 (Naiad Family)

A family of a single genus and about 40 species, nearly cosmopolitan. The Najadaceae should perhaps be merged into the Hydrocharitaceae (Haynes, Holm-Nielsen, & Les 1998b). References: Haynes in FNA (2000); Haynes (1979)=Z; Haynes & Hellquist (1996); Haynes, Holm-Nielsen, & Les in Kubitzki (1998b).

Najas Linnaeus 1753 (Naiad, Bushy-pondweed, Water-nymph)

A genus of about 40 species, nearly cosmopolitan. Probably better included in the Hydrocharitaceae (Angiosperm Phylogeny Group (2003). References: Haynes in FNA (2000); Haynes (1979)=Z; Haynes & Hellquist (1996); Haynes, Holm-Nielsen, & Les in Kubitzki (1998b).

Identification notes: Counts of leaf-teeth do not include the broadened, sheathing base of the leaf. Seeds are necessary for the identification of most species.

1 Plants dioecious; lower side of the midvein of the leaves prickly; [subgenus *Najas*] ..... ***[N. marina]***

1 Plants monoecious; lower side of the midvein of the leaves smooth; [subgenus *Caulinia*].
  2 Leaf-teeth multicellular, evident at 10× magnification, 7-15 per side; leaves becoming recurved late in the season; seed-coat pitted, the areoles distinctly wider than long, in ca. 12-18 ladder-like rows ..... ***N. minor***
  2 Leaf-teeth unicellular, not evident at 10× magnification, > 20 per side (except 13-17 per side in *N. gracillima*); leaves spreading to ascending; seed-coat smooth or pitted, if present the areoles longer than wide or about as long as wide.
    3 Seeds smooth, glossy, obovate, broadest above the middle; anthers 1-locular ..... ***N. flexilis***
    3 Seeds pitted, dull, cylindric, fusiform, or elliptic, broadest at the middle; anthers 1- or 4-locular.
      4 Style offset from the apex of the seed; anthers unilocular ..... ***N. gracillima***
      4 Style at the apex of the seed; anthers 4-locular ..... ***N. guadalupensis*** *var.* ***guadalupensis***

Najas flexilis (Willdenow) Rostkovius & Schmidt, Northern Naiad. Cp, Pd, Mt (VA): lakes and rivers; uncommon. July-August. Newfoundland west to Ontario, south to VA, MD, MO, and NE; also in the west from Alberta and Saskatchewan south to OR and UT. [= C, F, FNA, G, K, S, W, WV, Z; = *Naias flexilis* – S, orthographic variant]

Najas gracillima (A. Braun ex Engelmann) Magnus, Slender Naiad, Bushy Naiad. Mt, Cp (NC, SC, VA), Pd (NC, VA): ponds and lakes; uncommon. July-October. Nova Scotia west to MN, south to NC, AL, and MO; disjunct in CA. Haynes (1979) reports that this species cannot tolerate pollution and is apparently declining in abundance. [= RAB, C, F, FNA, G, K, W, WV, Z]

Najas guadalupensis (Sprengel) Magnus *var.* ***guadalupensis***, Common Naiad, Southern Naiad. Cp, Pd, Mt (GA, NC, SC, VA): lakes and rivers; common. July-October. Var. *guadalupensis* ranges from ME west to Alberta and WA, south to n. South America. Haynes (1979) interprets the species as including 3 other varieties – var. *floridana* Haynes & Wentz (in FL, north to AL and GA and to be sought in SC), var. *muenscheri* (Clausen) Haynes (endemic to the Hudson River), and var. *olivacea* (Rosendahl & Butters) Haynes (nearly limited to states bordering the Great Lakes). They differ in characteristics of the leaf and seed (see Haynes 1979). Haynes & Hellquist (1996) treat all infraspecific taxa as subspecies rather than varieties. [= C, Z; < *Najas guadalupensis* – RAB, F, G, GW, W, infraspecific taxa not distinguished; = *Najas guadalupensis* ssp. *guadalupensis* – FNA, K; < *Naias guadelupensis* – S, orthographic variant]

* ***Najas minor*** Allioni, Spinyleaf Naiad. Pd, Mt, Cp (GA, NC, SC, VA): ponds, lakes, and reservoirs, particularly where eutrophic; uncommon, native of Eurasia. July-October. This species is apparently a rather recent introduction to North America, now widespread in e. North America. Haynes (1979) reports that it is becoming more abundant in e. North America because of its tolerance for polluted, eutrophic waters. [= RAB, C, F, FNA, G, GW, K, W, WV, Z]

Najas filifolia Haynes, Narrowleaf Naiad. Cp (GA): lakes; rare (GA Special Concern). Sw. GA (Jones & Coile 1988) to FL (Haynes in FNA 2000). [= FNA, K, Z; = *Najas ancistrocarpa* A. Braun – GW] {not yet keyed}

Najas guadalupensis (Sprengel) Magnus *var.* ***floridana*** Haynes & Wentz, in GA and FL. [= Z; = *Najas guadalupensis* ssp. *floridana* Haynes & Wentz) Haynes & C.B. Hellquist – FNA, K; < *Najas guadelupensis* – GW; < *Naias guadelupensis* – S, orthographic variant] {not yet keyed}

Najas marina Linnaeus, Holly-leaf Naiad, occurs both n. and s. of our area and should be sought. It occurs in brackish or calcareous waters. It is dioecious (vs. monoecious in our 4 species), and has the lower side of the midvein of the leaves prickly (vs. smooth in our 4 species). [= C, F, FNA, G, K; = *Naias marina* – S, orthographic variant]

NARTHECIACEAE E.M. Fries 1846 (Bog-asphodel Family)

As circumscribed here (excluding Tofieldiaceae), a family of about 4 genera and 40 species, of e. Asia, e. North America, n. Europe, and the Guyana Shield of n. South America. Reveal & Zomlefer (1998) place the Nartheciaceae in the monotypic order Nartheciales. References: Zomlefer (1997b, 1999); Reveal & Zomlefer (1998); Tamura in Kubitzki (1998a).

Aletris Linnaeus 1753 (Colic-root, Stargrass)

As circumscribed here (including *Metanarthecium*), a genus of about 30 species, of e. North America and e. Asia. References: Weigant (2002)=X; Ward (1978)=Y; Zomlefer (1997b)=Z; Tamura in Kubitzki (1998a); Sullivan in FNA (2002a).

1 Perianth white to creamy-white (rarely pinkish).
  2 Perianth 6-10 mm long, cylindric at anthesis, 2-3× as long as broad, the perianth lobes narrowly deltoid (longer than broad); fruiting perianth markedly constricted above the middle ..... ***A. farinosa***
  2 Perianth 4-6 mm long, campanulate at anthesis, ca. 1× as long as broad, the perianth lobes broadly deltoid (about as long as broad); fruiting perianth somewhat narrowed above the base ..... ***A. obovata***
1 Perianth golden yellow (often faded in dried specimens).
  3 Perianth short-cylindric or campanulate at anthesis, 1-2× as long as broad, the perianth lobes not spreading; [flowering May-July] ..... ***A. aurea***
  3 Perianth long-cylindric at anthesis, 2.5-4× as long as broad, the perianth lobes spreading somewhat; [flowering March-May] ..... ***A. lutea***

Aletris aurea Walter, Golden Colic-root. Cp (FL, GA, NC, SC, VA): pine savannas, seepage bogs, pine flatwoods; uncommon (VA Rare). Mid May-July; August. S. MD south to ne. FL, Panhandle FL, west to e. TX and se. OK. Flowering several weeks later than *A. farinosa* when growing together. [= RAB, C, F, FNA, G, GW, K, S, WH, X, Y, Z]

Aletris farinosa Linnaeus, Northern White Colic-root, Mealy Colic-root, Stargrass. Cp (FL, GA, NC, SC), VA, Mt, Pd (GA, NC, SC, VA): pine savannas, pine flatwoods, seepage bogs, upland woodlands, roadbanks; common (rare in FL). Late

April-early June; July-August. S. ME, s. Ontario, and se. MN south to s. GA, FL (Wunderlin 1998), LA, and TX, the only species of the genus not restricted (or nearly so) to the Coastal Plain. [= RAB, C, F, FNA, G, GW, K, S, W, WH, X, Z]

Aletris lutea Small, Yellow Colic-root. Cp (FL, GA): pine savannas; common (uncommon in GA). E. GA (in immediate proximity to the SC border) south to s. FL, and west to e. LA (Weigant 2002). The report by F of *A. lutea* Small as far north as se. VA is in error. A specimen collected in se. NC has recently been annotated as *A. lutea*, but it appears to be *A. farinosa*. [= FNA, GW, K, S, WH, X, Y, Z]

Aletris obovata Nash ex Small, Southern White Colic-root. Cp (FL, GA, SC): pine savannas; uncommon (rare in GA and SC). May-early June; August. Se. SC south to c. peninsular FL, west to e. Panhandle FL. Reported for MS (Kartesz 1999), but the report rejected (likely based on a misidentified specimen). [= RAB, FNA, GW, K, S, WH, X, Y, Z]

Lophiola Ker-Gawler 1814 (Golden Crest)

A monotypic genus (As here interpreted to include *L. americana* and *L. septentrionalis*), of temperate e. North America. *Lophiola* is quite unlike any other genus, and its familial position has been problematic. Often treated in the Haemodoraceae (as in RAB, C, G, GW), *Lophiola* is better placed in the Nartheciaceae (or a very broad Liliaceae), as shown by studies of anatomy, pollen ultrastructure, and chemistry, though its placement in that family is also not without problems (Edwards, Churchill, & Weiss 1970; Simpson & Dickison 1981; Simpson 1983; Zavada 1983; Zavadu, Xu, & Edwards 1983; Ambrose 1985). References: Zomlefer (1997b)=Z; Tamura in Kubitzki (1998a); Robertson in FNA (2002a).

Lophiola aurea Ker-Gawler, Golden Crest. Cp (AL, FL, GA, LA, MS, NC): wet savannas, bogs, marshes, ditches adjacent to these natural habitats; common (uncommon in AL, GA, MS, rare in LA and NC). Late May-June; August-September. FL Panhandle and sw. GA west to e. LA; se. NC; n. DE and s. NJ; Nova Scotia. Only a few populations remain in NC. [= C, FNA, K, S, Z; > *L. americana* (Pursh) Wood – RAB, F (the NJ-DE material), G, GW; > *L. septentrionalis* Fernald – F (the Nova Scotian material)]

Narthecium Hudson 1762 (Asphodel)

A genus of about 8 species, many narrow disjuncts, collectively with a very fragmented distribution in the temperate Northern Hemisphere. References: Small (1924)=Z; Zomlefer (1997b)=Y; Utech in FNA (2002a); Tamura in Kubitzki (1998a); Schumacher (1947)=X; Sorrie & Weakley (in prep.)=Q.

1 Tepals 4-6 mm long; capsule 10-14 mm long; pedicels stout, about as long as the subtending bracts; [of Coastal Plain seeps and savannas] ..... ***N. americanum***
1 Tepals 6-9 mm long; capsule 8-10 mm long; pedicels slender, distinctly longer than the subtending bracts; [of Mountain bogs] ..... ***N. montanum***

Narthecium americanum Ker-Gawler, Yellow Asphodel. Cp (DE, NJ, SC): wet seepages or savannas; rare. June-July; August-September. S. NJ and DE; disjunct in c. SC (where apparently extirpated, though possibly still present in mucky seepages in the Sandhills). [= C, F, G, Q, X; < *Narthecium americanum* – RAB, FNA, GW, K, W, Y (also see *N. montanum*); = *Abama americana* (Ker-Gawler) Morong – S, Z]

Narthecium montanum (Small) C.H. Grey, Appalachian Yellow Asphodel. Mt (NC): bogs; rare (apparently extinct). With the drainage of the bogs of East Flat Rock, Henderson County, this species was apparently extirpated. It is still possible that it will be relocated, in bogs in Henderson or Transylvania counties, NC. Small (1924, 1933) considered the NC mountain population a distinct species, based on its longer, more slender pedicels, larger sepals, petals, and stamens, and smaller capsules. Schumacher (1947), in the most thorough worldwide assessment of *Narthecium*, agreed, and Sorrie & Weakley (in prep.) concur, based on an herbarium analysis of the characters of all taxa in the genus. The morphological distinctions (and geographic disjunction) between *N. montanum* and *N. americanum* are as great or greater as those between most species recognized worldwide in the genus. [= Q, X; < *Narthecium americanum* – RAB, FNA, GW, K, W, Y; = *Abama montana* Small – S, Z]

ORCHIDACEAE A.L. de Jussieu 1789 (Orchid Family)

A family of about 800 genera and 19,000 species, perennial (rarely annual), mycotrophic herbs and vines. Only a small minority of orchid species worldwide are terrestrial rather than epiphytic; only *Epidendrum magnoliae* in our flora shows the common epiphytic habit. References: Luer (1972) and Luer (1975)=L; Correll (1950)=X; Romero-González, Fernández-Concha, Dressler, Magrath, & Argus in FNA (Williams & Williams (1983); Brown (2003); Homoya (1993); Correll (1937); Pridgeon et al. (1999a, 1999b, 1999c).

Identification notes: Flowering plants are necessary for use of the key to genera.

1 Plant epiphytic, growing on the branches or trunks of trees in swamps ..... ***Epidendrum***
1 Plant terrestrial, growing on soil.
  2 Leaves absent at flowering, or with a solitary leaf with a purplish undersurface withering at about the time of flowering.
    3 Flowers with a spur ..... ***Tipularia***
    3 Flowers without a spur.

4 Flowers white, the lip, sepals, and petals all predominantly white ..... ***Spiranthes***
4 Flowers pink, greenish, yellowish, or purplish, the lip sometimes white or marked with white, the sepals and petals colored.
5 Flower solitary; lip strongly bearded ..... ***Arethusa***
5 Flowers in spikes or racemes; lip not bearded.
6 Lip with 2 fleshy ridges near the base; pollinia 4; plants mycoparasitic and never with leaves ..... ***Corallorhiza***
6 Lip with 3-7 ridges near the base or extending most of the length of the lip; pollinia 4 or 8; plants either mycoparasitic and never with leaves, or with a plicate winter leaf withering shortly before flowering.
7 Plants with a plicate winter leaf withering shortly before flowering (the withered remnant usually detectable); pollinia 4; veins of the petals and sepals not strikingly different in color than the intervein areas; lip with 3 ridges ..... ***Aplectrum***
7 Plants never with leaves and saprophytic; pollinia 8; veins of the petals and sepals strikingly different in color than the intervein areas; lip with 5-7 ridges ..... ***Hexalectris***
2 Leaves present at flowering (*Cleistes* with a foliaceous bract at the summit of the stem).
8 Leaf solitary.
9 Leaf basal.
10 Flower with a spur ..... ***Platanthera***
10 Flower without a spur.
11 Flower solitary; leaf plicate ..... ***Arethusa***
11 Flowers in a raceme or spike.
12 Flowers relatively large, purple, pink, to rarely white, the lip oriented upwards ..... ***Calopogon***
12 Flowers relatively small, whitish, the lip oriented downwards ..... ***Spiranthes***
9 Leaf cauline.
13 Flower solitary (-4), pink (rarely nearly white); [subfamily *Vanilloideae*; tribe *Pogonieae*].
14 Sepals brown to purple, linear or narrowly oblanceolate, 3-6.5 cm long, about 5 mm wide; leaf coriaceous ..... ***Cleistes***
14 Sepals pink (rarely white), elliptic or oblanceolate, 1.3-2.7 cm long, 3-11 mm wide; leaf herbaceous ..... ***Pogonia***
13 Flowers in spikes or racemes, 5-many, reddish, yellowish, or greenish.
15 Flower without a spur; petals, sepals, and lip 1-3 mm long ..... ***Malaxis***
15 Flower with a spur; petals, sepals, and lip 3-25 mm long ..... ***Platanthera***
8 Leaves 2-many.
16 Lip inflated, pouch-like or slipper-like, 2-6 cm long ..... ***Cypripedium***
16 Lip not inflated, or if so, then 0.3-1.1 cm long.
17 Leaves basal (sometimes with bladeless sheaths upwards on the stem).
18 Leaves plicate.
19 Lip oriented upwards; flowers pink to white ..... ***Calopogon***
19 Lip oriented downwards; flowers greenish, purplish-brown, or yellowish.
20 Leaves ovate to elliptic, 2-5× as long as wide; plant 1-3 dm tall ..... ***Liparis***
20 Leaves linear-lanceolate, > 10× as long as wide; plant 3-14 dm tall ..... ***Pteroglossaspis***
18 Leaves smooth, often creased at the midrib, but not plicate.
21 Lip with a spur.
22 Flowers bicolored, the lip white, the sepals and petals pink; leaves 2 ..... ***Galearis***
22 Flowers not bicolored, the lip, petals, and sepals similarly colored; leaves 2-5.
23 Lip deeply divided into 3 linear segments; leaves 3-5 ..... ***Habenaria***
23 Lip entire; leaves 2 ..... ***Platanthera***
21 Lip without a spur.
24 Leaf blades more-or-less horizontally oriented, flat against the ground or 1-2 cm above it.
25 Lip oriented upwards ..... ***Ponthieva***
25 Lip oriented downwards.
26 Leaves variegated with white; lip saccate ..... ***Goodyera***
26 Leaves green, not variegated; lip not saccate ..... ***Spiranthes***
24 Leaf blades ascending.
27 Leaves linear to lanceolate, 2-4 ..... ***Spiranthes***
27 Leaves elliptic to ovate, 2.
28 Lip broadest near its apex ..... ***Liparis***
28 Lip broadest near its base, tapering to the apex ..... ***Malaxis***
17 Leaves cauline.
29 Leaves plicate; lip saccate ..... ***Epipactis***
29 Leaves smooth, often creased at the midrib, but not plicate; lip not saccate.
30 Leaves whorled, terminating the stem ..... ***Isotria***
30 Leaves alternate or opposite, not terminating the stem.
31 Leaves 2, opposite, near the middle of the stem ..... ***Listera***
31 Leaves (2-) 3-many, alternate, variously distributed on the stem.
32 Lip without a spur; leaves 0.8-8.0 cm long.
33 Leaves ovate, 0.8-2.0 cm long ..... ***Triphora***
33 Leaves linear or narrowly lanceolate, 1-8 cm long ..... ***Zeuxine***
32 Lip with a spur; leaves linear, lanceolate, or narrowly elliptic, 5-40 cm long (at least the larger > 5 cm long, except in *Platythelys*, with lanceolate to ovate leaves 1.5-6.5 cm long).
34 Leaves 1.5-6.5 cm long, with inflated tubular sheaths; plants from creeping rhizomes ..... ***[Platythelys]***
34 Leaves 5-40 cm long, sessile; plants from fleshy or fusiform roots.
35 Lip divided into 3 linear divisions, the divisions not further divided, fringed, or eroded ..... ***Habenaria***
35 Lip not divided into 3 divisions, or divided into 3 divisions but the divisions not linear.
36 Spur saccate, 2-3 mm long, the orifice minute ..... ***Coeloglossum***
36 Spur elongate and slender, 4-50 mm long, the orifice larger ..... ***Platanthera***

Aplectrum Torrey 1818 (Puttyroot, Adam-and-Eve)

A genus of 2 species, 1 in e. North America and 1 in Japan (Sheviak & Catling in FNA (2002a). References: Sheviak & Catling in FNA (2002a).

Identification notes: Like *Tipularia*, *Aplectrum* has a single, overwintering leaf, purplish on the underside, and withering prior to the appearance of the flowering stalk; they are readily separable by leaf shape, texture, and veining (see *Tipularia*).

Aplectrum hyemale (Muhlenberg ex Willdenow) Torrey, Puttyroot, Adam-and-Eve. Mt, Pd (GA, NC, SC, VA), Cp (VA): rich, mesic forests; common. May-June. Québec and MN, south to SC, GA, AL, and OK. [= RAB, C, F, FNA, G, GW, K, L, S, W, X]

Arethusa Linnaeus 1753 (Dragon's-mouth, Bog-rose, Arethusa)

A monotypic genus (Sheviak & Catling in FNA 2002). References: Sheviak & Catling in FNA (2002a).

Identification notes: The combination of the following characters serves to separate *Arethusa* from other, vaguely similar, genera: flowers magenta, solitary and scapose, the lip descending, the other 2 petals and 3 sepals erect or ascending. *Calopogon* has a leafy stem, the inflorescence a raceme, the lip crested but oriented upwards. *Pogonia* has solitary, pale pink flowers, with a descending, bearded lip, but the stem has a well-developed, flat leaf, 1-2.5 cm wide, the flower is subtended by a well-developed, leaf-like, floral bract, and the 2 lower sepals are spreading-descending. *Cleistes* has 3 brown to purplish brown sepals.

Arethusa bulbosa Linnaeus, Dragon's-mouth, Bog-rose, Arethusa. Mt (NC, SC, VA): bogs; rare (NC Endangered, SC Rare, VA Rare). May-June. Widespread in ne. North America, south to NJ and IN and to NC and SC in the mountains, rare south of ME, MI, and MN. The lanceolate, plicate leaf (15-30 cm long, 2-4 mm wide) develops after flowering, the flowering plant thus consisting (aboveground) of the solitary scape only. The lip is crested with fimbriate ridges, marked with yellow and purple. [= RAB, C, F, FNA, G, GW, K, L, S, W, X]

Bletilla Reichenbach f.

* ***Bletilla striata*** (Thunberg) Reichenbach f., Urn Orchid. Cp (FL): lawns, roadsides; rare, native of China. Known only from Escambia County, FL. [= FNA, K, WH] {add to genus key}

Calopogon R. Brown 1813 (Grass-pink)

A genus of 5 species (one with two varieties), endemic to e. North America. The only other taxon is *C. tuberosus* var. *simpsonii* (Chapman) Magrath of s. FL. References: Goldman, Magrath, & Catling in FNA (2002a); Trapnell, Hamrick, & Giannasi (2004)=Z. Goldman, van den Berg, & Griffith (2004)=Y. Key adapted from Goldman, Magrath, & Catling in FNA (2002a).

Identification notes: The lip is oriented upwards.

1 Petals wider towards the tip than towards the base; lip usually as wide as or wider than long; flowers strongly fragrant..... ***C. multiflorus***
1 Petals equal or narrower towards the tip than towards the base; lip usually narrower than long; flowers scentless or mildly fragrant.
  2 Leaf appressed to the inflorescence during flowering; flowers < 1 cm apart; flowers not fragrant; flowers on same plant opening simultaneously ..... ***C. barbatus***
  2 Leaf not appressed to the inflorescence during flowering; flowers > 1 cm apart; flowers faintly to distinctly fragrant; flowers on same plant opening nearly simultaneously to sequentially.
    3 Lateral sepals 10-15 mm long, falcate, widely spreading ..... ***C. pallidus***
    3 Lateral sepals 15-28 mm long, weakly falcate to straight.
      4 Flowers of each plant opening nearly simultaneously; dilated distal portion of middle lip lobe usually much narrower than long, triangular to broadly rounded; stigma typically flat against column surface; corms elongate, forked ..... ***C. oklahomensis***
      4 Flowers of each plant opening sequentially; dilated distal portion of middle lip lobe usually much wider than long, typically anvil-shaped; stigma at angle to column surface; corms globose to elongate, not forked..... ***C. tuberosus var. tuberosus***

Calopogon barbatus (Walter) Ames, Bearded Grass-pink. Cp (FL, GA, NC, SC): savannas, sandhill seeps; uncommon (rare in NC and SC). April-early May. A Southeastern Coastal Plain endemic: se. NC south to s. FL and west to e. LA. [= RAB, FNA, GW, K, L, WH, X, Y, Z; = *Limodorum parviflorum* (Lindley) Nash – S]

Calopogon multiflorus Lindley, Many-flowered Grass-pink. Cp (FL, GA, NC, SC?): pine savannas, pine flatwoods, pitcher plant bogs; rare. May-June. A Southeastern Coastal Plain endemic: e. GA south to s. FL, west to LA; disjunct in Onslow Co., NC. Reported for SC (Charleston-Berkeley Co. line) (P. McMillan 2000). [= FNA, GW, K, L, WH, X, Y, Z; = *Limodorum multiflorum* (Lindley) C. Mohr – S]

Calopogon oklahomensis D.H. Goldman, Oklahoma Grass-pink. Cp (GA, SC): pine savannas; rare. E. SC south to s. GA, west to e. TX, north in the eastern Great Plains to MN. [= FNA, Y, Z]

Calopogon pallidus Chapman, Pale Grass-pink. Cp (FL, GA, NC, SC, VA): savannas, sandhill seeps; uncommon (VA Rare). May-July. A Southeastern Coastal Plain endemic: se. VA south to s. FL and west to LA. [= RAB, C, F, FNA, G, GW, K, L, WH, X, Y, Z; = *Limodorum pallidum* (Chapman) C. Mohr – S]

Calopogon tuberosus (Linnaeus) Britton, Sterns, & Poggenburg *var.* ***tuberosus***, Common Grass-pink. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC, VA): savannas, sandhill seeps, floating peat mats, in the Piedmont and Mountains in bogs; uncommon (rare in Mountains and Piedmont). April-July. Widespread in e. North America, also in Cuba and the West Indies; var. *simpsonii* (Chapman) Magrath occurs in FL, Cuba, and the West Indies. [= FNA, K, L, WH, Y, Z; = *C. pulchellus* R. Brown – F, G, RAB, X; < *C. tuberosus* – C, GW, W; = *Limodorum tuberosum* Linnaeus – S]

Cleistes L.C. Richard ex Lindley 1840 (Spreading Pogonia, Rosebud Orchid)

As traditionally circumscribed, a genus of about 55 species, primarily of tropical America. The circumscription of this genus is uncertain (Cameron & Chase 1999; Cameron et al. 1999; Pridgeon et al. 1999c); it appears that North American "*Cleistes*" is not closely related to South American *Cleistes* (which includes the type of the genus), and either a new genus will need to be named to house our two species, or alternatively, *Pogonia*, *Isotria*, and N. American "*Cleistes*" could be combined into *Pogonia* (a generic disposition popular many decades ago). References: Catling & Gregg (1992)=Z; Gregg & Catling in FNA (2002a); Gregg (1991).

1 Column 13-19 mm long; lip 21-33 (-38.5) mm long, the basal 3/4 of the central keel of the lip with 5-7 discontinuous and irregular ridges; sepals (24-) 30-40 (-55) mm long; petals 21-36 mm long; distance between median leaf and floral bract 3-16 cm; fresh flowers with strong vanilla scent (Coastal Plain populations) or odorless (Mountain and upper Piedmont populations) ..... ***C. bifaria***
1 Column 21-29 mm long; lip (26-) 34-56 mm long, the basal 3/4 of the central keel of the lip with 1-3 parallel, continuous low ridges; sepals (31-) 40-56 (-65) mm long; petals 27-53 mm long; distance between median leaf and floral bract 9-20 cm; fresh flower with daffodil-like odor ..... ***C. divaricata***

Cleistes bifaria (Fernald) Catling & Gregg, Small Spreading Pogonia. Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC), Pd (GA, NC, SC): savannas, sandhill seeps, moist to fairly dry meadows, dry ridgetops under pines (where seasonally moist); uncommon (rare in GA and VA). May-July. The species ranges in the Mountains and Piedmont from WV south through w. VA, e. KY, w. NC, and e. TN to w. SC, n. GA and n. AL, and in the Coastal Plain from se. NC to c. peninsular FL and west to e. LA (Catling & Gregg 1992). Catling & Gregg (1992) make a convincing case for the recognition of *C. bifaria* and *C. divaricata* as specifically distinct, based on differences in morphology, range, phenology (in the sympatric portions of their ranges), and floral fragrance. The co-occurrence of the two species at such sites as the Green Swamp, Brunswick County, NC, where phenologically separated, supports their taxonomic status. Where co-occurring, *C. bifaria* flowers on average about 10 days before *C. divaricata*. More recent studies (Smith et al. 2004) suggest the probability that montane and Coastal Plain populations of "*C. bifaria*" represent 2 different species. [= FNA, K, Z; < *C. divaricata* – RAB, C, G, GW, L, S, W, X; = *C. divaricata* var. *bifaria* Fernald – F; = *Pogonia bifaria* (Fernald) P.M. Brown & Wunderlin – WH]

Cleistes divaricata (Linnaeus) Ames, Large Spreading Pogonia. Cp (FL, GA, NC, SC, VA): pine savannas; uncommon (rare in VA). May-mid June. S. NJ to sw. GA and ne. FL, in the Coastal Plain; reports from more inland areas are based on a taxonomic concept of *C. divaricata* including *C. bifaria*. [= FNA, K, Z; < *C. divaricata* – RAB, C, G, GW, K, L, S, W, X (also see *C. bifaria*); = *C. divaricata* var. *divaricata* – F; = *Pogonia divaricata* (Linnaeus) R. Brown – WH]

Coeloglossum Hartman 1820 (Frog Orchid, Long-bracted Orchid)

Usually regarded as a monotypic genus, of north temperate regions of the Old and New World. However, *Coeloglossum* is probably not distinct from *Dactylorhiza* Neck. ex Nevski; *Coeloglossum* is the older name, but *Dactylorhiza* has been accepted for nomenclatural conservation. The taxonomic and nomenclatural outcome is uncertain. References: Sheviak & Catling in FNA (2002a); Bateman, Pridgeon, & Chase (1997)=Z; Pridgeon et al. (1997, 1999b).

Coeloglossum viride (Linnaeus) Hartman *var.* ***virescens*** (Muhlenberg ex Willdenow) Luer, Long-bracted Frog Orchid. Mt (NC, VA): moist woods; uncommon (rare in NC). April-June. The species is circumboreal; var. *virescens* is e. Asian and North American, in e. North America south in the Appalachians to NC. It is generally more "southern" than the typic var. *viride*, which is more completely circumboreal, widespread in n. Eurasia and far northern North America. [= K, L, W; = *Habenaria viridis* (Linnaeus) R. Brown var. *bracteata* (Muhlenberg ex Willdenow) Reichenbach ex A. Gray – RAB, C, F, G, X; < *Coeloglossum viride* (Linnaeus) Hartman – FNA; = *Coeloglossum bracteatum* (Muhlenberg ex Willdenow) Parlatore – S; < ***Dactylorhiza viridis*** (Linnaeus) R.M. Bateman, Pridgeon, & M.W. Chase – Z]

Corallorhiza Gagnebin 1755 (Coralroot)

A genus of about 15 species, distributed in north temperate regions of the Old and New World. The closest relative of *Corallorhiza* in our flora is *Aplectrum* (Freudenstein 1992). The mycotrophic nature of *Corallorhiza* is well established, but the exact means of the transfer of nutrients from the fungal hyphae to the orchid is not yet understood. References: Freudenstein (1992, 1997, 1999)=Z; Magrath & Freudenstein in FNA (2002a).

1 Lip with two lateral teeth or lobes; lateral sepals spreading to down-curved.
  2 Sepals 1-veined ..... ***[C. trifida]***
  2 Sepals 3-veined.
    3 Middle lobe of lip expanded slightly or not at all distally, the ratio of the width of the dilated part to the base of the mid-lobe < 1.5; floral bracts averaging 0.5-1.0 mm long ..... ***C. maculata var. maculata***
    3 Middle lobe of the lip distinctly expanded, the ratio of the width of the dilated part to the base of the midlobe greater than 1.5; floral bracts averaging 1.0-2.8 (-4.5) mm long ..... ***C. maculata var. occidentalis***
1 Lip without lateral teeth or lobes (though sometimes erose or minutely toothed near its apex); lateral sepals arching, upcurved, or forward-directed.
  4 Sepals and petals 5-7.5 mm long; dorsal sepal > 4.5 mm long, 3-nerved; flowering April-July.
    5 Lip with prominent, thickened, involute margins; flowering mid to late July ..... ***C. bentleyi***
    5 Lip planar; flowering April-May ..... ***C. wisteriana***
  4 Sepals and petals 3-4.5 mm long; dorsal sepal < 4.5 mm long, 1-nerved; flowering August-October.
    6 Perianth closed or nearly so (cleistogamous); lip 1.7-2.2 mm wide, straight; column lacking or with only poorly developed basal ventral auricles; stigma 0.2-0.5 mm wide ..... ***C. odontorhiza*** *[cleistogamous form]*
    6 Perianth open (chasmogamous); lip 2.1-3.7 mm wide, bent downwards at a nearly right angle; column with 2 prominent auricles at the base on the ventral surface; stigma 0.7-1.0 mm wide ..... ***C. odontorhiza*** *[chasmogamous form]*

Corallorhiza bentleyi Freudenstein. Mt (VA): dry-mesic to mesic forests, especially near roadsides; rare. The species was recently named and was known (at the time of publication) from only a single population (Freudenstein 1999). This species is now known from Monroe and Pocahontas counties, WV, and Giles, Alleghany, and Bath counties, VA. It is most closely related to *C. striata* Lindley. [= FNA, Z]

Corallorhiza maculata (Rafinesque) Rafinesque *var.* ***maculata***, Eastern Spotted Coralroot. Mt (GA, NC, VA): moist forests, northern hardwood forests; uncommon (GA Special Concern). July-August. Var. *maculata* is irregularly distributed in much of North America, primarily northern, from Newfoundland Québec, and MN south to PA, OH, and IN, and south in the Appalachians to ne. GA, in the west from British Columbia south to s. CA, s. AZ, and s. NM. Var. *mexicana* (Lindley) Freudenstein *ined.* is restricted to Mexico. [= FNA, Z; < *C. maculata* – RAB, C, F, G, K, L, W, X; < *Corallorrhiza maculata* – S, orthographic variant]

Corallorhiza maculata (Rafinesque) Rafinesque *var.* ***occidentalis*** (Lindley) Ames, Western Spotted Coralroot. Mt (VA): forests; rare (VA Rare). May-July. Var. *occidentalis* (Lindley) Ames has a distribution similar to var. *maculata*, except that in the east it ranges south only to PA, s. Ontario, and WI, with disjunct populations in e. WV (Pocahontas County; Morton et al. 2004) and VA. [= FNA, Z; < *C. maculata* – RAB, C, F, G, K, L, W, X; < *Corallorrhiza maculata* – S, orthographic variant]

Corallorhiza odontorhiza (Willdenow) Poiret, Autumn Coralroot. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): forests; uncommon (rare in FL). August-October. The cleistogamous form is the more common, and is widespread in e. North America, from ME, NY, s. Ontario, MI, and MN south to SC, c. GA, ne. FL, c. AL, n. MS, c. AR, and e. OK. The chasmogamous form is less common, and is scattered in ne. United States and adjacent Canada, in Ontario, CT, PA, MI, IA, IN, DC, NC, and TN, and in Mexico (Chiapas, Distrito Federal, Guerrero, Hidalgo, Jalisco, México, Michoacán, Morelos, Oaxaca, Puebla, Sonora), Guatemala, and Nicaragua. It may be recognized as a variety; see synonymy. [= RAB, C, F, G, L, W, WH, X; > *C. odontorhiza* var. *pringlei* (Greenman) Freudenstein – FNA, K, Z; > *C. odontorhiza* var. *odontorhiza* – FNA, K, Z; = *Corallorrhiza odontorhiza* – S, orthographic variant; > *C. pringlei* Greenman]

Corallorhiza wisteriana Conrad, Spring Coralroot. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests; uncommon (rare north of FL). April-May. Widespread in e. North America, from NJ, PA, OH, IN, IL, MO, and OK south to FL, and TX, and also in the Rockies from MT and w. SD south to s. Mexico. [= RAB, C, F, FNA, G, K, L, W, WH, X, Z; = *Corallorrhiza wisteriana* – S, orthographic variant]

Corallorhiza trifida Châtelain, Early Coralroot, Pale Coralroot. Boreal forests, bogs, peaty swamps. May. South to DC {specimen at NCU}, MD, WV, PA, NJ (Magrath & Freudenstein in FNA 2002, Kartesz 1999), and, allegedly, to GA (Small 1933). [= FNA, G, K, L, Z; > *C. trifida* var. *verna* (Nuttall) Fernald – C, F; = *Corallorrhiza corallorrhiza* – S]

Cypripedium Linnaeus 1753 (Lady's-slipper)

A genus of about 40-50 species, north temperate in distribution. References: Sheviak (1994)=Z; Case et al. (1998); Wallace & Case (2000)=Y; Sheviak in FNA (2002a); Pridgeon et al. (1999c). Key to yellow-flowered species adapted from Sheviak (1994).

1 Plant scapose, with 2 basal leaves; pouch-like lip of flower with a longitudinal fissure, pink (rarely nearly white); [section *Acaulia*] ..... ***C. acaule***
1 Plant caulescent, with (2) 3-7 leaves alternate on the stem; pouch-like lip of flower with a rounded orifice, yellow or pink (rarely white).
  2 Pouch-like lip of flower pink and white (rarely all white); lateral petals and dorsal sepal white, not twisted, obtuse to acute; [section *Obtusipetala*] ..... ***C. reginae***
  2 Pouch-like lip of flower yellow or white; lateral petals and dorsal sepal brown, purplish brown, or yellow, slightly to strongly twisted, acuminate-attenuate; [section *Cypripedium*].
    3 Pouch-like lip of flower white, 1.5-2.5 cm long; orifice margin acute on the apical margin; [of calcareous barrens] ..... ***C. candidum***
    3 Pouch-like lip of flower bright yellow, pale yellow, or rarely white, (2.0-) 2.2-6.3 cm long (if pale yellow or white, then > 4 cm long); orifice margin rounded-octuse on the apical margin; [of various habitats].
      4 Dorsal sepal 3.5-5.0 cm wide; pouch orifice 2.7-4.5 cm long; pouch-like lip 4.5-6.3 cm long, pale yellow or creamy white; plants robust, typically 5-8 dm tall ..... ***C. kentuckiense***
      4 Dorsal sepal 1.5-2.9 cm wide; pouch orifice 0.5-1.3 cm long; pouch-like lip (2.0-) 2.2-5.8 cm long, medium to rich yellow; plants not as robust, typically 2-5 (-6) dm tall.

5 Outer surface of uppermost sheathing bract glabrous or sparsely or inconspicuously pubescent when young; pouch-like lip 15-29 mm long; flower scent intense and sweet ..... ***[C. parviflorum var. makasin]***
5 Outer surface of uppermost sheathing bract densely and conspicuously silvery-pubescent when young, or rarely glabrescent; pouch-like lip 2.0-5.4 cm long; flower scent moderate to faint, rose-like or pungent-musty.
6 Pouch-like lip 2.2-3.4 cm long; sepals and lateral petals usually densely and minutely spotted with dark reddish brown or purple, thus appearing uniformly dark ..... ***C. parviflorum var. parviflorum***
6 Pouch-like lip (2.0-) 3.0-5.8 cm long; sepals and lateral petals unmarked (greenish-yellow), or more often streaked, blotched, striped or reticulately marked with dark reddish brown or purple (but generally not extensively blotched) ..... ***C. parviflorum var. pubescens***

Cypripedium acaule Aiton, Pink Lady's-slipper, Moccasin-flower. Pd, Mt (GA, NC, SC, VA), Cp (NC, SC, VA): dry to mesic, acid forests and woodlands, often under pine or other conifers; common. April-July. Newfoundland west to n. Alberta, south to NC, SC, TN, n. IN, and MN. [= RAB, C, F, FNA, G, K, L, W, X; = *Fissipes acaulis* (Aiton) Small – S]

Cypripedium candidum Muhlenberg ex Willdenow, White Lady's-slipper. Mt (VA): calcareous barrens; rare. NY and NJ west to ND, south to w. VA and MO. [= C, F, FNA, G, K, L, X]

Cypripedium kentuckiense C.F. Reed, Kentucky Yellow Lady's-slipper. Cp (GA, VA): sandy ravine bottoms and springhead seeps along small streams; rare. First reported for our area by Weldy et al. (1996). *C. kentuckiense* C.F. Reed is similar to *C. parviflorum* var. *pubescens* and, in addition to the site discovered in e. VA, reaches e. TN (Franklin and Scott counties, Cumberland Plateau) and e. KY. Case et al. (1998) studied isozymes of *C. kentuckiense* and related *Cypripedium spp.*; the recognition of *C. kentuckiense* as a species was supported. [= C, FNA, K, Y, Z; often included in a broad concept of *C. calceolus, C. pubescens*, or *C. calceolus* var. *pubescens* by most earlier authors]

Cypripedium parviflorum Salisbury *var.* ***parviflorum***, Small Yellow Lady's-slipper. Mt (GA, NC, VA): mesic forests, seepy forests over amphibolite, other habitats; rare. April-June. Rather widespread in North America, south in the east to NC and GA. The exact range, abundance, and habitats of this variety in our area are obscure, because of confusion with the more northern var. *makasin* (Farwell) Sheviak and small-flowered forms of var. *pubescens*. See Sheviak (1994) for a discussion of why North American plants of yellow lady's-slippers are recognized as a species distinct from the European *C. calceolus* Linnaeus. [= FNA, Y, Z; < *C. calceolus* Linnaeus var. *pubescens* – RAB, G, X, in part; = *C. parviflorum* – K, S; = *C. calceolus* var. *parviflorum* (Salisbury) Fernald – C, F, L, W]

Cypripedium parviflorum Salisbury *var.* ***pubescens*** (Willdenow) Knight, Large Yellow Lady's-slipper, Whippoorwill Shoes. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (VA): rich mesic forests; uncommon (rare in SC). April-June. Widespread in e. North America. [= FNA, Y, Z; < *C. calceolus* Linnaeus var. *pubescens* (Willdenow) Correll – RAB, G, X (also see *C. parviflorum* var. *parviflorum*); = *C. pubescens* Willdenow – K, S; = *C. calceolus* var. *pubescens* (Willdenow) Correll – C, F, L, W]

Cypripedium reginae Walter, Showy Lady's-slipper, Queen Lady's-slipper. Mt (GA?, NC*, VA): over circumneutral to basic rocks, or (allegedly) in mossy wet forests under *Rhododendron*; rare. May-June. Widespread in ne. North America, south to NC (?), GA, TN, and AR. The native occurrence of this species in NC is questionable; the only definite specimen from the state is from an implausible habitat for the species (highly acid humus under rhododendron). [= RAB, C, F, FNA, G, K, L, S, W, X]

Cypripedium parviflorum Salisbury var. *makasin* (Farwell) Sheviak ranges south to PA and NJ (Kartesz 1999). Var. *makasin* is the northern, small-flowered plant, characteristically of calcareous fens, often confused with var. *parviflorum*. It may reach our area. [= K, Y, Z] {synonymy incomplete}

Epidendrum Linnaeus 1759 (Green-fly Orchid)

A genus of about 1000 species, of tropical (and rarely subtropical) America. References: Hágsater in FNA (2002a); Pridgeon et al. (2005).

Epidendrum magnoliae Muhlenberg, Green-fly Orchid. Cp (FL, GA, NC, SC): epiphytic on limbs of trees, especially *Taxodium*, in blackwater river swamps, usually on relatively horizontal limbs mixed with *Pleopeltis polypodioides*, also rarely in crevices of Altamaha Grit outcrops; common (uncommon in GA, rare in NC and SC). July-October. The northernmost epiphytic orchid: se. NC south to c. peninsular FL, west to LA; also in ne. Mexico. It is locally rather common, but rarely seen as it occurs primarily in blackwater swamps, on upper limbs of *Taxodium, Nyssa*, and other trees, typically mixed with *Pleopeltis*. See Correll (1936) for additional discussion of this species at its northern limit. Hágsater (2000) indicates that *E. magnoliae* Muhlenberg has nomenclatural priority over *E. conopseum* R. Brown. [= FNA; = *E. conopseum* Aiton f. – RAB, L, WH, X; > *E. conopseum* var. *conopseum* – K; = *Amphiglottis conopsea* (Aiton f.) Small – S]

Epipactis Zinn 1757 (Helleborine)

A genus of about 25 species, of w. North America, Eurasia, and n. Africa (Brown & Argus in FNA 2002). References: Brown & Argus in FNA (2002a).

* ***Epipactis helleborine*** (Linnaeus) Crantz, Broad-leaved Helleborine. Mt (GA, NC, VA): forests; rare, native of Europe. June-September. This species has been collected a handful of times in various parts of the mountains, some of the colonies

dating back to the early 1960's; it has become common in ne. United States and se. Canada. [= C, F, FNA, K, L, X; = *E. latifolia* (Linnaeus) Allioni – G]

Eulophia R. Brown ex Lindley 1823

A genus of about 215 species, pantropical (Romero-González in FNA 2002). References: Romero-González in FNA (2002a). [also see *Pteroglossaspis*]

Eulophia alta (Linnaeus) Fawcett & Rendle, Wild Coco. Cp (GA): flatwoods, swamps; rare. S. GA south through the FL peninsula into the West Indies, Mexico, Central America, and South America. [= FNA, GW, K; = *Platypus altus* (Linnaeus) Small – S]

Galearis Rafinesque 1833 (Showy Orchis)

A genus of 3-6 species, of e. North America and e. Asia. References: Sheviak & Catling in FNA (2002a); Pridgeon et al. (1999b).

Galearis spectabilis (Linnaeus) Rafinesque, Showy Orchis. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (VA): rich, deciduous forests, most typically over calcareous or mafic rocks; common (rare in SC). April-July. New Brunswick and Québec west to MN, south to GA and AR. [= FNA, K, L, W; = *Orchis spectabilis* Linnaeus – RAB, C, F, G, X; = *Galeorchis spectabilis* (Linnaeus) Rydberg – S]

Goodyera R. Brown 1813 (Rattlesnake Orchid)

A genus of about 55-100 species, widespread in distribution but primarily Northern Hemisphere. References: Kallunki in FNA (2002a); Pridgeon et al. (1999c).

1 Leaves blue-green, the upper surface variegated with white, the midrib broadly whitened (1-3 mm wide), the remainder of the network of white variegations narrow (< 0.5 mm wide), generally lacking any internal variation in color, the outlines of the variegations smooth; inflorescence cylindric, not secund or one-sided ..... ***G. pubescens***
1 Leaves dark green, the upper surface variegated with pale green, the midrib only irregularly and narrowly pale green, most of the network of pale green variegations broad (0.5-1 mm wide), with a dark green center line (thus the variegations appearing double), the outlines of the variegations finely and irregularly toothed; inflorescence secund, primarily one-sided, or loosely spiraled.
  2 Lip narrowly saccate (th pouch much longer than deep), with an elongate recurved apex ..... ***G. repens***
  2 Lip deeply concave (the pouch about as deep as long), with a short spreading or recurved apex ..... ***[G. tesselata]***

Goodyera pubescens (Willdenow) R. Brown, Downy Rattlesnake-orchid. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry to moist forests and woodlands; common (rare in FL). June-August. New Brunswick west to Ontario and MN, south to panhandle FL, MS, and AR. One of the commonest of orchids in much of its range. [= RAB, C, F, FNA, G, K, L, W, X; = *Peramium pubescens* (Willdenow) MacM. – S]

Goodyera repens (Linnaeus) R. Brown, Lesser Rattlesnake-orchid. Mt (NC, SC, VA): moist forests, usually under conifers and rhododendrons; uncommon (rare in SC). June-September. A circumboreal species of northern North America and Eurasia, this species reaching its southern limit in e. North America in NC and SC. [= FNA, K, L, W; > *Goodyera repens* var. *ophioides* Fernald – RAB, C, F, G, X; > *Peramium ophioides* (Fernald) Rydberg – S]

Goodyera tesselata Loddiges, Checkered Rattlesnake-plantain, south to MD, PA, and NJ (Kallunki in FNA 2002, Kartesz 1999). Probably an allopolyploid, derived from *G. oblongifolia* × *repens*. [= FNA, C, F, G, K, L, X]

Habenaria Willdenow 1805 (Longspur Orchid, Habenaria)

A genus of about 600 species, tropical and subtropical in the Old World and New World. References: Sheviak in FNA (2002a); Pridgeon et al. (1999b). [also see *Coeloglossum*, *Platanthera*]

1 Lip and lateral petals toothed ..... ***H. odontopetala***
1 Lip or lateral petals divided into linear segments.
  2 Spur 4-10 cm long; [terrestrial, though in moist habitats] ..... ***H. quinqueseta***
  2 Spur 0.4-1.4 cm long; [aquatic or semi-aquatic in marshes and swamps] ..... ***H. repens***

Habenaria odontopetala Reichenbach f. Cp (FL): rich, moist hardwood hammocks; rare. Ne. FL south to s. FL; West Indies, Mexico and Central America. [= FNA, K; ? *H. floribunda* Lindley – WH]

Habenaria quinqueseta (Michaux) A. Eaton, Long-horned Habenaria, Michaux's Orchid. Cp (AL, FL, GA, LA, MS, SC): wet pine flatwoods, moist hardwood hammocks, Altamaha Grit outcrops, ditches; rare. August-October. SC south to s. FL, west to se. TX. [= FNA, K, WH; = *H. quinqueseta* var. *quinqueseta* – L; < *H. quinqueseta* – RAB, GW, S, X]

Habenaria repens Nuttall, Water-spider Orchid, Floating Orchid. Cp (AL, FL, GA, LA, MS, NC, SC, VA?): blackwater swamps, pools, banks of creeks and rivers; rare. April-November. NC south to FL and west to TX; West Indies, Mexico, Central America, and n. South America. Reported from se. VA. [= RAB, FNA, GW, K, L, S, WH, X]

Hexalectris Rafinesque 1825 (Crested Coralroot)

A genus of about 7 species, mycotrophic, of s. North America. References: Catling & Engel (1993)=Z; Catling (2004)=Y; Goldman, Coleman, Magrath, & Catling in FNA (2002a).

Hexalectris spicata (Walter) Barnhart *var. spicata*, Crested Coralroot, Brunetta. Pd, Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry forests and woodlands, especially over mafic or calcareous rocks, such as diabase, gabbro, calcareous siltstone, and dolomite (though sometimes in distinctly acid situations); rare. April-August. Var. *spicata* is widespread in se. North America, ranging from MD, OH, and MO south to FL, TX, and Mexico. Var. *arizonica* (S. Watson) Catling & Engel, an autopollinating relative, is distributed from e. TX west to AZ, south into Mexico. The yellow and purple flowers borne on a brown stem present a very peculiar color combination. The genus is primarily Mexican. [= FNA, Y, Z; < *H. spicata* – RAB, C, F, G, K, L, S, W, WH, X]

Isotria Rafinesque 1808 (Whorled Pogonia, Five-leaves, Fiveleaf Orchid)

A genus of 2 species, of e. North America. Cameron & Chase (1999) indicate that *Isotria* should perhaps be included in a more broadly circumscribed *Pogonia* (as was often done prior to 1922). References: Mehrhoff & Homoya in FNA (2002a).

Identification notes: Sterile *Isotria* is sometimes confused with *Medeola*. *Medeola* has a wiry-textured stem, with floccose hairiness, at least towards the base. *Isotria* has a fleshier stem lacking hairs.

1 Sepals 12-30 mm long, greenish-brown; lip 10-15 mm long; pedicel of fruit (0-) 5-10 (-15) mm long; plant glaucous, the stem whitish-green.. ..... ***I. medeoloides***
1 Sepals 35-60 mm long, purple-brown; lip 20-25 mm long; pedicel of fruit (12-) 20-55 mm long; plant scarcely glaucous (if at all), the stem generally purplish ..... ***I. verticillata***

Isotria medeoloides (Pursh) Rafinesque, Small Whorled Pogonia, Little Five-leaves. Mt (GA, NC, SC), Pd (NC, VA), Cp (NC): moist forests, in the mountains and upper Piedmont usually with *Pinus strobus*; rare. May-June. Widespread (but very local) in ne. North America, from s. ME and MI south to c. and e. WV, w. VA, w. NC, e. TN, and n. GA. The reproductive biology of this species was studied by Vitt & Campbell (1997). Van Alstine et al. (1996) discuss the habitats of known occurrences in Virginia. [= RAB, C, F, FNA, G, K, L, W, X; = *I. affinis* (C.F. Austin) Rydberg – S; = *Pogonia affinis* C.F. Austin]

Isotria verticillata (Muhlenberg ex Willdenow) Rafinesque, Large Whorled Pogonia, Larger Five-leaves. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist to dry forests; common (uncommon in GA, SC, NC, rare in FL). April-July. ME and MI south to Panhandle FL and e. TX. [= RAB, C, F, FNA, G, K, L, S, W, X; = *Pogonia verticillata* (Muhlenberg ex Willdenow) Nuttall – WH]

Liparis L.C. Richard 1817 (Wide-lip Orchid, Twayblade)

A genus of about 250-350 species, cosmopolitan. Regerences: Magrath in FNA (2002a).

1 Lip (8-) 10-12 mm long, pale purple; pedicels 11-18 mm long, equal to or longer than the capsule ..... ***L. liliifolia***
1 Lip 4-5.5 mm long, yellowish-green; pedicels 3-7 mm long, shorter than the capsule ..... ***L. loeselii***

Liparis liliifolia (Linnaeus) L.C. Richard ex Ker-Gawler, Large Twayblade, Mauve Sleekwort, Russet-witch, Brown Wide-lip Orchid. Mt (GA, NC, SC, VA), Pd (GA, NC, VA), Cp (NC, VA): moist forests, floodplains; uncommon (rare in SC). May-July. VT and Ontario west to MN, south to GA and AR; also in China. [= RAB, C, F, FNA, G, GW, K, L, S, W, X]

Liparis loeselii (Linnaeus) L.C. Richard, Fen Orchid, Loesel's Twayblade, Bog Twayblade, Yellow Wide-lip Orchid. Mt (NC, VA), Cp (NC, VA), Pd (VA): seepages at moderate to high elevations in the mountains, mucky bay swamps (dominated by *Persea palustris* and *Magnolia virginiana*) at about sea level on the Outer Banks, and other moist, seepy habitats, especially over mafic or calcareous rocks; rare. May-July. Nova Scotia and Québec west to Mackenzie and British Columbia, south to ne. NC, sw. NC, AL, AR, KS, NE, and WA. [= RAB, C, F, FNA, G, GW, K, L, S, W, X]

Listera R. Brown 1813 (Twayblade)

A genus of about 25 species, boreal, north temperate, and south temperate (Magrath & Coleman in FNA 2002). References: Magrath & Coleman in FNA (2002a).

1 Lip usually cleft about one-third its length, the two lobes oblong, with rounded apices ..... ***L. smallii***

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1 Lip usually cleft about two-thirds its length, the two lobes linear, with acute apices.
  2 Lip 6-10 mm long, lacking prominent teeth near the base (but with 2 vertically-oriented lobes); pedicels and raceme axis glandular-puberulent; sepals and petals 1-2 mm long ..... ***L. australis***
  2 Lip 3-5 mm long, with 2 prominent teeth near the base, these diverging horizontally; pedicels and raceme axis glabrous; sepals and petals 1-5-3 mm long ..... ***L. cordata var. cordata***

Listera australis Lindley, Southern Twayblade. Cp (FL, GA, NC, SC, VA), Pd (GA), Mt (NC): swamps, second terraces in floodplain forests, wet woods under *Rhododendron maximum*; uncommon (rare in GA, NC, and SC). February-July. Mainly a Southeastern Coastal Plain species, from NJ south to FL and west to e. TX, but also scattered inland of the Coastal Plain and north into VT and s. Canada. [= RAB, C, F, FNA, G, GW, K, L, W, WH, X; = *Ophrys australis* (Lindley) House – S]

Listera cordata (Linnaeus) R. Brown *var. cordata*, Heartleaf Twayblade, Lesser Twayblade. Mt (NC): habitat not known; rare (NC Watch List). June-July. A widespread circumboreal species of n. Eurasia and n. North America, south to NC (at least formerly, not seen in this century). Var. *cordata* is widespread in ne. United States and widespread in Canada; var. *nephrophylla* (Rydberg) Hultén is widespread in nw. North America. [= FNA, K, L; < *L. cordata* – RAB, C, F, G, W, X]

Listera smallii Wiegand, Appalachian Twayblade, Small's Twayblade, Kidneyleaf Twayblade. Mt (GA, NC, SC, VA): shaded swamps, wet slopes, nearly always beneath *Rhododendron maximum*; uncommon (rare in GA and SC). June-July. A Southern and Central Appalachian endemic: s. PA south to nw. SC and ne. GA. [= RAB, C, FNA, G, GW, K, L, W, X; = *Ophrys smallii* (Wiegand) House – S]

Listera convallarioides (Swartz) Nuttall was attributed to NC by Correll (1950); this record of this far-northern species is almost certainly an error. {not keyed}

Malaxis Solander ex Swartz 1788 (Adder's-mouth)fYucca

A genus of about 250-300 species, nearly cosmopolitan. References: Catling (1991)=Z; Catling & Magrath in FNA (2002a). Key adapted from Catling (1991).

1 Leaves 2-5; lip oriented upwards, erect, entire, obtuse to acuminate ..... ***M. spicata***
1 Leaf solitary; lip oriented downwards, deflexed, 3-lobed (the central lobe smaller than the 2 lateral lobes).
  2 Lip pointed, acuminate, lacking lateral lobes ..... ***[M. brachypoda]***
  2 Lip bifid, with 2 well-developed lateral lobes on either side of a smaller central lobe.
    3 Pedicels 3-5 (-5.8) mm long (even in plants with inflorescences over 80 mm long); basal lobes of the lip prominent, 0.75-1.1 mm long, usually 1.5-2 (-2.5)× as long as the apical lateral lobes and > 0.6× as long as the length from the base to the tip of the mid-lobe; inflorescences loosely flowered above, the lower flowers withering slowly ..... ***M. bayardii***
    3 Pedicels (4-) 5-10 (-13) mm long (and > 5 mm long in plants with inflorescences > 45 mm long); basal lobes of the lip not prominent, 0.4-1.1 mm long, mostly < 1.5× as long as the apical lateral lobes and < 0.6× as long as the length from the base to the tip of the mid-lobe; inflorescences densely flowered above, the lower flowers soon withering ..... ***M. unifolia***

Malaxis bayardii Fernald, Appalachian Adder's-mouth. Mt (NC, VA), Pd (NC, SC), Cp (SC, VA): dry, open, upland forests, shale barrens; rare. July-September. S. NY and se. MA south through CT, RI, NJ, PA, and VA to w. and c. NC, mostly in the mountains (but somewhat disjunct on the Coastal Plain of VA). See Catling (1991) for further discussion of the distinction of *M bayardii* from *M. unifolia*. [= F, FNA, K, Z; < *M. unifolia* – RAB, C, G, GW, L, S, W, X]

Malaxis spicata Swartz, Florida Adder's-mouth. Cp (FL, GA, NC, SC, VA): maritime swamp forests, calcareous but mucky swamps in the outer Coastal Plain, spring-fed swamps, wet hammocks; uncommon (rare north of FL). July-October. Se. VA south to FL; n. West Indies. [= RAB, C, FNA, G, GW, K, L, S, WH, X; ? *M. floridana* (Chapman) Kuntze – F]

Malaxis unifolia Michaux, Green Adder's-mouth. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC, VA): bogs, moist forested slopes, in the Sandhills in longleaf-oak-hickory forests; uncommon (rare in Piedmont and Coastal Plain, rare in FL). June-August. Newfoundland and FL west to MN, IA, MO, e. OK, and e. TX; also in Mexico, Cuba, the West Indies, and Central America. [= F, FNA, K, Z; < *M. unifolia* – RAB, C, G, GW, L, S, W, WH, X (also see *M. bayardii*)]

Malaxis brachypoda (A. Gray) Fernald, White Malaxis, ranges as far south as sc. PA (Rhoads & Klein 1993) and NJ (Kartesz 1999), in moist forests and bogs; it is additionally reported by F to range south to the Mountains of TN, the documentation unknown. [= F, K; = *M. monophyllos* (Linnaeus) Swartz var. *brachypoda* (A. Gray) Morris & Eames – C, FNA, G, L, X; = *M. monophyllos* (Linnaeus) Swartz ssp. *brachypoda* (A. Gray) Á. & D. Löve]

Mesadenus Schlechter 1920

A genus of 7 species, of tropical and subtropical s. North America, West Indies, Central America, and South America. References: Ackerman in FNA (2002a).

Mesadenus lucayanus (Britton) Schlechter. Cp (FL): shell middens, dry calcareous hammocks; rare. Late December-March. Ne. FL (Duval County) south to s. FL; West Indies; e. Mexico and n. Central America. [=FNA, S; < *Spiranthes polyantha* Reichenbach f. – L, WH] {add to genus key}

Platanthera L.C. Richard 1817 (Fringed Orchid, Fringeless Orchid)

A genus of about 200 species, largely of the temperate northern hemisphere, extending south into tropical Central America and tropical se. Asia. The recognition of *Gymnadeniopsis* as separate from *Platanthera* is uncertain at this time; originally named by Rydberg, its recognition was acknowledged as possibly warranted by Sheviak in FNA (2002a) and embraced by Brown (2006a). Three of our species would belong to *Gymnadeniopsis*: *P. clavellata*, *P. integra*, and *P. nivea*. References: Sheviak in FNA (2002a); Reddoch & Reddoch (1993); Pridgeon et al. (1999b).

Identification Notes: hybrids are frequent and are not keyed; they are generally intermediate in characters and are found in mixed populations of the two parents. Further information follows the species accounts.

1 Lip entire, finely toothed, or eroded (neither fringed nor deeply divided into 3 lobes).
  2 Leaves basal, 1 or 2, orbicular, (5-) 8-25 cm wide, prostrate on the ground, the stem naked or with a few bladeless bracts.
    3 Stem bractless ..... ***[P. hookeri]***
    3 Stem with bracts.
      4 Corolla spur 28-47 mm long; hemipollinarium 4.6-6.8 mm long; seeds (0.72-) 0.76-0.97 mm long ..... ***[P. macrophylla]***
      4 Corolla spur 14-28 mm long; hemipollinarium 3.0-4.8 mm long; seeds 0.54-0.72 (-0.79) ..... ***P. orbiculata***
  2 Leaves cauline, 1-10 or more, mostly lanceolate, 1-5 cm wide, ascending, the stem with at least 1 (usually several) bladed leaves.
    5 Lip 11-15 mm long; spur mostly 40-50 mm long ..... ***P. integrilabia***
    5 Lip 2-8 mm long; spur 4-23 mm long.
      6 Flowers green, greenish-white, yellowish-green, yellowish-white, or dull-white.
        7 Larger stem leaves usually 1, rarely 2, near the middle of the stem; raceme 2-9 cm long, 2-3.5 cm in diameter; lip without a tubercle on the upper surface near the base, also lacking lateral auricles near the base ..... ***P. clavellata***
        7 Larger stem leaves usually 2 (-5), near the middle of the stem or towards its base; raceme 5-20 cm long, 1.2-2 cm in diameter; lip with a tubercle on the upper surface near the base, also usually with 2 lateral auricles.
          8 Most bracts of the inflorescence shorter than the flowers they subtend (the lowermost few exceeding the flowers); flowers sparsely distributed; lip orbicular, 1-1.5× as long as broad, yellowish-green ..... ***P. flava var. flava***
          8 Most bracts of the inflorescence exceeding the flowers they subtend (the uppermost few sometimes shorter than the flowers); flowers densely distributed; lip oblong, 2-3× as long as broad, green ..... ***P. flava var. herbiola***
      6 Flowers golden-yellow or bright-white.
        9 Flowers golden-yellow; spur 4-8 mm long; lip minutely crenulate, directed downward ..... ***P. integra***
        9 Flowers bright-white; spur 11-23 mm long; lip entire, directed upward ..... ***P. nivea***
1 Lip either fringed, deeply divided into 3 lobes, or both.
  10 Lip not deeply divided into 3 lobes, deeply fringed; flowers white, yellow, orange.
    11 Flowers white; spur 15-50 mm long.
      12 Spur 15-26 mm long, ca. 1× as long as the ovary; lip descending and thence curved back towards the stem, narrowed at its base to a very short isthmus (between the base and the fringed portion); lip fringing short and relatively coarse; [of Newfoundland west to MI and IL, south to GA] ..... ***P. blephariglottis***
      12 Spur 30-50 mm long, ca. 2× as long as the ovary; lip projected forward; lip narrowed to an extended isthmus; lip fringing elongate and delicate; [of e. NC south to c. peninsular FL, west to e. TX] ..... ***P. conspicua***
    11 Flowers yellow to orange; spur 5-33 mm long.
      13 Spur 20-33 mm long, exceeding the 12-27 mm long ovary; undivided portion of lip 8-12 mm long ..... ***P. ciliaris***
      13 Spur 4-17 mm long, equal to or shorter than the ovary; undivided portion of lip 4-6 mm long.
        14 Spur 8-17 mm long, about as long as the 10-19 mm long ovary; spur orifice circular ..... ***P. chapmanii***
        14 Spur 4-10 mm long, shorter than the 7-13 mm long ovary; spur orifice keyhole-shaped or triangular ..... ***P. cristata***
  10 Lip deeply divided into 3 lobes, the lobes deeply fringed, shallowly fringed, eroded, or entire; flowers purple or greenish-white or yellowish-white.
    15 Lateral lobes of lip deeply fringed (nearly or entirely to the point of junction with the central lobe of the lip); flowers greenish-white or yellowish-white.
      16 Perianth greenish-white; lateral petals linear-spatulate, < 2 mm wide, blunt, entire to inconspicuously crenulate; lateral sepals deflexed ..... ***P. lacera***
      16 Perianth white or cream; lateral petals cuneate to broadly obovate, 4-12 mm wide, toothed; lateral sepals divergent ..... ***P. leucophaea***
    15 Lateral lobes of lip entire, eroded, or shallowly fringed (generally no > 1/2 way from the apex to the point of junction with the central lobe of the lip); flowers purple (or rarely white in albino forms).
      17 Lobes of lip eroded or entire, few (if any) of the segments > 1 mm long ..... ***P. peramoena***
      17 Lobes of lip shallowly fringed, most or all of the segments > 1 mm long.
        18 Lobes of lip fringed from 1/3 to ½ of the way to the base of the lobes; opening to nectary widely rounded (the pollen sacs spread widely apart); spur 20-26 mm long ..... ***P. grandiflora***
        18 Lobes of the lip fringed < 1/3 of the way to the base of the lobes; opening to nectary dumbbell-shaped (the pollen sacs close together); spur 12-20 mm long ..... ***P. psycodes***

Platanthera blephariglottis (Willdenow) Lindley, Small White Fringed Orchid. Cp (GA, NC, SC, VA): seepages, sandhill-pocosin ecotones; uncommon (GA Special Concern). July-September. Newfoundland west to MI and IL, south to GA. Following Brown (2006b), it seems best to recognize the two white-fringed orchids as separate species; they are morphologixcally distinctive, and where they co-occur their blooming time is offset. [= *Platanthera blephariglottis* (Willdenow) Lindley var. *blephariglottis* – FNA, K, L; < *Habenaria blephariglottis* (Willdenow) Hooker var. *blephariglottis* – RAB, X; < *Habenaria blephariglottis* var. *blephariglottis* – F (possibly misapplied); < *Habenaria blephariglottis* – GW; *Blephariglottis blephariglottis* (Willdenow) Rydberg – S (possibly misapplied); < *Platanthera blephariglottis* (Willdenow) Lindley – W]

Platanthera chapmanii (Small) Luer, Chapman's Orange-fringed Orchid. Cp (FL, GA): pine savannas; rare. S. GA and n. FL; e. TX. Previously generally confused with the hybrid between *P. ciliaris* × *cristata (P.* × *chapmanii)*. See Folsom (1984) and Brown (2004). [= FNA, K, WH; = *Blephariglottis chapmanii* Small – S] {synonymy incomplete}

Platanthera ciliaris (Linnaeus) Lindley, Yellow Fringed Orchid. Cp (FL, GA, NC, SC, VA), Mt, Pd (GA, NC, SC, VA): savannas, moist roadbanks, meadows, pastures; common (rare in Piedmont, uncommon in FL). July-September. NH, MI, IL, MO, and OK south to c. peninsular FL and TX. *P. ciliaris* is probably our most common and least habitat-specific *Platanthera*. [= FNA, K, L, W, WH; = *Habenaria ciliaris* (Linnaeus) R. Brown – RAB, C, F, G, GW, X; = *Blephariglottis ciliaris* (Linnaeus) Rydberg – S]

Platanthera clavellata (Michaux) Luer, Small Green Wood Orchid. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): seepages, bogs, swamps, other wet places; common (uncommon in Piedmont, rare in FL). June-September. Newfoundland and ND south to Panhandle FL and TX. [= FNA, K, L, W, WH; = *Habenaria clavellata* (Michaux) Sprengel – C, G, GW, X; > *Habenaria clavellata* var. *wrightii* Olive – RAB; > *Habenaria clavellata* (Michaux) Sprengel var. *clavellata* – RAB, F; = ***Gymnadeniopsis clavellata*** (Michaux) Rydberg – S]

Platanthera conspicua (Nash) P.M. Brown, Large White Fringed Orchid. Cp (FL, GA, NC, SC): savannas, seepages, sandhill-pocosin ecotones; uncommon (but locally abundant). July-September. NC south to c. peninsular FL, west to TX. Brown (2006b) and Sheviak in FNA (2002a) clarify the taxonomy of this complex; previous studies (such as Hardin 1961) used different characters, and interpreted the white-fringed orchid taxa differently. [= *Platanthera blephariglottis* (Willdenow) Lindley var. *conspicua* (Nash) Luer – FNA, K, L, WH; < *Habenaria blephariglottis* (Willdenow) Hooker var. *blephariglottis* – RAB, X; *Habenaria blephariglottis* var. *conspicua* (Nash) Ames – C, F; < *Habenaria blephariglottis* – GW; *Blephariglottis conspicua* (Nash) Small – S (also see *Platanthera integrilabia*); *Blephariglottis blephariglottis* (Willdenow) Rydberg – S (possibly misapplied)]

Platanthera cristata (Michaux) Lindley, Crested Fringed Orchid, Golden Fringed Orchid. Cp (FL, GA, NC, SC, VA), Mt (NC, SC, VA): savannas, bogs, moist roadsides; uncommon (rare in Mountains). June-September. *P. cristata* is more limited to the Coastal Plain than the related *P. ciliaris*, ranging from s. MA south to FL and west to TX, and also inland in KY, TN, AR, SC, and NC. [= FNA, K, L, W, WH; = *Habenaria cristata* (Michaux) R. Brown – RAB, C, F, G, GW, X; = *Blephariglottis cristata* (Michaux) Rafinesque – S]

Platanthera flava (Linnaeus) Lindley *var. **flava***, Southern Rein Orchid, Southern Gypsy-spike. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): shaded wet places, such as swampy forests; uncommon (rare in Piedmont, rare in VA). March-September. VA, IN, IL, MO, and OK, south to c. peninsular FL and TX; remarkably disjunct in s. Nova Scotia, where it occurs associated with other disjuncts from the Southeastern Coastal Plain. See Homoya (1993) for additional discussion of the two varieties of *P. flava*. [= FNA, K, L; = *Habenaria flava* (Linnaeus) R. Brown var. *flava* – RAB, C, F, G, X; < *Habenaria flava* – GW; > *Perularia scutellata* (Nuttall) Small – S; > *Perularia bidentata* (Elliott) Small – S]

Platanthera flava (Linnaeus) Lindley *var. **herbiola*** (R. Brown) Luer, Tubercled Rein Orchid, Northern Gypsy-spike. Mt (GA, NC, VA), Pd (NC): bogs, seepages; rare. May-September. Nova Scotia, Québec, and MN south to NC, GA, TN, and MO. See Homoya (1993) for additional discussion of the two varieties of *P. flava*; he suggests that specific status may be warranted. [= FNA, K, L, W; = *Habenaria flava* (Linnaeus) R. Brown var. *herbiola* (R. Brown) Ames & Correll – RAB, C, F, G, X; = *Perularia flava* (Linnaeus) Farwell – S, apparently misapplied]

Platanthera grandiflora (Bigelow) Lindley, Large Purple Fringed Orchid, Plume-royal. Mt (GA, NC, VA): bogs, seepages, moist places at high elevations; rare. June-August. Widespread in ne. North America, south in the mountains to NC and n. GA. Blooming 3-4 weeks earlier than *P. psycodes* when they grow in proximity. [= FNA, K, L, W; = *Habenaria psycodes* (Linnaeus) Sprengel var. *grandiflora* (Bigelow) A. Gray – RAB, C, G, X; = *Habenaria fimbriata* (Aiton) R. Brown – F; = *Blephariglottis grandiflora* (Bigelow) Rydberg – S]

Platanthera integra (Nuttall) A. Gray ex Beck, Golden Fringeless Orchid, Yellow Fringeless Orchid. Cp (FL, GA, NC, SC), Mt, Pd (NC): savannas in the Coastal Plain, bogs in the Mountains and Piedmont; rare. July-September. Essentially endemic to the Southeastern Coastal Plain, ranging from s. NJ south to FL and west to se. TX, with disjunct occurrences in TN (Eastern Highland Rim) and in bogs at low elevations of the Blue Ridge of NC. It is apparently now extirpated in the Mountains and Piedmont of NC. [= FNA, K, L, WH; = *Habenaria integra* (Nuttall) Sprengel – RAB, C, F, G, GW, X; = ***Gymnadeniopsis integra*** (Nuttall) Rydberg – S]

Platanthera integrilabia (Correll) Luer, Monkey-face Orchid, White Fringeless Orchid. Mt (GA, NC, SC, VA?), Pd (GA): bogs, red maple-gum swamps, seeps and streambanks; rare. July-September. Endemic to KY, e. TN, sw. VA (Lee County, documentation uncertain), w. NC, nw. SC, n. GA, n. AL, and n. MS, primarily in the Cumberland Plateau. See Zettler, Ahuja, & McInnis (1996) for a discussion of pollination. [= FNA, K, L, W; = *Habenaria blephariglottis* (Willdenow) Hooker var. *integrilabia* Correll – RAB, F, X; = *Habenaria correlliana* Cronquist – C; ? *Habenaria blephariglottis* var. *holopetala* (Lindley) A. Gray]

Platanthera lacera (Michaux) G. Don, Green Fringed Orchid, Ragged Fringed Orchid, Ragged Orchid. Mt, Pd, Cp (GA, NC, SC, VA): swamps, bogs, seepages; uncommon, rare in Piedmont and Coastal Plain (rare in SC). June-August. Widespread in ne. North America, south to SC, GA, AL, AR, and OK. Var. *terrae-novae* (Fernald) Luer is not distinct, and is based on hybrid swarms involving *P. lacera* and *P. psycodes* (Catling 1997). [= FNA, K, W; = *Habenaria lacera* (Michaux) R. Brown – RAB, C, G, GW, X; > *Habenaria lacera* var. *lacera* – F; = *Blephariglottis lacera* (Michaux) Farwell – S; > *Platanthera lacera* var. *lacera* – L]

Platanthera leucophaea (Nuttall) Lindley, Prairie Fringed Orchid. Mt (VA): damp calcareous meadows; rare. May-July. ME west to NE, south to w. VA, nw. PA, c. OH, c. IN, IL, MO, and OK. [= FNA, K, W; = *Habenaria leucophaea* (Nuttall) A. Gray var. *leucophaea* – C; = *Habenaria leucophaea* (Nuttall) A. Gray – G, X]

Platanthera nivea (Nuttall) Luer, Snowy Orchid, Bog-spike. Cp (GA, NC, SC): wet savannas; uncommon (rare north of FL). May-September. Essentially a Southeastern Coastal plain endemic, *P. nivea* ranges from s. NJ south to FL and west to TX, disjunct in Coffee County, TN (Eastern Highland Rim). This species is even more irregular than most *Platanthera* in its flowering, whole populations sometimes not flowering for a number of years. The flowers are so white as to seem illuminated from within. This species was once locally abundant in the outer Coastal Plain of the Carolinas and further south; Correll (1950) describes "large colonies of this species which form a blanket of white over the landscape." Also see the picture in B.W. Wells'

Natural Gardens of North Carolina. [= FNA, K, L; = *Habenaria nivea* (Nuttall) Sprengel – RAB, C, F, G, GW, WH, X; = ***Gymnadeniopsis nivea*** (Nuttall) Rydberg – S]

Platanthera orbiculata (Pursh) Lindley, Large Round-leaved Orchid, Dinner-plate Orchid. Mt, Pd (NC, VA): moist hardwood forests, especially over amphibolite; uncommon (rare in Piedmont). June-September. Newfoundland and Labrador west to AK, south to PA (and in the mountains to NC and TN), OH, IN, MN, SD, and OR. Reddoch & Reddoch (1993) have shown that *P. orbiculata* differs from *P. macrophylla* at the species level; see note below for further discussion. Pollination is by night-flying moths, likely noctuids. [= FNA; = *Habenaria orbiculata* (Pursh) Lindley – RAB; = *Habenaria orbiculata* var. *orbiculata* – C, F; < *Habenaria orbiculata* – G, W, X (also see *P. macrophylla*); = *Platanthera orbiculata* var. *orbiculata* – K, L; = *Lysias orbiculata* (Pursh) Rydberg – S]

Platanthera peramoena (A. Gray) A. Gray, Purple Fringeless Orchid, Purple Spire Orchid, Pride-of-the-peak. Mt (GA, NC, SC, VA), Pd (NC, VA), Cp (VA): bogs, seepages, moist forests; rare. June-October. NJ, s. PA, OH, c. IL, and se. MO south to nw. SC, n. GA, n. AL, c. MS, and c. AR. See Spooner & Shelly (1983) for a review of information about this species. [= FNA, K, L, W; = *Habenaria peramoena* A. Gray – RAB, C, F, G, GW, X; = *Blephariglottis peramoena* (A. Gray) Rydberg – S]

Platanthera psycodes (Linnaeus) Lindley, Small Purple Fringed Orchid, Butterfly Orchid. Mt (GA, NC, SC, VA): northern hardwood forersts, other moist forests, seepages, bogs; uncommon (rare in GA). June-August. Widespread in ne. North America, south in the mountains to n. GA. [= FNA, K, L, W; = *Habenaria psycodes* (Linnaeus) Sprengel var. *psycodes* – RAB, C, G, X; = *Habenaria psycodes* – F, GW; = *Blephariglottis psycodes* (Linnaeus) Rydberg – S]

Platanthera aquilonis Sheviak, south to NJ and PA. [= FNA; *P. hyperborea* (Linnaeus) Lindley var. *hyperborea* – K, misapplied; *Habenaria hyperborea* (Linnaeus) R. Brown var. *hyperborea*, misapplied] {not keyed; synonymy incomplete}

Platanthera hookeri (Torrey & A. Gray) Lindley, Hooker's Orchid, ranges south to s. PA, in rich moist forests. [= FNA, K, L; = *Habenaria hookeri* Torrey – C, F, G, X]

Platanthera huronensis (Nuttall) Lindley, south to NJ (Sheviak 2002, Kartesz 1999) and PA (Kartesz 1999). [= FNA, K; = *Habenaria hyperborea* (Linnaeus) R. Brown var. *huronensis* (Nuttall) Farwell] {not keyed; synonymy incomplete}

Platanthera macrophylla (Goldie) P.M. Brown is apparently reported from NC and VA by Luer (1975). I have seen no verification of this distribution, nor is it validated by Reddoch & Reddoch (1993) or Sheviak in FNA (2002). *P. macrophylla* does range south to sw. PA and might be expected in montane VA. It generally occurs in coniferous swamps, from Nova Scotia west to n. MI, south to sw. PA and MD (Kartesz 1999). [= FNA, K; = *P. orbiculata* var. *macrophylla* (Goldie) Luer – L; = *Habenaria orbiculata* (Pursh) Torrey var. *macrophylla* (Goldie) B. Boivin – C, F; < *Habenaria orbiculata* – G, X (also see *P. macrophylla*)].

The following hybrids are known from our area (others should be expected):

Platanthera ×andrewsii (M. White) Luer [*P. lacera* × *psycodes*]. This hybrid is known from several locations in the Mountains. It is distinguished by characteristics intermediate between the two parents, especially the purple to pale lavender flowers, the central lobe of the lip long and narrow and deeply fringed. [= FNA]

Platanthera ×bicolor (Rafinesque) Luer [*P. blephariglottis* × *ciliaris*]. This hybrid is rather common in the Coastal Plain, and can sometimes be found by the hundreds where both parents are abundant. The flowers from a distance appear a pale, creamy orange; when observed more closely, they prove to be bicolored, the broader portions pale orange, the fringed portions white. [= FNA]

Platanthera ×canbyi (Ames) Luer [*P. blephariglottis* × *cristata*]. This hybrid is known from a few locations in the Coastal Plain. It is intermediate between the parents. [= FNA]

Platanthera ×channellii Folsom [*P. ciliaris* × *cristata*]. This hybrid is known from several sites in the Coastal Plain (Charleston County, SC), Piedmont (Iredell County, NC), and Mountains (Henderson County, NC). It can be distinguished by its intermediate morphology, especially the spur 11-15 mm long. Folsom (1984) and Brown (2004) discuss the closely related *P. chapmanii* (Small) Luer, ranging from se. GA to panhandle FL, and in e. TX, which they recognize as a species, based on its occurrence in populations independent of its parents, pollination biology, and subtle morphologic distinction from *P. ×channellii*. [= FNA; *P. ×chapmanii* – misapplied]

Platythelys Garay (Jug Orchid)

A genus of about 9 species, of the New World tropics and subtropics. References: Ackerman in FNA (2002a).

Platythelys querceticola (Lindley) Garay, Jug Orchid. Cp (FL, LA, MS): wet hammocks and swamps; rare. Late July-September. N. FL south to s. FL, west to AL(?), MS, and LA; Mexico; West Indies; Central America; South America. [= FNA, K; = *Erythrodes querceticola* (Lindley) Ames – L, X; = *Physurus querceticola* Lindley – S; ? *P. latifolia* (Linnaeus) Garay & Ormerod – WH] {add to genus key}

Pogonia Antoine Laurent de Jussieu 1789 (Rose Pogonia, Pogonia)

A genus of 3 species, of temperate e. North America and e. Asia. Cameron & Chase (1999) indicate that molecular analyses indicate that there may be merit in the traditional broad circumscription of *Pogonia* to include *Isotria* and N. American taxa of *Cleistes*. References: Catling & Sheviak in FNA (2002a). [also see *Cleistes, Isotria*]

Pogonia ophioglossoides (Linnaeus) Ker-Gawler, Rose Pogonia, Snakemouth, Beardflower, Ettercap, Addermouth. Cp (FL, GA, NC, SC, VA), Mt (NC, SC, VA), Pd (GA, NC, SC, VA): savannas, bogs, especially in open peaty or gravelly situations; uncommon (rare in Piedmont and Mountains) (rare in VA). March-June. Newfoundland and Manitoba south to s. FL and TX. [= RAB, C, FNA, G, GW, K, L, S, W, WH, X; > *P. ophioglossoides* var. *ophioglossoides* – F]

Ponthieva R. Brown 1813 (Shadow Witch)

A genus of about 30-53 species, of tropical and warm temperate America. References: Ackerman in FNA (2002a); Pridgeon et al. (1999b).

Ponthieva racemosa (Walter) C. Mohr, Shadow Witch. Cp (FL, GA, NC, SC, VA): bottomlands, floodplains, moist ravines, nearly always over calcareous rock ("marl" or coquina limestone); uncommon (rare north of FL). September-October. Se. VA south to FL and west to se. TX; disjunct in the Eastern Highland Rim, TN, and south into Central and South America. The basal rosette of leaves, white (suffused with green) flowers in fall, and habitat are distinctive. [= RAB, C, F, FNA, G, GW, K, S, WH, X; = *P. racemosa* var. *racemosa* – L]

Pteroglossaspis Reichenbach filius 1878 (Wild Coco)

A genus of 7-10 species, of s. North America, Cuba, Colombia, and tropical Africa (Romero-González in FNA 2002). References: Romero-González in FNA (2002a).

Identification notes: The long (to 7 dm), plicate leaves are distinctive among our orchids. Small individuals can be mistaken for *Calopogon* when not in bloom. *Pteroglossaspis* differs, however, in having the stem covered from node to node by a succession of sheaths (vs. the sheaths much shorter) and in having the leaves 2-3 on a separate shoot emerging from the corm before the bloom-stalk (vs. leaf 1, on the bloom-stalk).

Pteroglossaspis ecristata (Fernald) Rolfe, Spiked Medusa, Smooth-lipped Eulophia. Cp (FL, GA, NC, SC): mesic pinelands with blackjack oak, other sandhills and dry-mesic to mesic longleaf pinelands; rare. June-September; July-November. Se. NC south to FL, west to LA; West Indies (Cuba). One of the rarest orchids in our region. [= FNA, K, WH; = *Eulophia ecristata* (Fernald) Ames – RAB, L, X; = *Triorchos ecristatus* (Fernald) Small – S]

Sacoila Rafinesque 1838

A genus of ca. 10 species, of the tropics and subtropics. References: Brown & Catling in FNA (2002).

Sacoila lanceolata (Aublet) Garay *var.* ***lanceolata***. Cp (FL): pine flatwoods, road shoulders; rare. April-June. Ne. and Panhandle FL south to s. FL; West Indies, Mexico, Central America, South America. [= FNA, WH; = *Stenorrhynchos lanceolata* (Aublet) L.C. Richard var. *lanceolata* – K; = *Spiranthes lanceolata* (Aublet) Léon var. *lanceolata* – L; < *Stenorrhynchos orchioides* (Swartz) L.C. Richard – S] {add to genus key}

Spiranthes L.C. Richard 1817 (Ladies'-tresses, Pearl-twist, Spiral Orchid)

A genus of about 30-40 species, mainly north temperate, but with species scattered in other areas. The *Spiranthes* flora of our region is still rather poorly understood, and the treatment here will undoubtedly change further. References: Sheviak & Brown in FNA (2002a); Luer (1975); Sheviak (1991); Pridgeon et al. (1999c). Key adapted largely from Sheviak & Brown in FNA (2002a). [also see *Sacoila*]

Identification notes: Flowering plants are necessary for identification of the species.

1 Rachis of inflorescence with all hairs **not** glandular, tapering to a pointed tip; [flowering March-September] ..... ***S. vernalis***
1 Rachis of inflorescence **either** glabrous **or** with some or all hairs gland-tipped, capitate or clavate.
  2 Lip bright yellow or orange-yellow, with greenish veins; sepals and petals pure white; [flowering May-July] ..... ***S. lucida***
  2 Lip either white, or lip yellowish and lacking greenish veins; sepals and petals creamy, ivory, yellow, or greenish; [collectively flowering February-December].
    3 Lip with conspicuous, terminally widened, greenish (rarely yellowish) diverging veins extending nearly to the tip; [flowering March-July].
      4 Flowers white, with green veins; sepals appressed; flowers 6-9 mm long ..... ***S. praecox***
      4 Flowers creamy green, with darker green veins; flowers 10-17 mm long ..... ***S. sylvatica***
    3 Lip lacking conspicuous, terminally widened, greenish diverging veins (veins not terminally widened); [collectively flowering February-December].
      5 Rachis glabrous; flowers gaping from near middle, the tubular portion < 3 mm long; lip pure white; [flowering June-September] ..... ***S. tuberosa***
      5 Rachis pubescent or glabrous; flowers gaping only from beyond the middle, the tubular portion > 3 mm long; lip white, creamy, yellow, or centrally green; [collectively flowering February-December].
        6 Inflorescence with 3 or 4 flowers per cycle of spiral, the spiral usually tight and obscure, but then with 3 or 4 secondary ranks of flowers evident; [collectively flowering August-December] ..... **Key A**
        6 Inflorescence with 5 or more flowers per cycle of spiral, the spiral usually open and obvious; [collectively flowering February-December] ..... **Key B**

Key A

1 Petals ca. 6 mm long; lower portion of stem with recurved-spreading leaves
  2 Rostellum and viscidium absent; sepals 3.5-5 mm long ..... ***S. ovalis var. erostellata***
  2 Rostellum and viscidium present; sepals 4-6.1 mm long ..... ***S. ovalis var. ovalis***
1 Petals 7.5 mm long or longer; leaves wholly basal, or lower portion of stem with recurved-spreading blades, or leaves absent at flowering.
  3 Lip only slightly or not at all differentiated from the petals; buds often failing to open (but setting seed through agamospermy); column normal, or abnormal or aborted; leaves usually absent at flowering ..... ***S. cernua***
  3 Lip clearly differentiated from petals; buds opening into normal flowers; column normal; leaves present or absent at flowering.
    4 Basal callosity of the lip relatively short and conic,a wide as high, and usually < 1 mm long; lateral sepals free and spreading, often over the top of the flower; leaves absent at flowering; [of dry calcareous barrens of the Ridge and Valley and westward, in the Ridge and Valley of sw. VA and nw. GA, and westward] ..... ***S. magnicamporum***
    4 Basal callosity of the lip 1-2 mm long; lateral sepals more or less appressed (very rarely spreading over the top of the flower); leaves present at flowering; [of various dry to wet sites, collectively widespread in our area].
      5 Upper margin of the lateral sepals obviously separated from the adjacent margin of the dorsal sepal, the separation abrupt at the base (commonly by about 1 mm); lip strongly curving from the claw (the resulting angle 20-60 degrees), cuneate at the base; perianth creamy, yellowish, or greenish white; [of upland, dry to mesic sites] ..... ***S. ochroleuca***
      5 Upper margin of the lateral sepals touching (or nearly so) the adjacent margin of the dorsal sepal, or only gradually separated with distance from the base; lip not strongly curving from the claw (angle < 30 degrees), cordate to truncate at the base; perianth white to creamy or ivory, the center of the lip ivory to pale yellowish or rarely greenish; [primarily of wet sites, such as bogs, fens, marshes, bottonland swamps].
        6 Plants to about 50 cm tall, not colonial; leaves comparatively slender, flaccid-membranaceous with thickened midrib, the petioles of the basal leaves < 6 mm wide; leaves wholly basal or the lower sheaths with ascending-spreading blades; perianth usually 8-11 mm long; lip membranaceous to fleshy, < 7 mm long; [widespread in our area] ..... ***S. cernua***
        6 Plants to over 100 cm tall, forming clonal colonies via stolons; leaves broad, stiffly aerenchymatous-thickened, the petioles of basal leaves 7 mm or more wide; leaves up the stem, with spreading recurved blades on the lower cauline sheaths, frequently also on the upper, with leaves extending to the inflorescence; perianth 10-15 mm long (sometimes smaller in depauperate plants); lip fleshy, usually over 7 mm long; [of the Coastal Plain] ..... ***S. odorata***

Key B

1 Lateral sepals widely diverging from the base, 8-10 mm long; lip dilated at base, oblong toward tip, yellow centrally; inflorescence secund to twisted usually only a half-turn from bottom to top; [flowering late October-December] ..... ***S. longilabris***
1 Lateral sepals spreading to appressed, not widely diverging, 3.8-10 mm long; lip ovate to oblong-quadrate, lacking a distinct basal dilation, white or creamy centrally; inflorescence usually with several spiral cycles (rarely nearly secund); [flowering February-November].
  2 Lip with lacerate-dentate tip; leaves usually linear, > 30× as long as wide, persistent and present at flowering; [flowering May-August] ..... ***S. laciniata***
  2 Lip with undulate to crisped tip; leaves lanceolate to ovate or obovate, < 30× as long as wide, either persistent and present at flowering, or withering prior to flowering.
    3 Flowers comparatively large and stout, the perianth 5-10 mm long, white to yellowish, the lip often darker centrally but not green or greenish yellow; leaves ascending, relatively slender, not ovate or obovate, present at flowering; rachis conspicuously and densely glandular-pubescent; [flowering August-November] ..... ***S. cernua***
    3 Flowers comparatively small and slender, the perianth usually < 5.5 mm long; leaves strictly basal, spreading and ovate to obovate or oblanceolate; rachis glabrous or densely but minutely glandular-pubescent; [flowering February-September].
      4 Rachis densely pubescent; flowers yellowish to pale greenish yellow, the lip yellow centrally; [flowering February-April]; [of s. SC southward and westward] ..... ***S. brevilabris***
      4 Rachis glabrous or sparsely and minutely pubescent; flowers yellowish to white, the lip yellowish or green centrally; [flowering February-September]; [collectively widespread in our area].
        5 Flowers yellowish to pale greenish yellow; lip yellow centrally ..... ***S. floridana***
        5 Flowers white, lip green centrally.
          6 Leaves oblanceolate, withering at anthesis; lateral sepals spatulate, green at base; flowering February-May ..... ***S. eatonii***
          6 Leaves ovate to obovate or elliptic, spreading, present or absent at anthesis; lateral sepals acuminate, white throughout; flowering July-September.
            7 Flowers densely arranged on the spike (ratio of spike length in mm: flower number < 2.3); entire plant essentially glabrous; leaves usually absent at anthesis; [flowering earlier, mostly July] ..... ***S. lacera var. gracilis***
            7 Flowers laxly arranged on spike (ratio of spike length in mm: flower number = or > 2.3); inflorescence capitate-pubescent; leaves usually persisting through anthesis; [flowering later, mostly August-September] ..... ***S. lacera var. lacera***

Spiranthes brevilabris Lindley, Short-lipped Ladies'-tresses. Cp (FL, GA, SC): pine savannas; rare. Late February-April. Se. SC south to s. FL, west to se. TX. [= FNA, K, WH; = *S. gracilis* (Bigelow) Beck var. *brevilabris* (Lindley) Correll – GW; = *S. brevilabris* Lindley var. *brevilabris* – L]

Spiranthes cernua (Linnaeus) L.C. Richard, Nodding Ladies'-tresses. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): bogs, swamps, ditches, usually in acidic, sphagnous situations; common (uncommon in Piedmont and Coastal Plain, rare in FL). July-November. Widespread in e. North America. [= FNA, G, K, L, W, WH; = *S. cernua* var. *cernua* – RAB, C, F, GW, L, X; < *S. cernua* var. *cernua* – F, X; = *Ibidium cernuum* (Linnaeus) House – S]

Spiranthes eatonii Ames ex P.M. Brown, Eaton's Ladies'-tresses. Cp (GA, NC, SC, VA): dry to moist pine flatwoods; uncommon (GA Rare). February-May. A Southeastern Coastal Plain endemic: se. VA south to FL, west to se. TX. Apparently previously confused with *S. lacera*, *S. floridana*, *S. brevilabris*, and *S. tuberosa*, but distinctive in the combination of spring blooming season, white flowers, and basal, narrowly oblanceolate leaves (Brown 1999). [= FNA, K]

Spiranthes floridana (Wherry) Cory, Florida Ladies'-tresses. Cp (GA, NC, SC): wet savannas, other moist sites; rare (GA Rare, NC Rare). April-May. A Southeastern Coastal Plain endemic: se. NC south to FL and west to TX, a Southeastern Coastal

Plain endemic. [= FNA, K; = *S. brevilabris* Lindley var. *floridana* (Wherry) Luer – L; = *S. gracilis* (Bigelow) Beck var. *floridana* (Wherry) Correll – RAB, GW, X; = *Ibidium floridanum* Wherry – S]

Spiranthes lacera (Rafinesque) Rafinesque *var.* ***gracilis*** (Bigelow) Luer, Southern Slender Ladies'-tresses. Mt, Pd, Cp (GA, NC, SC, VA): fields, meadows, pastures, woodlands; uncommon. August-September. Widespread in se. North America, north to s. NH, MI, WI, and KA. [= C, FNA, K, L, W; = *S. gracilis* (Bigelow) Beck var. *gracilis* – RAB, GW, X; = *S. gracilis* – F; < *S. gracilis* – G (apparently including *S. lacera* var. *lacera*); = *Ibidium gracile* (Bigelow) House – S]

Spiranthes lacera (Rafinesque) Rafinesque *var.* ***lacera***, Northern Slender Ladies'-tresses. Mt (NC, VA): clearings, openings; rare. July. Nova Scotia and New Brunswick west to Saskatchewan, south to sw. NC, w. VA, TN, and MO. The occurrence of this species in NC is documented by a specimen at DUKE, collected at 5200 feet elevation on Tusquitee bald. [= C, FNA, K, L, W; = *S. lacera* – F (sensu stricto); < *S. gracilis* – G; < *S. gracilis* var. *gracilis* – X]

Spiranthes laciniata (Small) Ames, Lace-lip Ladies'-tresses. Cp (GA, NC, SC), {VA?}: pond cypress depressions and savannas, swamps; rare (NC Rare, SC Rare). May-August. A Southeastern Coastal plain endemic: NJ south to FL and west to se. TX. [= RAB, C, FNA, K, L, X; = *S.* ×*laciniata* – F, GW; = *Ibidium laciniatum* (Small) House – S]

Spiranthes longilabris Lindley, Giant Spiral Orchid. Cp (GA, NC, SC): wet savannas; rare (GA Rare, NC Threatened, SC Rare). Late October-December. A Southeastern Coastal Plain endemic: se. NC south to FL and west to LA. [= RAB, FNA, GW, K, L, X; = *Ibidium longilabre* (Lindley) House – S]

Spiranthes lucida (H.H. Eaton) Ames, Shining Ladies'-tresses. Mt (NC, VA): sunny seepage over amphibolite or other basic rock; rare (NC Rare, VA Rare). June. Widespread in ne. United States, south to NC, e. TN, sc. TN (Chester et al. 1993), c. AL, MO, and KS. The species was reported for NC by Fernald (1950) and by Small (1933), but was not treated by RAB; its occurrence in NC was verified in 1992 by its discovery in a seepage area in Ashe County. [= C, F, FNA, G, K, L, W, X; *Ibidium plantagineum* (Rafinesque) House – S]

Spiranthes magnicamporum Sheviak, Great Plains Ladies'-tresses. Mt (GA, VA): grassy barrens and glades over limestone; rare (GA Endangered, VA Rare). Primarily in the Great Plains, from ND south to TX, east (often as widely disjunct populations) to sw. Ontario, se. PA, sw. VA (Ludwig 1999), KY, w. TN (Jones 2006), and nw. GA. [= C, FNA, K, L; < *S. cernua* – G; < *S. cernua* var. *cernua* – F, X]

Spiranthes ochroleuca (Rydberg) Rydberg, Yellow Nodding Ladies'-tresses. Mt (NC, SC?, VA): meadows and pastures at moderate to high elevations, up to at least 1500m in elevation; rare (NC Rare, VA Rare). September-October. Largely northeastern, extending south in the mountains to NC. See Sheviak & Catling (1980) and Catling (1983a) for further information on this species. [= FNA, K, L, W; = *S. cernua* var. *ochroleuca* (Rydberg) Ames – C, F, X; = *Ibidium ochroleucum* (Rydberg) House – S]

Spiranthes odorata (Nuttall) Lindley, Fragrant Ladies'-tresses, Marsh Ladies'-tresses. Cp (GA, NC, SC, VA): swamps and marshes; uncommon (VA Rare). September-November. A Southeastern Coastal Plain endemic: se. VA south to FL and west to se. TX. [= F, FNA, G, K, L; = *S. cernua* var. *odorata* (Nuttall) Correll – RAB, C, GW, L, X; = *Ibidium odoratum* (Nuttall) House – S]

Spiranthes ovalis Lindley *var.* ***erostellata*** Catling, Oval Ladies'-tresses. Pd (NC, SC, VA), Cp (GA, NC, SC), Mt (GA, VA): swamp forests, bottomland forests; uncommon (GA Rare). August-November. Var. *erostellata* is fairly widespread in se. North America, ranging from sc. PA, MI, and IL south to panhandle FL, s. MS, and s. LA. Var. *ovalis* is limited to AR, LA, and TX, differing in having a viscidium and rostellum. See Catling (1983b) for further information about this variety and its biology. [= C, FNA, K, W; < *S. ovalis* – RAB, F, G, GW, L, X; < *Ibidium ovale* (Lindley) House – S; ? *S. montana* Rafinesque]

Spiranthes ovalis Lindley *var.* ***ovalis***, Oval Ladies'-tresses. Cp (FL, GA): swamp forests, mesic ravines; rare. October-November. GA, TN, AR, and TX south to FL and LA. [= FNA, K, WH; < *S. ovalis* – GW, L, X; < *Ibidium ovale* (Lindley) House – S]

Spiranthes praecox (Walter) S. Watson, Grass-leaved Ladies'-tresses, Giant Ladies'-tresses. Cp (GA, NC, SC, VA), Pd (NC, VA), Mt (GA, VA): savannas, swamps, bogs; uncommon (rare in Piedmont). March-July. A Southeastern Coastal plain endemic: NJ south to FL and west to TX. [< *S. praecox* – RAB, C, F, FNA, G, GW, K, L, W, X (also see *S. sylvatica*); < *Ibidium praecox* (Walter) House – S (also see *S. sylvatica*)]

Spiranthes sylvatica P.M. Brown, Woodland Ladies'-tresses, Pale Green Ladies'-tresses. Cp (GA, NC, SC, VA): live oak hammocks, other woodlands; rare (GA Rare). Late March-early May. VA south to c. peninsular FL, west to e. TX. [< *S. praecox* – RAB, C, F, FNA, G, GW, K, L, X; < *Ibidium praecox* (Walter) House – S]

Spiranthes tuberosa Rafinesque, Little Ladies'-tresses, Little Pearl-twist. Mt, Pd, Cp (GA, NC, SC, VA): in a wide variety of habitats, especially relatively well-drained woodlands and fields; common. June-September. Widespread in se. North America, north to MA, OH, and MO. [= C, FNA, G, K, L, W; > *S. grayi* Ames – RAB, L, X; > *S. tuberosa* var. *grayi* (Ames) Fernald – F; > *S. tuberosa* var. *tuberosa* – F; *Ibidium beckii* (Lindley) House – S, misapplied]

Spiranthes vernalis Engelmann & A. Gray, Spring Ladies'-tresses. Cp, Pd, Mt (GA, NC, SC, VA): savannas, bogs, marshes, fairly dry fields; common (uncommon in Piedmont, rare in Mountains). March-July (-early September in the mountains). MA to FL and west to TX and SD, also in Mexico and Central America. [= RAB, C, F, FNA, G, GW, K, L, W, X; = *Ibidium vernale* (Engelmann & A. Gray) House – S]

Tipularia Nuttall 1818 (Cranefly Orchid)

A genus of 3 species; the other species of the genus are e. Asian (1 in Japan and 1 in the Himalayas) (Catling & Sheviak in FNA 2002). References: Catling & Sheviak in FNA (2002a).

Identification notes: The leaves are present during the winter, withering before the flowering stalk appears, the plant thus occasionally mistaken for one of the saprophytic orchids. The leaves are usually purple underneath, a characteristic shared with *Aplectrum*, but *Tipularia* leaves are

ovate, < 10 cm long, and are not notably plicate along the veins (vs. *Aplectrum*, with leaves narrowly elliptic, 10-20 cm long, and notably plicate along the very prominent, white, cartilaginous veins).

Tipularia discolor (Pursh) Nuttall, Cranefly Orchid. Pd, Cp, Mt (GA, NC, SC, VA): in a wide variety of mesic to rather dry forests; common. July-September. Se. MA, s. NY, OH, IN, and s. MI south to FL and TX. Along with *Goodyera pubescens*, *Tipularia* is one of the commonest orchids in NC (indeed in e. North America). [= RAB, C, F, FNA, G, K, L, W, X; = *T. unifolia* (Muhlenberg) Britton, Sterns, & Poggenburg – S]

Triphora Nuttall 1818 (Three Birds Orchid)

A genus of about 25 species, of e. North America, the West Indies, and Central and South America (Medley in FNA 2002). References: Medley in FNA (2002a); Brown & Pike (2006)=Z.

1 Flowers yellow, erect, not opening fully, the lip uppermost ..... ***T. rickettii***
1 Flowers pink to white, nodding, opening fully, the lip lowermost ..... ***T. trianthophoros*** *var.* ***trianthophoros***

Triphora rickettii Luer. Cp (FL): upland hardwood hammocks; rare. Ne. FL (Columbia County) south into wc. Peninsular FL. Sometimes treated as a disjunct component of the Mexican *T. yucatanensis*. [= L, WH; < *Triphora yucatanensis* Ames – FNA, K]

Triphora trianthophoros (Swartz) Rydberg *var.* ***trianthophoros***, Three Birds Orchid, Nodding Pogonia, Nodding Ettercap. Mt (GA, NC, SC, VA), Cp, Pd (NC, SC, VA): humid forests and swamps, rhododendron thickets, especially on rotten logs or on humus; rare. July-September. The species is widespread (but scattered) in e. North America, and south into Central America. Var. *trianthophoros* occurs from ME and Ontario west to WI, south to c. peninsular FL and e. TX; disjunct in nc. Mexico; var. *mexicana* (S. Watson) P.M. Brown occurs from Mexico south to Central America. The recently named var. *texensis* P.M. Brown & R.B. Pike needs additional evaluation. The flowers are extremely ephemeral, making the species very difficult to locate. The correct spelling of the epithet is "*trianthophoros*." [= *Triphora trianthophora* (Swartz) Rydberg var. *trianthophora* – Z; = *T. trianthophora* ssp. *trianthophora* – FNA; < *T. trianthophora* – RAB, C, F, G, GW, K, L, S, W, X; < *T. trianthophoros* – WH, orthographic variant]

Zeuxine Lindley 1826 (Soldier Orchid)

A genus of about 26 species, of tropical and subtropical Old World (introduced elsewhere). References: Ackerman in FNA (2002a).

* ***Zeuxine strateumatica*** (Linnaeus) Lindley, Lawn Orchid, Soldier Orchid. Cp (FL, GA): lawns; common (rare north of FL), native of Asia. [= FNA, GW, K, L, WH]

POACEAE (R. Brown) Barnhart 1895 *or* *GRAMINEAE* A.L. de Jussieu 1789 (Grass Family)

A family of about 670 genera and 10,000 species, cosmopolitan. References: Flora of North America Editorial Committee (2003a, 2007a)=FNA; Hitchcock and Chase (1950)=HC; Blomquist (1948). Key to genera adapted in large part from FNA.

[note: only a small portion of the key to genera complete]

Key to tribes

1 Plant a shrub or tree (the culms perennial, woody, to 25 m tall), with complex branching systems from the upper nodes; leaves strongly dimorphic, those of the main culm sheathing, those of the branches or culm tips pseudopetiolate ..... **Key A: tribe *Bambuseae***
1 Plant an herb (the culms annual, not truly woody, to 5 m tall), lacking complex branching systems from the upper nodes; leaves not dimorphic, none of them pseudopetiolate.
  4
    5 ..... **Key P: tribe *Paniceae***
    5 ..... **Key Q: tribe *Andropogoneae***
  4
    6 ..... **Key N: tribe *Aristideae***
    6
      7
        8 ..... **Key C: tribe *Brachyelytreae***
        8
          9 ..... **Key B: tribe *Oryzeae***
          9
            10 ..... **Key L: tribe *Cynodonteae***
            10 ..... **Key J: tribe *Poeae***
      7 [to be continued]

Key A – tribe *Bambuseae*

Key based on Stapleton (2007).

1 Rhizomes pachymorph, having root-bearing internodes thicker than the culm; culms usually in single clumps ..... ***Bambusa***
1 Rhizomes leptomorph, root-bearing internodes thinner than the culm; culms solitary or in many connected clumps.
  2 Mid-culm branches consistently 2, unequal, rarely with a smaller central third branch ..... ***Phyllostachys***
  2 Mid-culm branches not consistently 2, initially 1-9.
    3 Dwarf bamboos, less than 1(-1.5) m tall.
      4 Leaf blade margins more or less bleached in winter, terminal blade often angled from shoot axis, blades usually not variegated ..... ***[Sasa]***
      4 Leaf blade margins not or only slightly bleached in winter, terminal blade parallel to shoot axis, blades often variegated ..... ***Pleioblastus***
    3 Medium-stature to tall bamboo, more than 1 m tall.
      5 Mid-culm branches initially 5-9 ..... ***Pleioblastus***
      5 Mid-culm branches initially 1-3(-5).
        6 Mid-culm branches (1-)2-7; branches and leaves small to medium relative to culm size; [native] ..... ***Arundinaria***
        6 Mid-culm branches 1(-3); branch and leaves often very large relative to culm size; [alien].
          7 Leaf blade margins bleached in winter, terminal blade often deflexed from shoot axis; culm buds initially closed ..... ***[Sasa]***
          7 Leaf blade margins not bleached in winter, terminal blade parallel to shoot axis; culm buds initially open or closed ..... ***Pseudosasa***

Key B – tribe *Oryzeae*

1 Lemma margins free; plants perennial.
  2 Plants **either** < 1 m tall **or** a floating aquatic with lax stems to 1.5 m long ..... ***Luziola***
  2 Plants 1-4 m tall, emergent, the stems stout, not lax ..... ***Zizaniopsis***
1 Lemmas and paleas clasping along their margins; plants annual or perennial.
  3 Spikelets either pistillate or staminate, the upper branches of the panicle with pistillate spikelets, the lower branches with staminate spikelets; caryopses terete ..... ***Zizania***
  3 Spikelets bisexual; caryopses laterally flattened.
    4 Glumes absent and also lacking glume-like sterile florets subtending the floret; lemmas and paleas pectinately ciliate-hispid on the margins; [native] ..... ***Leersia***
    4 Glumes absent or greatly reduced, glume-like sterile florets subtending the fertile floret; lemmas and paleas glabrous or pubescent, but not pectinately ciliate hispid on the margins; [introduced] ..... ***Oryza***

Key C – tribe *Brachyelytreae*

One genus ..... ***Brachyelytrum***

Key D – tribe *Diarrheneae*

One genus ..... ***Diarrhena***

Key E – tribe *Meliceae*

1 Lemmas awned, the awns 8-15 mm long; calluses hairy; [of VA, WV, KY, and northward] ..... ***Schizachne***
1 Lemmas unawned; calluses glabrous; [collectively widespread in our area].
  2 Lower glumes 1-veined; [plants of wetlands] ..... ***Glyceria***
  2 Lower glumes 3-7-veined; [plants of mesic to dry habitats] ..... ***Melica***

Key F – tribe *Stipeae*

1 Plants not cespitose, the main leaves cauline ..... ***[Piptatherum (racemosum)]***
1 Plants cespitose, the leaves basally disposed.
  2 Leaves > 4 mm wide; awns **either** 7-15 **or** 40-120 mm long.
    3 Leaves 4-10 mm wide, the base twisted so that the abaxial surface is uppermost; awns 7-15 mm long ..... ***Oryzopsis***
    3 Leaves 2-8 mm wide, not twisted at the base; awns 50-120 mm long ..... ***[Nassella (neesiana)]***
  2 Leaves < 4 mm wide; awns 5-120 mm long
    4 Palea grooved, longer than the lemma; lemma margins involute, fitting into the paleal groove; [native species, collectively widespread in our area] ..... ***Piptochaetium***
    4 Palea flat, shorter than or equal to the lemma; lemma margin convolute or not overlapping; [alien and native species, rare in our area].
      5 Lemmas papillose and also often pubescent, particularly on the veins, convolute and wrapping around the caryopsis such that the margins strongly overlap; awns 15-120 mm long ..... ***Nassella***

5 Lemmas smooth, the margins separated and parallel their entire lengths at maturity; awns 5-25 mm long; [native species, of WV northward] ..... *[Piptatherum (canadense)]*

Key G – tribe *Brachypodieae*

One genus ..... ***Brachypodium***

Key H – tribe *Bromeae*

One genus ..... ***Bromus***

Key I – tribe *Triticeae*

1 Spikelets 2-7 at all or most nodes.
  2 Spikelets 3 at each node ..... ***Hordeum***
  2 Spikelets
3Elymus
3Secale
1 Spikelets 1 at all or most nodes.
Elymus, Pascopyrum, Aegilops, Triticum, Thinopyrum

Key J – tribe *Poeae*

Poa, Festuca, Deschampsia, Avenilla, Cynosurus, Phalaris, Lagurus, Hainardia, Parapholis, Schedonorus, Vulpia, Lolium, Puccinellia, Sclerochloa, Dactylis, Poa, Torreyochloa, Briza, Aira, Sphenopholis, Deschampsia, Avenella, Agrostis, Polypogon, Lagurus, Phleum, Gastridium, Desmazeria, Cynosurus, Parapholis, Hainardia, Lachnagrostis, Amphibromus, Calamagrostis, Gaudinia, Avena, Holcus, Arrhenatherum, Trisetum, Koeleria, Rostraria, Anthoxanthum, Cinna, Phalaris, Limnodea, Ammophila, Milium, Alopecurus, Apera

Key K – tribe *Arundineae*

Molinia, Phragmites, Arundo

Key L – tribe *Cynodonteae*

Uniola, Distichlis, Monanthochloe, Tridens, Triplasis, Leptochloa, Dinebra, Eragrostis, Eleusine, Dactyloctenium, Sporobolus, Calamovilfa, Muhlenbergia, Chloris, Eustachys, Gymnopogon, Ctenium, Cynodon, Spartina, Bouteloua, Tragus, Zoysia

Key M – tribe *Danthonieae*

Cortaderia, Danthonia

Key N – tribe *Aristideae*

One genus ..... ***Aristida***

Key O – tribe *Centotheceae*

One genus ..... ***Chasmanthium***

Key P – tribe *Paniceae*

2 First glume 5-7.5 mm long, nearly as long as sterile lemma; fertile lemma 1/3 length of sterile lemma ..... ***Phanopyrum***
2 First glume shorter, or if this long, then at most 3/4 length of sterile lemma; fertile lemma > ½ the length of the sterile lemma.
  3 Sterile palea indurate and expanding the spikelet at maturity, as long as sterile lemma; outer surface of the distal palea with compound papillae ..... ***Steinchisma***
  3 Sterile palea membranous, not expanding the spikelet at maturity, usually shorter than sterile lemma or absent; outer surface of the distal palea lacking compound papillae ..... ***Panicum***
Digitaria, Anthenantia, Alloteropsis, Amphicarpum, Oplismenus, Echinochloa, Sacciolepis, Dichanthelium, Panicum, Megathyrsus, Phanopyrum, Brachiaria, Melinis, Urochloa, Eriochloa, Pennisetum, Cenchrus, Setaria, Stenotaphrum, Steinchisma, Axonopus, Paspalum, Reimarochloa

Key Q – tribe *Andropogoneae*

Add to genus key: *Elionurus*, *Hackelochloa*.

1 Leaves ovate-lanceolate, 2-10 cm long, 2.5-7× as long as wide; plants weak-stemmed annuals, branching, decumbent, rooting at the lower nodes; [alien weeds].
  2 Leaves cordate-clasping at base; spikelets not paired, unaccompanied by a vestige ..... ***Arthraxon***
  2 Leaves tapering to a broadly cuneate base; spikelets paired (one of the pair sometimes vestigial) ..... ***Microstegium***
1 Leaves lanceolate to linear, either longer or proportionately narrower; plants either perennial or coarse annuals with erect and mostly unbranched culms.
  3 Spikelets embedded in the thickened rachis (the inflorescence thus like an ear of corn), or fitting into grooves in the thickened rachis (the inflorescence thus cylindrical and resembling a rat's tail), or the pistillate inflorescences enclosed in a hard, bead-like, pearly-white, modified bract.
    4 Spikelets unisexual, with male and female spikelets in separate inflorescences or in different parts of the same inflorescence.
      5 Internode narrower than and more-or-less enclosed by the female spikelet ..... ***Coix***
      5 Internode broader than and more-or-less enclosing the female spikelet.
        6 Racemes of mixed sex (female below, male above) ..... ***Tripsacum***
        6 Racemes of single sex ..... ***Zea***
    4 Spikelets, or at least one of each pair, bisexual.
      7 Pedicels fused to the internode; [coarse alien grass of disturbed habitats] ..... ***Rottboellia***
      7 Pedicels free from the internodes; [either a native coarse grass of pinelands or prairie-like areas, or a short alien grass of lawns and disturbed areas].
        8 Sessile spikelet smooth or pitted; culms 50-200 cm tall; [native grass of pinelands or prairie-like areas] ..... ***Coelorachis***
        8 Sessile spikelet with pectinate margins; culms 5-40 cm tall; [alien grass of lawns and disturbed areas] ..... ***Eremochloa***
  3 Spikelets not embedded or fitting into grooves in the rachis, the rachis slender (the spikelets visibly separate and often pedicelled).
    9 Pedicelled spikelet similar to the sessile spikelet, both fertile.
      10 Spikelets falling in pairs together with sections of the disarticulating rachis ..... ***Saccharum***
      10 Spikelets falling separately from the persistent rachis.
        11 Panicle contracted, spikelike; glumes membranous ..... ***Imperata***
        11 Panicle loose; glumes cartilaginous or coriaceous ..... ***Miscanthus***
    9 Pedicelled spikelet differing from the sessile in shape and sex (sometimes represented only by a pedicel).
      12 Spikelets awned, the awn 10-20 cm long.
        13 First glume lacking glands; panicle open, the branches 5-8 cm long ..... ***Chrysopogon***
        13 First glume with a row of punctate, concave glands; panicle contracted, spikelike ..... ***Heteropogon***
      12 Spikelets awned or not, if awned the awn < 5 cm long.
        14 Inflorescence a panicle, the branches not subtended by sheaths.
          15 Pedicelled spikelet represented by pedicel only; apex of sheath bearing 2 auricles 1-10 mm long; [native] ..... ***Sorghastrum***
          15 Pedicelled spikelet present, staminate; apex of sheath truncate; [alien] ..... ***Sorghum***
        14 Inflorescence of 1-13 digitate (whorled) racemes borne at the summit of a peduncle, the peduncle subtended by a raceme sheath.
          16 Racemes 1 per peduncle and raceme sheath ..... ***Schizachyrium***
          16 Racemes 2-13 per peduncle and raceme sheath.
            17 Pedicels of the pedicelled (reduced or absent) spikelets terete or slightly flattened and grooved on one side only ..... ***Andropogon***
            17 Pedicels of the pedicelled (reduced or absent) spikelets strongly flattened and grooved on both sides, the central portion thin or membranous ..... ***Bothriochloa***

Aegilops Linnaeus 1753 (Goatgrass)

A genus of about 23 species, annuals, of w. Asia east to the Mediterranean region. References: Saufferer in FNA (2007a); Tucker (1996)=Z.

1 Spikelets cylindric; glumes with 4 awns; rachis disarticulating at maturity ..... ***Ae. cylindrica***
1 Spikelets nearly ovate; glumes with 1 awn; rachis not disarticulating at maturity ..... ***Ae. neglecta***

* ***Aegilops cylindrica*** Host, Jointed Goat Grass. Mt, Pd (VA): disturbed areas; uncommon, native of s. Europe. [= C, F, FNA, G, HC, K, Z]
* ***Aegilops neglecta*** Requien ex Bertoloni, Small Goat Grass, Three-awned Goatgrass. Cp (VA): disturbed areas; rare, native of s. Europe. Reported from Arlington County, VA. [= FNA, Z; *Ae. ovata* Linnaeus – C, G, HC, apparently misapplied; *Ae. geniculata* Roth – K, apparently misapplied]

* *Aegilops triuncialis* Linnaeus var. *triuncialis*, Barbed Goatgrass. Disturbed areas. Known from MD. [= FNA; < *Ae. triuncialis* – HC, K] {not keyed}
* *Aegilops ventricosa* Tausch, Swollen Goatgrass. Disturbed areas. Known from DE. [= FNA] {not keyed}

Agrostis Linnaeus 1753 (Bentgrass)

A genus of about 220 species, primarily temperate. References: Harvey in FNA (2007a); Tucker (1996)=Z. [also see *Lachnagrostis* and *Polypogon*]

1 Palea 1/2-3/4 as long as the lemma, 0.6-1.2 mm long; plants introduced, often (though not always) in disturbed habitats; plants flowering June-October; [subgenus *Agrostis*].
  2 Ligule mostly 0.5-2 mm long, truncate; panicle branches naked towards the base, diffuse when in fruit, the spikelets well-separated..... ***A. capillaris***
  2 Ligule mostly 2.5-6 mm long, acute, rounded, or truncate; panicle branches (some of them) with spikelets to near the base, the spikelets usually agglomerated.
    3 Leaves 3-8 mm wide; inflorescence triangular-ovoid, the branches widely spreading at maturity, usually reddish; plant with rhizomes, without stolons ..... ***A. gigantea***
    3 Leaves mostly 1-3 mm wide; inflorescence narrowly ovoid, the branches ascending at maturity, usually tan; plant without rhizomes, with or without stolons.
      4 Stolons well developed; leaves mostly < 5 cm long ..... ***A. stolonifera var. palustris***
      4 Stolons poorly developed or absent; leaves mostly > 7 cm long ..... ***A. stolonifera var. stolonifera***
1 Palea < 2/5 as long as the lemma, 0-0.5 mm long; plants native, typically in more or less natural habitats; plants flowering March-November; [subgenus *Vilfa*].
  5 Lemma usually awned (sometimes unawned), the awn inserted near the tip, 4-10 mm long, straight, very delicate and flexuous; annual, flowering April-June ..... ***A. elliottiana***
  5 Lemma awned or not, the awn (when present) inserted either near the middle of the lemma or near the apex, 0-6 mm long, straight or bent, neither delicate nor flexuous; perennial, flowering March-November.
    6 Lemma with a (2-) 3-5 mm long, geniculate awn.
      7 Anthers 1.0-1.5 mm long; spikelets 1.7-3.0 mm long; plant loosely cespitose, with stolons to 25 cm long ..... ***[A. canina]***
      7 Anthers 0.5-0.8 mm long; spikelets 2.0-4.o mm long; plant densely cespitose ..... ***A. mertensii***
    6 Lemma awnless or with a 0-3 mm long awn, this often straight (rarely geniculate in *A. scabra*).
      8 Spikelets 1.2-2 mm long; anthers 0.3-0.6 mm long; lemma never awned; plants flowering March-July ..... ***A. hyemalis***
      8 Spikelets 1.8-3.5 (-3.7) mm long; anthers 0.3-1.5 mm long; lemma awnless or awned; plants flowering June-November.
        9 Leaves (at least the basal) mostly involute, 1-2 (-3) mm wide; panicle branches mostly forking well beyond the middle; anthers 0.4-0.8 mm long ..... ***A. scabra***
        9 Leaves flat, 2-6 mm wide; panicle branches mostly forking at or below the middle; anthers 0.3-1.2 mm long.
          10 Lemma 1.8-3 mm long, minutely but copiously scabrous (at 20× or more); anthers 0.7-1.2 mm long; spikelets (2.3-) 2.7-3.5 (-3.7) mm long, usually clustered near the tips of the branchlets; panicle branches scabrous; culms to 15 dm tall; [of wet savannas and other wet habitats of the Coastal Plain] ..... ***A. altissima***
          10 Lemma 1.4-2 mm long, glabrous; anthers 0.3-0.6 mm long; spikelets (1.8-) 2.2-2.7 (-3.2) mm long, usually not clustered near the tips of the branchlets; panicle branches glabrous to scabrous; culms to 10 dm tall; [of various habitats, nearly throughout our area] ..... ***A. perennans***

Agrostis altissima (Walter) Tuckerman, Coastal Bog Bentgrass. Cp (FL, GA, NC, SC, VA), Mt (VA): wet savannas, sinkhole ponds, edges of swamp forests; rare. October-November. MA (?) and NJ south to se. LA, primarily on the Coastal Plain. [= F, HC, Z; < *A. perennans* – RAB, FNA GW, K, WH; = *A. perennans* var. *elata* (Pursh) A. Hitchcock – C, G, S]

* ***Agrostis capillaris*** Linnaeus, Rhode Island Bentgrass, Colonial Bentgrass, Browntop. Mt (NC, SC, VA), Pd (VA), Cp (VA): meadows, roadsides, disturbed areas; uncommon, native of Europe (and possibly n. North America). June-August. [= C, FNA, K, Z; = *A. tenuis* Sibthorp – RAB, G, HC, S, W, WV; > *A. tenuis* var. *tenuis* – F]

Agrostis elliottiana J.A. Schultes, Elliott's Bentgrass, Southern Bentgrass. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC): dry soils of barrens, fields, and rock outcrops; uncommon (rare in VA). April-June. MD west to s. OH, and e. KS, south to Panhandle FL (Gadsden County) and c. TX. [= RAB, C, F, FNA, G, HC, K, S, W, WH, Z]

* ***Agrostis gigantea*** Roth, Redtop, Black Bentgrass. June-October. Mt, Pd (GA, VA), Cp (VA), {provinces} (AL, LA, MS, NC?, SC): fields, roadsides, disturbed areas; common, native of Eurasia. [= C, F, FNA, K, W, Z; < *A. stolonifera* – RAB, GW; = *A. stolonifera* Linnaeus var. *major* (Gaudin) Farwell – G; = *A. alba* – HC, WV, misapplied; >< *A. alba* – S, misapplied]

Agrostis hyemalis (Walter) Britton, Sterns, & Poggenburg, Ticklegrass, Small Bentgrass. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): roadsides, other disturbed habitats; common. March-July. ME west to WI, south to FL and TX. [= F, FNA, K, WH, WV, Z; < *A. hyemalis* – RAB (also see *A. scabra*); = *A. hyemalis* var. *hyemalis* – C, G; = *A. hiemalis* – GW, HC, orthographic variant; < *A. hiemalis* – S, W, orthographic variant (also see *A. scabra* var. *scabra*] {FL}

Agrostis mertensii Trinius, Arctic Bentgrass. Mt (NC, VA): in thin soil of high elevation rocky summits; rare (NC Rare). July-August. Circumboreal, in North America south to ME (Mt. Katahdin), NH (White Mountains), VT, NY (Adirondack Mountains), WV (Spruce Knob), TN (Roan Mountain, Abrams Creek), NC (Roan Mountain, Big Yellow Mountain, Black Mountains), Québec, British Columbia, CO, UT (?), and AK. [= C, FNA, K, W, Z; > *A. borealis* Hartman – RAB, HC, S, WV; > *A. borealis* Hartman var. *americana* (Scribner) Fernald – F, G]

Agrostis perennans (Walter) Tuckerman, Upland Bent, Autumn Bentgrass. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): woodlands, forests, roadsides; common. August-October. Newfoundland west to MN, south to n. FL and TX; c. Mexico south to c. South America. [= HC, WV, Z; < *A. perennans* – RAB, FNA, GW, K, W, WH (also see *A. altissima*); = *A. perennans* var. *perennans* – C, G, S; > *A. perennans* var. *perennans* – F; > *A. perennans* var. *aestivalis* Vasey – F]

Agrostis scabra Willdenow, Fly-away Grass, Rough Bentgrass. Mt (VA), {FL, GA, NC, SC, VA}. (VA Watch List). June-November. Throughout North America, though mainly in cooler climates; ne. Asia. [= FNA, GW, K, WH, Z; < *A. hyemalis* – RAB, W; = *A. hyemalis* (Walter) Britton, Sterns, & Poggenburg var. *scabra* (Willdenow) Blomquist – C; > *A. scabra* var. *scabra* – F; = *A: hyemalis* (Walter) Britton, Sterns, & Poggenburg var. *tenuis* (Tuckerman) Gleason – G; = *A. scabra* var. *scabra* – HC]

* ***Agrostis stolonifera*** Linnaeus *var.* ***palustris*** (Hudson) Farwell, Creeping Bentgrass. {FL, GA, NC, SC, VA}: disturbed areas, wet, moist, or dry; common, native of Europe. June-October. [= C; < *A. stolonifera* – RAB, FNA GW, W, WH (also see *A. gigantea*); = *A. alba* Linnaeus var. *palustris* (Hudson) Persoon – F, misapplied; = *A. stolonifera* var. *compacta* Hartman – G; = *A. palustris* Hudson – HC, WV, Z; < *A. stolonifera* – K; < *A. alba* – S, misapplied] {FL?}

* ***Agrostis stolonifera*** Linnaeus *var.* ***stolonifera***. {FL, GA, NC, SC, VA}: disturbed areas, wet, moist, or dry; common, native of Europe. June-October. [= C, G; < *A. stolonifera* – RAB, FNA, GW, W, WH (also see *A. gigantea*); = *A. alba* Linnaeus var. *alba* – F, misapplied; = *A. stolonifera* – HC, Z; < *A. stolonifera* – K; >< *A. alba* – S, misapplied] {FL?}

* *Agrostis canina* Linnaeus, Brown Bentgrass, Velvet Bentgrass. Roadsides, open areas, lawns. Native of Eurasia, south in North America to DE, se. PA (Rhoads & Klein 1993), WV, and TN (Kartesz 1999). [= C, F, FNA, G, HC, K, WV]

Aira Linnaeus 1753 (Hair Grass)

A genus of 8-9 species, annuals, native of Europe, n. Africa, and w. Asia. References: Wipff in FNA (2007a); Tucker (1996)=Z.

1 Panicle dense and spike-like, 0.5-4.1 cm long, 0.3-0.7 cm wide, the branches short and appressed to ascending ..... ***A. praecox***
1 Panicle open, 1.2-13.5 cm long, 1.5-10 cm wide, the branches elongate, diffusely spreading or ascending.
  2 Pedicels usually 1-2× as long as the spikelets; lemma of both the lower floret and the upper floret with an awn 2-4 mm long ..... ***A. caryophyllea***
  2 Pedicels usually 2-8× as long as the spikelets; lemma of upper floret with an awn 1.5-2.5 mm long, lemma of the lower floret awnless or with a minute awn < 1 mm long ..... ***A. elegantissima***

* ***Aira caryophyllea*** Linnaeus, Silver Hair Grass. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, VA), Mt (NC): fields, roadsides, disturbed areas; uncommon, native of Europe. May. [= RAB, C, G, HC, K, WH, Z; = *Aira caryophyllea* var. *caryophyllea* – FNA; = *Aspris caryophyllea* (Linnaeus) Nash – S]

* ***Aira elegans*** Willdenow ex Kunth, Elegant Hair Grass. Pd (GA, NC, SC, VA), Cp (GA, NC, SC, VA), Mt (GA, SC): fields, roadsides, disturbed areas; common, native of Europe. May-June. [= RAB, G, HC, K; = *Aira elegantissima* Schur – C, Z; = *Aira caryophyllea* Linnaeus var. *capillaris* (Mertens & W.D.J. Koch) Mutel – FNA; = *Aspris capillaris* (Host) A.S. Hitchcock – S]

* ***Aira praecox*** Linnaeus, Early Hair Grass, Spike Hairgrass. Cp (NC, VA): fields, roadsides, disturbed areas; uncommon, native of Europe. Reported for NC by Burk (1961), and recently collected in the NC Sandhills (B.Sorrie, pers.comm. 2004). [= C, G, HC, K, Z]

Alloteropsis J. Presl 1828

A genus of 5-8 species, annuals and perennials, native of tropical Asia and Australia. References: Hall in FNA (2003a).

* ***Alloteropsis cimicina*** (Linnaeus) Stapf, Bugseed Grass. Cp (FL): disturbed areas; rare, native of se. Asia. Naturalized in Florida Panhandle and ne. FL. [= FNA, WH]

Alopecurus Linnaeus 1753 (Foxtail Grass)

A genus of about 36 species, north temperate and temperate South America. References: Tucker (1996)=Z.

1 Glumes 4-6 mm long, acute or acuminate.
  2 Glumes with hairs < 1.0 mm long on the keel, merely scabrous towards the tip ..... ***A. myosuroides***
  2 Glumes with hairs 1.0-1.5 mm long on the keel, including towards the tip ..... ***A. pratensis***
1 Glumes 2-3.2 mm long, obtuse or truncate.
  3 Awn about as long as the glumes (at most exceeding the glumes by 1 mm) ..... ***A. aequalis*** *var.* ***aequalis***
  3 Awn longer than the glumes, exceeding the glumes by 1.5-3.5 mm.
    4 Anthers 0.4-0.7 mm long; annual ..... ***A. carolinianus***
    4 Anthers 1.3-2 mm long; perennial ..... ***A. geniculatus***

Alopecurus aequalis Sobolewski *var.* ***aequalis***, Short-awn Foxtail Grass. Mt (VA): [habitat]; rare (VA Watch List). Circumboreal, south in North America to NJ, w. VA, IN, MO, and CA. [= F, K; < *A. aequalis* – C, G, HC]

Alopecurus carolinianus Walter, Carolina Foxtail Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): moist fields, ditches, forests; common (rare in Mountains). April-May. MA west to British Columbia, south to n. FL and CA. [= RAB, C, F, G, GW, HC, K, WH, WV, Z; = *A. ramosus* Poiret – S]

* ***Alopecurus geniculatus*** Linnaeus, Water Foxtail Grass. Pd, Cp (VA): disturbed areas; rare, native of Eurasia. [= C, F, G, HC; > *A. geniculatus* var. *geniculatus* – K]

* ***Alopecurus myosuroides*** Hudson, Slender Foxtail Grass. Pd (NC, VA), Cp (VA): moist fields; uncommon, native of Europe. April-May. [= RAB, C, F, G, HC, K, S, WV, Z]

* ***Alopecurus pratensis*** Linnaeus, Meadow Foxtail. Mt (NC, VA), Pd (GA), Cp (VA): roadsides, fields; rare, native of Eurasia. May-July. Reported for Piedmont of nc. GA (Jones & Coile 1988), for scattered locations in PA (Rhoads & Klein 1993), and for VA, KY, WV, MD, and DE (Kartesz 1999). [= C, F, G, HC, K, WV]

Ammophila Host 1809 (Beach-grass)

A genus of 2-3 species, rhizomatous perennials, north temperate. References: Barkworth in FNA (2007a); Tucker (1996)=Z.

1 Ligule 10-35 mm long ..... ***[A. arenaria]***
1 Ligule 1-4.6 mm long ..... ***A. breviligulata***

Ammophila breviligulata Fernald, American Beach-grass. Cp (NC, SC*, VA): dunes; common. August-September. Newfoundland south to about Cape Hatteras, Dare County, NC, and on shores around the Great Lakes; planted further south. As a native grass, *Ammophila* ranged south only to NC, where it was rare; it is now commonly planted ("sprigged") in the Carolinas as a sand-binder and is now common south into SC. [= K; < *A. breviligulata* – RAB, F, G, HC, S; = *A. breviligulata* ssp. *breviligulata* – FNA; ? *A. breviligulata* – C, Z]

* *Ammophila arenaria* (Linnaeus) Link, European Beach-grass. Introduced in MD and PA (Kartesz 1999). Native of Europe. [= C, F, FNA, HC, K]

Amphibromus Nees 1843

A genus of about 12 species, annuals and perennials, native of Australia, New Zealand, and South America. References: Jacobs in FNA (2007a).

* *Amphibromus scabrivalvis* (Trinius) Swallen var. *scabrivalvis*, Rough Amphibrome. Established in Tangipahoa Parish, LA; native of South America. [= FNA; < *Amphibromus scabrivalvis* – K; < *Helictotrichon scabrivalve* (Trinius) G. Tucker]

Amphicarpum Kunth 1829 (Peanut-grass)

The genus consists only of the two species treated here, remarkable for their dimorphic spikelets, some of them cleistogamous and subterranean, others aerial and chasmogamous. A series of publications over the past century make *Amphicarpum* one of the best studied "useless" grasses anywhere (Holm 1896; Weatherwax 1934; Gray & Fairbrothers 1971; McNamara & Quinn 1977; Cheplick & Quinn 1982, 1983, 1986, 1987, 1988a, 1988b; Cheplick 1989). References: Wipff in FNA (2003a).

1 Leaf blades hirsute with pustular-based hairs on both surfaces, the margins ciliate (and also slightly cartilaginous-thickened); [of moist to wet, peaty or sandy-peaty soils] ..... ***A. amphicarpon***
1 Leaf blades glabrous, the margins cartilaginous-thickened; [of seasonally flooded natural ponds] ..... ***A. muhlenbergianum***

Amphicarpum amphicarpon (Pursh) Nash, Pinebarrens Peanut-grass. Cp (DE, GA, MD, NC, NJ, SC, VA): wet, peaty, open soils, especially peat-burns in pocosin edges, primarily in the outer Coastal Plain, responding strongly to fire; uncommon (rare in VA). August-October. An Atlantic Coastal Plain endemic, scattered and rather rare, from e. MA to GA. If one carefully excavates young plants in spring or summer, they will generally be found to be connected to the remnants of the previous year's subterranean spikelet. [= FNA; = *Amphicarpum purshii* Kunth – RAB, C, F, G, GW, HC, K; = *Amphicarpon amphicarpon* (Pursh) Nash – S]

Amphicarpum muhlenbergianum (J.A. Schultes) Hitchcock, Florida Peanut-grass, Blue Maiden-cane. Cp (AL, FL, GA, NC, SC): natural depression ponds, flatwoods ponds, clay-based Carolina bays; rare. August-October. A Southeastern Coastal Plain endemic: FL and s. AL north to se. NC, rare north of s. GA. First found in NC in the late 1980's by M. Boyer. [= RAB, FNA, GW, HC; = *A. muehlenbergianum* – K, orthographic variant; = *Amphicarpon floridanum* Chapman – S]

Andropogon Linnaeus 1753 (Broomsedge, Bluestem)

A genus of about 100-110 species, mainly tropical. [also see *Bothriochloa* and *Schizachyrium*]

The difference between this treatment and that in RAB may cause some users to react with skepticism, dismay, or alarm, but I am confident that it represents a much truer description of the genus. Campbell's work (1983, et seq.) has greatly clarified the taxonomy of *Andropogon* in e. North America. Great confusion and disagreement were previously the rule in dealing with the *A. virginicus-A. glomeratus* complex. Campbell's careful morphologic work has provided workable technical characters which distinguish the taxa he recognizes.

I have generally followed Campbell (1983, et seq.) in his circumscriptions of taxa. I disagree, however, with his strongly morphologic species concept and the basis for his decisions regarding the rank of the taxa (species, variety, and "variant," an informal, English name for a subvarietal entity). Campbell bases the rank recognition of taxa on their "morphological distance"

from one another, as determined by the sum of non-matching characters out of 33 characters analyzed. In general, he regards species as separated by a morphologic distance of 9 or more, varieties by 6 or more, and variants by 3 or more. Such an approach fails to take into account additional evidence of the ecological preferences, geographic distributions, reproductive isolation, evolutionary pathways, and population biology of the taxa.

Evidence presented by Campbell (1983) is useful in determining a more meaningful assignment of taxonomic rank. For instance, he states that "there are ample opportunities for gene flow between taxa because they frequently grow together and flower at the same time of day and (mostly) at the same time of year. I have observed two taxa growing within one to three meters of one another over our hundred times. In only five of these opportunities for hybridization were there plants whose intermediate morphology suggested that they were hybrids. In the rare instances where hybridization does take place, there are few mature hybrid individuals. I have found only twelve putative hybrid individuals in the five localities where hybridization is suspected. The parents outnumber these hybrids by between five and one hundred or more to one." In discussing *A. virginicus* var. *glaucus* (here treated as *A. capillipes*) he states "the drylands variant ... produces generally shorter raceme sheaths, racemes, and spikelets; its flowers are more frequently chasmogamous, and unlike the wetlands variant, it has no hairs below the raceme sheath. In addition, it grows in better-drained soil and has a narrower geographic range ... I have seen these taxa growing within one to three meters of one another at three localities in northwestern Florida. At only one of these was there difficulty in classifying any individual: a single plant on a slope between a bog inhabited by the wetlands variant and a roadside lined with the drylands variant..."

Some additional examples would be Campbell's discussion of several closely related taxa in the *A. glomeratus* complex. "*Andropogon glomeratus* var. *glomeratus* and the robust variant of var. *pumilus* have inflorescences so similar in shape that most previous workers have united them and have overlooked the differences between them. The robust variant is taller, usually with rather smooth sheaths and with shorter, more ciliate, and darker ligules, narrower raceme sheaths, and lower glume keels that are scabrous below the middle. Although both taxa grow in wet sites, the robust variant is weedier, shows a greater tolerance for drier conditions and various soil types, and has a wider geographic range." His discussion of *A. glomeratus* var. *glaucopsis* and var. *hirsutior* is also worth repeating. "Often the two grow together in populations of thousands of individuals. Because they grow together so frequently and are morphologically so alike, the possibility that they are not distinct taxa but merely genetic segregates of one another has been carefully considered. Based on observations of several hundred seedlings grown from seeds from both taxa (growing together in nature), there is no evidence for [mere] genetic segregation. The glaucousness/greenness and pubescence/glabrousness of the stem sheaths are discernible in the seedlings within a few weeks of germination."

Taxa differing in numerous morphologic characters, with different (though overlapping) geographic ranges, with different ecological preferences (often rather narrowly segregated by hydrology), and (when they do occur in proximity to one another) showing little or no sign of introgression or hybridization are probably better treated as biological species. Thus, I have treated a number of Campbell's varieties as species. Several of his "variants" also seem to warrant taxonomic recognition, at varietal or specific rank; in fact, he subsequently elevated several (Campbell 1986). References: Campbell (1983)=Z; Campbell in FNA (2003a). Key adapted in part from Z.

Identification notes: A thorough understanding of the architecture of the inflorescences of *Andropogon* is necessary in order to identify them successfully. The parts will be described, beginning from the apex of a branch of the inflorescence. Spikelets occur in pairs, the sessile spikelet (usually just referred to as the **spikelet**) and the **pedicelled spikelet**, which is usually vestigial or absent (except in *A. gerardii*) and sterile (except in *A. gerardii*, where it is staminate). The first or **lower glume** of the sessile spikelet has two **keels**, and the presence and location of antrorse prickle hairs (scabrousness) is an important character in the *A. glomeratus* complex. The length of the sessile spikelet is an important character; it should be measured exclusive of the **awn**, borne at the apex of the lemma. Awn length is also a useful taxonomic character. The pedicelled spikelet is borne on the **pedicel**, which is attached at the base of the sessile spikelet and typically angles away from it at about a 45 degree angle. The **rachis internode** extends from the base of one sessile spikelet to the next sessile spikelet above, breaking apart (upon dehiscence) just below the next spikelet and remaining attached to the sessile spikelet below. The **dispersal unit** consists of a sessile spikelet sitting in the V shape formed by (on one side) the pedicel and pedicelled spikelet and (on the other side) the rachis internode. Both the pedicel and the rachis internode are usually pubescent with long hairs, and the color of those hairs and their distribution are useful characters.

While the dispersal units are still attached to one another, the rachis internodes form a continuous and more-or-less straight **rachis**. The dispersal units attached together in an unbranched sequence are termed a **raceme**, whose length is a useful character. Two or more racemes are attached digitately at the summit of the **peduncle** (in *Schizachyrium* only a single raceme is found). The number of racemes attached is an important character. A **raceme sheath** subtends the peduncle, often more or less surrounding the peduncle and the racemes. The length of the peduncle (distance between the points of attachment of the raceme sheath and the racemes) is an important character. The length and width (at its widest point) of the raceme sheath are very useful characters, used throughout the key. The racemes, peduncle and subtending raceme sheath make up an **inflorescence unit**. The overall inflorescence is more-or-less complexly branched; its overall size and shape are very useful in recognizing the various taxa, but variation in such a subjective (and environmentally plastic) character has added to the taxonomic confusion in *Andropogon*. The use of inflorescence shape in the key has been minimized, but is often mentioned in the discussion of each species. The number of inflorescence units per plant varies from species to species, in some species rarely exceeding 10, in others ranging upwards to 500 or 600. The absence or presence of hairs immediately below the raceme sheath is useful in some groups.

There are several important characters of the foliage. *A. capillipes* and *A. glaucopsis* have culm sheaths and leaf blades that are strongly glaucous; this is usually very obvious, but can be tested for by running the finger along the surface of the leaf (a white coating of wax will come off on the finger). The key often calls for the ligule length; measure the longest portion of the undivided portion of the ligule. The ligule often has an erose or ciliate upper margin; measure the length of the ciliations. The length of leaf blade is measured from the ligule to the leaf apex; do not include the leaf sheath, which is often long and (especially late in the year) only loosely sheathing the culm or even divergent it. Whether the culm is antrorsely scabrous or smooth is better determined by touch than by sight. Choose several mid-culm sheaths, run one's finger downwards

and upwards along the sheath surface (near the collar is best). If the sheath is antrorsely scabrous one will feel a somewhat greater resistance to moving the finger downwards than upwards.

1 Pedicellate spikelet staminate, as large as the sessile, fertile spikelet; sessile spikelets > 7 mm long; [section *Andropogon*]..... ***A. gerardii***
1 Pedicellate spikelet sterile, vestigial or absent; sessile spikelets < 7 mm long; [section *Leptopogon*].
  2 Leaves strongly glaucous (often nearly white with a powdery wax that can be rubbed off on the fingers), glabrous.
    3 Ligules (0.9-) 1.5 (-2.0) mm long, with ciliations 0-0.2 mm long; leaf blades usually (33-) avg. 40 (-75) cm long; pubescence beneath raceme sheaths moderate to dense; raceme sheaths (2.0-) 2.4-3.6 (-4.4) cm long, (1.3-) 2.0-2.5 (-3.0) mm wide..... ***A. glaucopsis***
    3 Ligules (0.2-) 0.4 (-0.5) mm long, with ciliations 0.3-1.2 mm long; leaf blades (12-) avg. 19 (-38) cm long; pubescence beneath raceme sheaths absent to dense; raceme sheaths (2.1-) 2.9-4.3 (-6.0) cm long, (2.7-) 3.1-3.8 (-5.5) mm wide.
      4 Summit of branchlet below attachment of raceme sheath pubescent with hairs 2-4 mm long; raceme sheaths (2.4-) 3.2-4.8 (-6.0) cm long; spikelets (3.0-) 3.5-3.9 (-4.4) mm long; racemes (1.5-) 2.0-3.0 (-4.0) cm long; leaves 2.5-6.5 mm wide, averaging 5 mm; upper floret lemma awn 0.9-2.1 mm long, averaging 1.4 mm..... ***A. capillipes*** *var. 1 ["wetland variant"]*
      4 Summit of branchlet below attachment of raceme sheath glabrous; raceme sheaths (2.1-) 2.6-3.8 (-4.9) cm long; spikelets (2.6-) 3.2-3.5 (-3.9) mm long; racemes (1.4-) 1.7-2.4 (-3.2) cm long; leaves 2-5 mm wide, averaging 3.5 mm; upper floret lemma awn 0.6-1.5 mm long, averaging 1.1 mm..... ***A. capillipes*** *var. 2 ["dryland variant"]*
  2 Leaves green (to somewhat glaucous, but never powdery white), pubescent or glabrous.
    5 Upper culm sheaths distinctly broadened and strongly overlapping, often largely hiding the raceme sheaths before senescence (but in some forms with the raceme sheaths strongly exserted); culms mostly < 1 m tall (to 1.4 m tall)..... ***A. elliottii***
    5 Upper culm sheaths reduced, not strongly overlapping, not hiding the raceme sheaths after anthesis; culms mostly > 1 m tall (except *A. perangustatus*, *A. tracyi*, and small forms of *A. virginicus*).
      6 Many or all peduncles longer than the subtending raceme sheaths at maturity, racemes then fully exserted above the apex of the raceme sheath.
        7 Inflorescence branches arching outwards in pronounced curves; racemes (1.2-) 1.5-2.1 (-2.6) cm long; awn (0.2-) avg. 0.7 (-1.1) cm long; spikelets (4.1-) 4.4-4.6 (-5.0) mm long..... ***A. brachystachyus***
        7 Inflorescence branches erect; racemes (2.2-) 2.6-6 cm long; awn 0.5-2.0 cm long; spikelets (4.3-) 4.9-6.5 (-7.5) mm long.
          8 Lower glumes more or less folded; stamen 1; racemes (2.2-) 2.6-4.3 (-5.3) cm long; awn (0.5-) avg. 0.8 (-1.6) cm long; spikelets (4.3-) 4.9-5.4 (-6.1) mm long ..... ***A. arctatus***
          8 Lower glumes flat; stamens 3; racemes 3-6 cm long; awn 1-2 cm long; spikelets (4.5-) 5-6.5 (-7.5) mm long ..... ***A. ternarius*** *var.* ***ternarius***
      6 Peduncles all shorter than the subtending raceme sheaths at maturity, at least the bases of the racemes not exserted above the apex of the raceme sheath.
        9 Inflorescence units with (2-) 4-7 (-13) racemes; raceme sheaths (4.1-) 5.3-8.0 (-10-1) mm wide; hairs of the rachis internode and pedicel yellow-tawny when dry ..... ***A. mohrii***
        9 Inflorescence units with 2-5 (-7) racemes; raceme sheaths (1.5-) 2.0-4.8 (-6.3) mm wide; hairs of the rachis internode and pedicel gray to whitish when dry.
          10 Postflowering peduncles < 10 mm long.
            11 Culm sheaths antrorsely scabrous (often hirsute as well); leaf blades usually > 35 cm long.
              12 Ligules (0.6-) 0.8 (-1.3) mm long (usually < 1 mm long), with ciliations 0.2-0.9 mm long; raceme sheaths (1.5-) 2.0-2.5 (-3.0) mm wide (usually < 2.5 mm wide); keels of first glume often scabrous below the middle ..... ***A. tenuispatheus***
              12 Ligules (0.7-) 1.2 (-2.2) mm long (usually > 1 mm long), with ciliations 0.0-0.3 mm long; raceme sheaths (2.0-) 2.4-3.4 (-4.7) mm wide (usually > 2.5 mm wide); keels of first glume scabrous only above the middle, smooth below.
                13 Inflorescences oblong to obpyramidal; spikelets (3.8-) 4.1-4.4 (-5.0) mm long; anthers usually not marcescent within spikelet; mature peduncles (4 -) 11-35 (-60) mm long (usually some of them > 10 mm long)..... ***A. glomeratus*** *var.* ***glomeratus***
                13 Inflorescences (linear to) oblong; spikelets (3.4-) 3.6-3.8 (-4.6) mm log; anthers usually marcescent within spikelets; peduncles (2-) 3-5 (-8) mm long..... ***A. glomeratus*** *var.* ***hirsutior***
            11 Culm sheaths not scabrous (often hirsute); leaf blades < 35 cm long (except in *A. glomeratus* var. *pumilus*).
              14 Leaves glabrous.
                15 Ligules (0.8-) 1.1 (-1.5) mm long, with ciliations 0-0.1 mm long; basal leaves often filiform, < 1.5 mm wide, strongly erect ..... ***A. perangustatus***
                15 Ligules (0.2-) 0.5 (-0.8) mm long, with ciliations 0.2-1.3 mm long; basal leaves usually > 2 mm wide, soon arching.
                  16 Culm internodes green (or glaucous just below the node only); raceme sheaths (2.2-) 2.5-3.8) (-4.5) cm long, (1.7-) 2.4-3.1) (-4.0) mm wide; peduncles (1-) 4-9 (-30) mm long; racemes 2 (-3) per inflorescence unit..... ***A. virginicus*** *var.* ***decipiens***
                  16 Culm internodes glaucous; raceme sheaths (2.8-) 3.3-4.7 (-6.7) cm long, (3.0-) 3.2-3.8 (-5.2) mm wide; peduncles (2-) 3-4 (-6) mm long; racemes 2-4 (-7) per inflorescence unit, at least some inflorescence units (especially at culm and branch apices) with 3 or more racemes..... ***A. virginicus*** *var.* ***virginicus*** *['smooth variant']*
              14 Leaves pubescent, at least on the margin near the collar.
                17 Keels of first glume often scabrous below the middle; leaves usually > 44 cm long..... ***A. tenuispatheus***
                17 Keels of first glume scabrous only above middle; leaves usually < 31 cm long.
                  18 Pubescence of young culm sheaths appressed; spikelets usually > 4 mm long; hairs on rachis internode and sterile pedicel dense, long; callus hairs 1.5-5 mm long..... ***A. longiberbis***
                  18 Pubescence of young culm sheaths spreading; spikelets mostly < 4 mm long; hairs on rachis internode and sterile pedicel rather sparse and short; callus hairs 1-2.5 mm long.
                    19 Raceme sheaths (2.2-) 2.5-3.8 (-4.5) cm long, (1.7-) 2.4-3.1 (-4.0) mm wide; racemes 2 (3) per inflorescence unit; spikelets (3.0-) 3.3-3.6 (-4.0) mm long..... ***A. virginicus*** *var.* ***decipiens***
                    19 Raceme sheaths (2.3-) 3.4-5.2 (-6.7) cm long, (2.7-) 3.3-4.0 (-5.5) mm wide; racemes 2-5 (-7) per inflorescence unit; spikelets (2.9-) 3.7-3.9 (-4.7) mm long ..... ***A. virginicus*** *var.* ***virginicus***
          10 Postflowering peduncles > 15 mm long.
            20 Culm sheaths antrorsely scabrous (often hirsute as well).
              21 Ligules (1.0-) 1.2 (-2.0) mm long, with ciliations 0-0.3 mm long; keels of first glume scabrous only above middle..... ***A. glomeratus*** *var.* ***glomeratus***
              21 Ligules (0.6-) 0.8 (-1.3) mm long, with ciliations 0.2-0.9 mm long; keels of first glume often scabrous below middle.....

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..... ***A. tenuispatheus***

20 Culm sheaths not scabrous (often hirsute).

22 Culms < 1.2 m tall; leaf blades < 30 cm long and < 3 mm wide; inflorescence units rarely > 20/culm.

23 Raceme sheaths (2.2-) 2.5-3.8 (-4.5) cm long; spikelets (3.0-) 3.3-3.6 (-4.0) mm long; leaf blades (2.5-) 3.6 (-5.5) mm wide ..... ***A. virginicus var. decipiens***

23 Raceme sheaths (2.6-) 4.1-6.6 (-8.5) cm long; spikelets (3.0-) 3.4-5.1 (-5.5) mm long; leaf blades (0.8-) 1.8 (-3.0) mm wide.

24 Ligules (0.8-) 1.1 (-1.5) mm long, with ciliations 0-0.1 mm long ..... ***A. perangustatus***

24 Ligules (0.2-) 0.4 (-0.5) mm long, with ciliations (0.1-) 0.2-0.8 mm long ..... ***A. tracyi***

22 Culms usually > 1.2 m tall; leaf blades often > 30 cm long and > 3 mm wide; inflorescence units usually > 20/culm.

25 Inflorescence branches arching outwards in pronounced curves; awn mostly < 1 cm long; spikelets (4.1-) 4.4-4.6 (-5.0) mm long; anther > 1.7 mm long ..... ***A. brachystachyus***

25 Inflorescence branches erect; awn mostly >1 cm long; spikelets (3.0-) 3.3-3.8 (-4.5) mm long; anther < 1.5 mm long.

26 Raceme sheaths (1.5-) 2.0-2.5 (-3.0) mm wide; keels of first glume often scabrous below middle; culms to 2.5 m tall; leaves to 109 cm long and 9.5 mm wide ..... ***A. tenuispatheus***

26 Raceme sheaths (1.7-) 2.4-3.1 (-4.0) mm wide; keels of first glume scabrous only above middle; culms < 1.7 m tall; leaves < 35 cm long and 5.5 mm wide ..... ***A. virginicus var. decipiens***

Andropogon arctatus Chapman, Florida Bluestem. Cp (FL, NC*): moist disturbed ground; rare, apparently native of farther south (NC Watch List). This curious record from Pamlico County, NC (the specimen at GH, collected by Randolph and Randolph in 1922, annotated as *A. arctatus* by Campbell) is likely a waif. The species is native to pinelands from n. FL west to w. panhandle of FL and adjacent s. AL, south to s. FL. [= FNA, HC, K, S, Z]

Andropogon brachystachyus Chapman, Shortspike Bluestem. Cp (FL, GA, SC): moist to wet pinelands, natural pond margins, bogs, disturbed roadsides; rare (GA Special Concern). Se. SC (McMillan et al. 2002) south to FL, south to s. FL, west to e. FL Panhandle. *A. brachystachyus* is considered by some to range north to NC. [= FNA, K, Z; = *A. brachystachys* – GW, HC, S, orthographic variant]

Andropogon capillipes Nash *var. 1*, Wetland White Bluestem. Cp (FL, GA, NC, SC, VA): wet savannas, ditches adjacent to savannas, depressional wetlands; common. September-October. S. NJ south to s. FL and west to e. TX; also in the Bahamas (Sorrie & LeBlond 1997). Campbell (1983) informally describes two "variants" of this species (which he treats at the varietal level, as *A. virginicus* var. *glaucus*). *A. capillipes* is clearly a species distinct from *A. virginicus*; moreover, the substantial morphological and ecological differences between Campbell's two "variants" (which he describes as nearly always sharply distinct, even when growing in close proximity) warrant recognition as good species, or at least as varieties. [< *A. virginicus* – RAB; < *A. virginicus* var. *glaucus* Hackel – F, FNA; < *A. capillipes* – GW, HC, K, S; = *A. virginicus* var. *glaucus* "wetlands variant" – Z; = *A. virginicus* var. *dealbatus* Mohr ex Hackel]

Andropogon capillipes Nash *var. 2*, Dryland White Bluestem. Cp (FL, GA, NC, SC): dry to mesic pine flatwoods, sandhills, adjacent roadbanks; uncommon. September-October. Se. NC south to s. FL and west to s. AL. See *A. capillipes var. 1* for discussion of these two taxa. The type of *A. capillipes* (collected by A.H. Curtiss in FL) is of this taxon; Nash (1900) states that it occurs "in dry soil, North Carolina to Florida" and emphasizes that it is "abundantly distinct from *A. virginicus*, to which it is related." [< *A. virginicus* – RAB; < *A. virginicus* var. *glaucus* Hackel – F, FNA; < *A. capillipes* – GW, HC, K, S; = *A. virginicus* var. *glaucus* "drylands variant" – Z]

Andropogon elliottii Chapman. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA), Ip (KY): dry to moist forests, woodlands, fields, and disturbed areas; common (uncommon in Mountains and Interior Low Plateau). September-October. Widespread in se. United States, from s. NJ west to s. IN, s. IL, s. MO, south to s. FL and TX. Campbell (1983) argued that the name *A. elliottii* should be replaced by *A. gyrans*; Ward (2004c) argues for retention of the traditional *A. elliottii*. [= HC, WV; > *A. elliottii* – RAB, S; > *A. campyloracheus* Nash – RAB, S; = *A. gyrans* Ashe – C, W; = *A. gyrans* var. *gyrans* – FNA, K, Z; > *A. elliottii* var. *elliottii* – F, G; > *A. elliottii* var. *gracilior* Hackel – F, G; > *A. elliottii* var. *projectus* Fernald & Griscom – G]

Andropogon floridanus Scribner, Florida Bluestem. Cp (FL, GA): longleaf pine sandhills; rare. September-October. S. GA west to FL Panhandle, south to s. FL. Reported for e. and s. GA (FNA, Jones & Coile 1988). [= FNA, HC, K, S] {not yet keyed}

Andropogon gerardii Vitman, Big Bluestem, Turkeyfoot. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), IP (KY): in a wide variety of habitats, usually rather dry, such as sandhills, glades, cliffs, and rock outcrops, in the Piedmont in woodlands, former prairie-like sites, woodlands, open forests, and river-scour grasslands, in the Mountains in glades, riverside scour areas, and rarely in grassy balds, ascending to at least 1600 m over mafic rocks (on Old Field Bald, Watauga and Ashe counties, NC); common (rare in VA Coastal Plain, rare in KY Mountains). July-October. Québec west to Saskatchewan, south to FL and AZ. Some favor treating *A. hallii* Hackel as a subspecies of *A. gerardii* (Wipff 1996c). I do not agree, but if that course is followed, then our eastern taxon should be known as *A. gerardii* ssp. *gerardii*. [= RAB, C, FNA, G, GW, HC, K, W; > *A. gerardii* var. *gerardii* – F; = *A. provincialis* Lamarck – S; = *A. gerardi* – WV, orthographic variant]

Andropogon glaucopsis Elliott, Chalky Bluestem. Cp (FL, GA, NC, SC, VA): wet savannas, pine flatwoods, ditches, wet disturbed sites; uncommon (rare in VA). September-October. Se. VA south to c. peninsular FL and west to e. TX. The extent of the western Gulf Coastal Plain distribution (to the West Gulf Coastal Plain of w. LA and e. TX) is based on specimens (at BRIT) and sight records (B. Sorrie, pers. comm.). Although sometimes included in the past in either *A. glomeratus* or *A. virginicus*, this species is distinctive and easily recognized in the field (even from a car at 60 m.p.h.) by the combination of blue color, height of well over 1 m (taller than the other glaucous bluestems), and semi-bushy inflorescence. [= GW, K; < *A. virginicus* – RAB; = *A. virginicus* var. *glaucopsis* (Elliott) A.S. Hitchcock – F, HC; = *A. glomeratus* var. *glaucopsis* (Elliott) A.S. Hitchcock – FNA, Z; < *A. glomeratus* – S]

Andropogon glomeratus (Walter) Britton, Sterns, & Poggenburg *var. **glomeratus***. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Ip (KY): swamps, wet savannas, pine flatwoods, wet disturbed sites; common (rare in

KY). September-October. S. MA south to c. peninsular FL and west to s. MS, primarily on the Coastal Plain, but scattered inland to w. PA, WV, c. KY, c. TN and AR. [= FNA, K, Z; < *A. virginicus* – RAB; = *A. virginicus* var. *abbreviatus* (Hackel) Fernald & Griscom – C, F, G, GW, WV; < *A. glomeratus* – HC, S, W]

Andropogon glomeratus (Walter) Britton, Sterns, & Poggenburg *var.* ***hirsutior*** (Hackel) C. Mohr. Cp (FL, GA, NC, SC, VA), Ip (KY): wet savannas, pine flatwoods, adjacent ditches, other wet disturbed sites; common. September-October. E. MD south to c. peninsular FL west to se. LA. This taxon should be recognized at the specific level, but the appropriate combination has not been made. [= FNA, K, Z; < *A. virginicus* – RAB; ? *A. virginicus* var. *glaucopsis* (Elliott) A.S. Hitchcock – G, misapplied; = *A. virginicus* var. *hirsutior* (Hackel) A.S. Hitchcock; < *A. glomeratus* – HC, S]

Andropogon longiberbis Hackel, Longbeard Bluestem. Cp (FL, GA, NC, SC): dry sandy soils of sandhills and dunes; uncommon (rare north of FL). September-October. Se. NC south to s. and w. FL, and in the Bahamas. [= FNA, HC, K, S, Z]

Andropogon mohrii (Hackel) Hackel ex Vasey, Tawny Bluestem, Bog Bluestem. Cp (FL, GA, NC, SC, VA): wet savannas, sphagnous bogs; rare. September-October. Se. VA south to n. FL, west to LA. [= RAB, C, F, G, GW, HC, K, S; = *A. liebmannii* Hackel var. *pungensis* (Ashe) C.S. Campbell – FNA, Z]

Andropogon perangustatus Nash, Narrow-leaved Bluestem. Cp (FL, GA, NC, SC, VA), Pd? (VA?): clay-based Carolina bays and boggy wetlands; rare. August-October. E. VA south to c. peninsular FL, east to e. TX. Growth form, general appearance, and habitat (dense bluish tussocks with very narrow leaves and long ligules, growing in wet areas such as clay-based Carolina bays) make *A. perangustatus* readily recognizable. [= HC, S; = *A. gyrans* Ashe var. *stenophyllus* (Hackel) C.S. Campbell – FNA, K, Z; = *A. elliottii* Chapman var. *stenophyllus* (Hackel) D.B. Ward]

Andropogon tenuispatheus (Nash) Nash. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): maritime wet grasslands, brackish marsh edges, moist disturbed sites; common (uncommon in VA). September-October. Se. VA and c. OK south to s. FL and w. TX, also south into Central America and the Caribbean. [< *A. virginicus* – RAB; = *A. glomeratus* (Walter) Britton, Sterns, & Poggenburg var. *pumilus* Vasey ex Dewey – FNA, K, Z ("robust variant"); < *A. glomeratus* – HC, S]

Andropogon ternarius Michaux *var.* ***ternarius***, Splitbeard Bluestem. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY), Mt (GA, NC, SC, VA): dry to moist soils; common (uncommon in Mountains). September-October. Var. *ternarius* ranges from DE west to KY and s. MO, south to FL and TX. Var. *cabanisii* (Hackel) Fernald & Griscom is endemic in s. and c. peninsular FL. [= FNA, K, Z; < *A. ternarius* – RAB, C, G, W; > *A. ternarius* var. *ternarius* – F; > *A. ternarius* var. *glaucescens* (Scribner) Fernald & Griscom – F; = *A. ternarius* – HC, S]

Andropogon tracyi Nash, Tracy's Bluestem. Cp (FL, GA, NC, SC), Pd (GA, NC, SC): dry sandy or clayey soils of sandhills, disturbed sites; rare. September-October. E. NC south to s. FL and west to MS. [= FNA, HC, K, S, Z]

Andropogon virginicus Linnaeus *var.* ***decipiens*** C.S. Campbell, Deceptive Bluestem. Cp (FL, GA, NC, SC, VA), Ip (KY): savannas, flatwoods, maritime wet grasslands, disturbed pinelands; uncommon (rare in KY and VA). September-October. Se. VA south to s. FL and west to w. FL; also in the Bahamas (Sorrie & LeBlond (1997). [= FNA, K, Z (1986); < *A. virginicus* – RAB, S; < *A. virginicus* var. *virginicus* – F, G, HC; = *A. virginicus* var. *virginicus* – Z (1983 – "deceptive variant")]

Andropogon virginicus Linnaeus *var.* ***virginicus***, Old-field Broomstraw, Broomsedge, "Sedge Grass", "Sage Grass". Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Ip (KY): old fields, roadbanks, disturbed sites; common. September-October. Widespread, from MA west to MI and e. KA, south to FL and e. TX, and in the Caribbean and Central America. Campbell (1983) recognized 3 "variants" within *A. virginicus* var. *virginicus*; the "deceptive variant" he later (1986) described formally as var. *decipiens* (see above). The "old-field variant" is the common "variant" in our area, occurring abundantly throughout the state. It has green stem internodes and the leaves usually pubescent, at least on the margins near the collar. The "smooth variant" is known only from the Coastal Plain and is apparently rare in our area, known from NC and SC (Berkeley and Marion counties; P. McMillan, pers. comm.). It has glaucous stem internodes and glabrous leaves. It is unclear whether the "smooth variant" warrants taxonomic recognition. [= FNA, K; Z ("oldfield variant" and "smooth variant"); < *A. virginicus* – RAB, S, W; < *A. virginicus* var. *virginicus* – C, WV; < *A. virginicus* var. *virginicus* – G, HC (also see var. *decipiens*); >< *A. virginicus* var. *virginicus* – F; > *A. virginicus* var. *tetrastachyus* (Elliott) Hackel – F]

Anthenantia Palisot de Beauvois 1812 (Silkyscale)

A genus of 3 species, of se. North America (or 4-5 species of se. North America and tropical America, if *Leptocoryphium* is included in *Anthenantia*). Clayton & Renvoize (1986) state that "*Anthenantia* is the etymologically correct version of three alternative spellings given by Beauvois." References: Wipff in FNA (2003a); Crins (1991)=Z; Kral (2004)=Y; Clayton & Renvoize (1986).

1 Leaves weakly if at all geniculate and auriculate at junction of blade and sheath, ascending to erect (lacking a sharp bend outward at the summit of the sheath), medium green; blade (3-) 4-8 (-10) mm wide, the proximal margins glabrous or sometimes ascending pilose-ciliate; pigmentation of leaves, spikelets and their trichomes variously reddish or purplish; fertile lemma red-brown to nearly black, leaf tip with a very short taper to a blunt or rounded apex; lower sheaths crowded and keeled (therefore distichous) ..... ***A. rufa***

1 Leaves strongly geniculate and auriculate at junction of blade and sheath, spreading, usually squarrose (with a sharp bend outward at the summit of the sheath), yellowish green,; blade 4-10 (-15) mm wide, the proximal margins ciliate at least basally with ascending strumose-hirsute cilia; pigment of leaves, spikelets and their trichomes usually with little or any red; fertile lemma brown; leaf tip with a long taper to a sharp apex; lower sheaths not crowded, keeled, or distichous ..... ***A. villosa***

Anthenantia rufa (Nuttall) J.A. Schultes, Purple Silkyscale. Cp (FL, GA, NC, SC): wet savannas in the outer Coastal Plain, seepage bogs and moist sandhill-pocosin ecotones in the fall-line sandhills; rare (NC Watch List, SC Rare). September-October. Se. NC south to n. FL and west to w. LA. *A. rufa* inhabits much wetter habitats than the similar *A. villosa*, and is more

typical of the outer Coastal Plain. Plants without culms are reminiscent of the Liliaceae. [= FNA, Y; = *Anthaenantia rufa* – RAB, GW, HC, K, S, Z, orthographic variant]

Anthenantia villosa (Michaux) Palisot de Beauvois, Green Silkyscale. Cp (FL, GA, NC, SC): sandhills, especially in submesic swales; uncommon (rare in the outer Coastal Plain). September-October. Se. NC south to s. FL and west to e. TX. *A. villosa* is found in drier habitats than *A. rufa*, most typically in upland swales in the sandhills. Kral (2004) has segregated a new species, *A. texana* Kral, of the w. Gulf Coastal plain, previously confused with *A. villosa*. [= Y; < *Anthaenantia villosa* – RAB, HC, K, S, Z, orthographic variant; < *Anthenantia villosa* – FNA]

Anthoxanthum Linnaeus 1753 (Vernal Grass)

A genus of about 50 species (as here circumscribed to include *Hierochloe*), perennials and annuals, of temperate, boreal, and arctic regions. Tucker (1996), Soreng et al. (2003), and Allred & Barkworth in FNA (2007a) all include *Hierochloe* into a more broadly circumscribed *Anthoxanthum*. References: Allred & Barkworth in FNA (2007a); Tucker (1996)=Z; Soreng et al. (2003)=Y.

1 Glumes subequal; lowest 2 florets staminate ..... ***A. hirtum***
1 Glumes unequal, the lower shorter than the upper; lowest 2 florets sterile.
  2 Annual, geniculate; ligules 0.5-2 mm long; glumes glabrous; leaves 1-2 mm wide ..... ***A. aristatum***
  2 Perennial, erect; ligules (1-) 2-3 mm long; glumes villous throughout or at least on the keel; leaves 2-5 mm wide ..... ***A. odoratum***

* ***Anthoxanthum aristatum*** Boissier, Annual Vernal Grass. Cp (FL, NC, SC, VA), Pd (VA), Mt (VA): roadsides, disturbed areas; rare, native of Europe. April-June. [= RAB, C, FNA, G, HC, K, S, WH, Z; = *A. puelii* Lecoq & Lamotte – F, WV]

Anthoxanthum hirtum (Schrank) Y. Schouten & Veldkamp, Holy Grass, Sweet Grass, Vanilla Grass. Mt (NC, VA): fens, wet calcareous medaows, high elevation pastures and openings; rare. April-May. A circumboreal species and subspecies, widespread in n. Eurasia and n. North America, ranging south in North America to NJ, MD, PA, OH, IN, IL, IA, SD, CO, UT, NM, and CA, with several disjunct occurrences in North Carolina, in Long Hope Valley, Ashe County, the Nantahala River Bogs, Macon County, and Pond Mountain, Ashe County. The report by S ("recorded by Chapman from Statesville, N.C.") can be discounted; the record reflects a collection made in the mountains by Mordecai E. Hyams, a botanist and herb trader based in Statesville. Belden et al. (2004) document the first occurrence in Virginia. The sweet, vanilla-like odor of this grass is responsible for various folk uses – by Native Americans for making fragrant baskets, in Scandinavia strewn on church floors on festival days. [= FNA; < *Hierochloe odorata* (Linnaeus) Palisot de Beauvois – C, F, G, HC, WV; > *H. hirta* (Schrank) ssp Borbás ssp. *arctica* (J. Presl) G. Weimarck – K; < *Torresia odorata* (Linnaeus) A.S. Hitchcock – S; < *Anthoxanthum nitens* (Weber) Y. Schouten & Veldkamp – Z; ? *Anthoxanthum nitens* (Weber) Y. Schouten & Veldkamp spp. *nitens* – Y; > *H. odorata* var. *fragrans* (Willdenow) Richter (the North American plants)]

* ***Anthoxanthum odoratum*** Linnaeus, Sweet Vernal Grass Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): lawns, roadsides, disturbed areas; common, native of Europe. April-June. *A. odoratum* is a familiar grass of suburban areas and roadsides, and its pollen is known as a major cause of spring hay fever. From a letter from Charles Darwin to J.D. Hooker, in June 1855: "Have just made out my first grass, hurrah! hurrah! I must confess that fortune favours the bold, for, as good luck would have it, it was the easy *Anthoxanthum odoratum*: nevertheless it is a great discovery; I never expected to make out a grass in all my life, so hurrah! It has done my stomach surprising good..." [= RAB, C, F, FNA, G, HC, S, W, WV, Z; = *A. odoratum* ssp. *odoratum* – K]

Apera Adanson 1763 (Windgrass)

A genus of 3 species, of temperate Europe and w. Asia. References: Allred in FNA (2007a).

* *Apera spica-venti* (Linnaeus) Palisot de Beauvois, Common Windgrass. Reported for se. PA (Rhoads & Klein 1993), MD, and KY (Kartesz 1999). [= FNA, K]

Aristida Linnaeus 1753 (Three-awn Grass)

A genus of about 250-300 species, widespread in the tropics, subtropics, and warm temperate zones. References: Allred in FNA (2003a); Allred (1986)=Z; Allred (1984, 1985); Peet (1993)=Y; Ward (2001)=X; Henrard (1929)=Q; Kesler, Anderson, & Hermann (2003)=V. Key adapted, in part, from Z.

Identification notes: The awns must be dry and relatively mature to assume their characteristic positions (immature awns and moist mature awns are erect and parallel). It is sometimes useful to dry a collection unpressed. Beware, however, that drying followed by dispersal can take place very quickly under the right conditions (such as the dashboard of a hot car)!

1 Plant a perennial, forming dense tussocks, the leaves primarily basal, usually very numerous, mostly > 3 dm long, 0.5-1.5 mm wide, almost always tightly involute; flowering only in the growing season following fire.
  2 Base of blade and collar (and often the upper sheath) with conspicuous tuft or bearding of woolly to villous pubescence (sometimes deciduous on foliage more than a year old); leaves usually glabrous above the basal 2 cm of the blade; [of s. SC south] ..... ***A. beyrichiana***

2 Base of blade, collar, and upper sheath lacking a conspicuous tuft of woolly to villous pubescence; leaves with 2 lines of villous pubescence on either side of the midrib on the lower surface extending nearly or entirely the length of the blade (sometimes deciduous on foliage more than a year old); [of n. SC and NC] ..... ***A. stricta***

1 Plant an annual or perennial, forming small tufts (or solitary), the leaves primarily cauline, usually few, mostly < 3 dm long (if as long as 3 dm then > 2 mm wide), flat to slightly folded, but not wiry; flowering not strongly triggered by fire.

3 First glume 3-7 nerved.

4 Central awn of the lemma (8-) 12-65 (-70) mm long, the lateral awns as long or nearly so ..... ***A. oligantha***

4 Central awn of the lemma (9-) 12-25 (-30) mm long, the lateral awns 1-4 mm long (or even lacking) ..... ***A. ramosissima***

3 First glume 1-2-nerved.

5 Central awns spirally coiled at the base (above the awn column), like a corkscrew, ½ to 3 full turns (when dry).

6 Lateral awns 5-13 mm long, spreading ..... ***A. basiramea***

6 Lateral awns 1-4 mm long, erect

7 First glume 1/2 to 2/3 as long as the second glume; lemma 6-11 mm long, glabrous to scaberulous ..... ***A. curtissii***

7 First glume as long as or nearly as long as the second glume; lemma 3-8 mm long, sparsely appressed-pubescent ..... ***A. dichotoma***

5 Central awns straight to curved (or contorted at the base).

8 Lateral awns < ½ as long as the central awn.

9 Inflorescences 15-25 cm wide; loosely cespitose perennial, unbranched upwards ..... ***A. patula***

9 Inflorescences 1-6 cm wide; annuals, much branched above the base.

10 Awns flattened at the base ..... ***A. adscensionis***

10 Awns terete at the base.

11 Lemmas 8-22 mm long; central awn curved ca. 180 degrees at the base ..... ***A. ramosissima***

11 Lemmas 2.5-10 mm long; central awn curved ca. 90 degrees at the base.

12 Central awn (8-) 12-27 mm long; lateral awns (1-) 6-18 mm long ..... ***A. longespica*** *var.* ***geniculata***

12 Central awn mostly 1-10 (-14) mm long; lateral awns 0-5 (-8) mm long ..... ***A. longespica*** *var.* ***longespica***

8 Lateral awns > ½ as long as the central awn.

13 Sheaths lanose or floccose (the hairs kinked and intertwined); nodes of the panicle axis with tufts of lanose or floccose hairs ..... ***A. lanosa***

13 Sheaths glabrous to pilose (the hairs straight and usually appressed, not intertwined); nodes of the panicle axis glabrous or pilose.

14 Awn column (the connivent awns twisted together) or lemma beak (slender, narrowed, and twisted portion of lemma body below the awns) 7-30 mm long; lemma body (including the beak, if present) separated from the awns (or awn column) by an articulation zone, the awns (or awn column) disarticulating at maturity from the lemma.

15 Panicle spiciform, broadest near the middle, dense, the spikelets overlapping strongly; awns (10-) 20-30 mm long, borne at the summit of a twisted lemma beak 7-30 mm long; culms simple or with very few branches; plants perennial ..... ***A. spiciformis***

15 Panicle almost corymbiform, broadest above the middle, open, the spikelets overlapping only slightly; awns 30-40 mm long, not including the 8-15 mm long column formed by the twisting together of the 3 awn bases; culms often much-branched; plants annual ..... ***A. tuberculosa***

14 Awn column or lemma beak absent or < 7 mm long; lemma body not separated from the awns by an articulation zone.

16 Main lower branches of the panicle divergent from the culm and with pulvini ..... ***A. purpurea*** *var.* ***longiseta***

16 Main lower branches of the panicle (or pedicels in racemose species) ascending to appressed and lacking pulvini.

17 Plants with thick rhizomes; basal sheaths shredding into persistent fibers; [of wet pine flatwoods of FL] ... ***A. rhizomorpha***

17 Plants tufted, not rhizomatous; basal sheaths not shredding into persistent fibers; [collectively of various habitats].

18 Spikelets borne singly at each node of the main axis, the inflorescence thus a spike or raceme ..... ***A. mohrii***

18 Spikelets 2 or more per node of the main axis at most nodes (a few nodes may have single spikelets), often with side branches present as well, the inflorescence thus a panicle (less commonly a raceme).

19 First glume 1/3-¾ the length of the second glume ..... ***A. gyrans***

19 First glume > ¾ the length of the second glume.

20 Central awn 15-40 mm long; first glume prominently 2-keeled, (8-) 9-14 mm long when mature ..... ***A. palustris***

20 Central awn 8-25 mm long; first glume either 1-keeled and 6-14 mm long, **or** weakly 2-keeled and 5.5-9 (-10) mm long when mature.

21 Central awn about 2× as thick as the lateral awns, divergent to reflexed; first glume 1-keeled or weakly 2-keeled; [plants of moist to wet habitats].

22 Basal internode of the culm 0.3-0.6 mm wide; most nodes of the inflorescence with 1-2 spikelets; all awns spreading, the central spirally twisted basally and often contorted by as much as 180 degrees (best seen in fresh material); central awn 15-20 mm long, lateral awns 11-16 mm long, the ratio of the lateral:central awn length 0.69-0.80; lemma callus beard 0.6-1.0 mm long ..... ***A. simpliciflora***

22 Basal internode of the culm 0.7-1.2 mm wide; most nodes of the inflorescence with 3 or more spikelets; central awn spreading to slightly deflexed, not spirally twisted basally, the lateral awns ascending to erect (best seen in fresh material); central awn 13-22 mm long, lateral awns 8-15 mm long, the ratio of the lateral:central awn length 0.55-0.69; lemma callus beard 0.2-0.6 mm long ..... ***A. virgata***

21 Central awn < 1.5× as thick as the lateral awns, erect to divergent; first glume 1-keeled (rarely weakly 2-keeled); [plants of dry habitats].

23 Culms mostly > 10 dm tall and 3-6 mm in diameter near the base; awns 8-15 mm long; panicle branches > 4 cm long; callus ca. 1.0 mm long ..... ***A. condensata***

23 Culms 5-8 (-10) dm tall and 1-4 mm in diameter near the base; awns 12-25 mm long; panicle branches 1-4 cm long; callus 0.4-0.8 mm long.

24 First glume 1-4 mm longer than the second glume (rarely about equal to it); awns 15-25 mm long, straight or slightly contorted at the base; leaf blades 1-3 mm wide, usually curling ..... ***A. purpurascens***

24 First glume shorter than or about equal to the second glume; awns 12-18 mm long, spirally contorted at the base; leaf blades about 1 mm wide, usually not curling ..... ***A. tenuispica***

* ***Aristida adscensionis*** Linnaeus, Sixweeks Three-awn. Pd (SC): {habitat in our area unknown}; rare, native of w. United States. Reported for SC (FNA). {further investigate} [= F, FNA, G, HC, K]

Aristida basiramea Engelmann ex Vasey, Forktip Three-awn. Cp (SC, VA): sandy soils; rare, probably introduced, native of mw. United States. ME and Ontario south to SC (FNA), FL (Wunderlin & Hansen 2003), AL, TX, and CO (FNA). [= F, FNA, G, HC, K; = *A. basiramea* var. *basiramea* – C] {FL}

Aristida beyrichiana Trinius & Ruprecht, Southern Wiregrass. Cp (FL, GA, SC): sandhills, savannas, from very dry to seasonally saturated soils; common. September-November. S. SC south to s. FL, west to s. MS. See Peet (1993) for discussion of the taxonomy and ecology of this species; also see comments under *A. stricta*, which also apply here. Ward (2001) proposes varietal status for *A. stricta* and *A. beyrichiana*. [= K, Y; < *A. stricta* – RAB, FNA, GW, HC, S, V, Z; = *A. stricta* Michaux var. *beyrichiana* (Trinius & Ruprecht) D.B. Ward – X]

Aristida condensata Chapman, Big Three-awn. Cp (FL, GA, NC, SC): dry sandy soils of sandhills; rare (NC Watch List, SC Rare). August-October. Sc. NC south to s. FL, west to s. MS (Sorrie & Leonard 1999). [= RAB, FNA, HC, K, S, Z]

Aristida curtissii (A. Gray ex S. Watson & Coulter) Nash, Curtiss's Three-awn. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): roadsides, disturbed areas, bare eroding soil; uncommon (rare in VA Mountains). August-October. ME west to WY, south to FL, AR, OK, and CO, perhaps largely or entirely adventive in our area. See Z for a discussion of the rationale for reducing *A. curtissii* to a variety of *A. dichotoma*. C reduces it to a variety of the more western *A. basiramea* Engelmann ex Vasey. For now, and for simplicity, I prefer to retain the two as species. [= RAB, G, HC, S; = *A. basiramea* Engelmann ex Vasey var. *curtissii* (A. Gray ex S. Watson & Coulter) Shinners – C; = *A. dichotoma* Michaux var. *curtissii* A. Gray – F, FNA, K, W, WV, Z]

Aristida dichotoma Michaux, Fork-tip Three-awn. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): roadsides, fields, disturbed areas, bare eroding soil; common. August-October. ME west to WI, south to FL and TX. See *A. curtissii* for comments. [= RAB, C, G, HC, S; = *A. dichotoma* var. *dichotoma* – F, FNA, K, W, WV, Z]

Aristida gyrans Chapman, Corkscrew Three-awn. Cp (FL, GA): dry pinelands; rare (GA Special Concern). E. GA and w. Panhandle FL, south to s. FL. In Bryan, Long, and Montgomery counties in e. GA (Sorrie 1998b), and in wc. GA (J. Allison, pers. comm.). [= FNA, HC, K, S]

Aristida lanosa Muhlenberg ex Elliott, Woollysheath Three-awn. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): dry sandy soils of sandhills and fields; common, rare in Piedmont (rare in VA Coastal Plain). August-October. NJ south to FL, west to TX, north in the interior to MO and OK. [= RAB, C, FNA, G, HC, K, S, WV, Z; > *A. lanosa* var. *lanosa* – F; *A. lanosa* var. *macera* Fernald & Griscom – F]

Aristida longespica Poiret *var.* ***geniculata*** (Rafinesque) Fernald, Eastern Slim-spike Three-awn. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): disturbed areas; common? August-October. The distribution and habitats of the 2 varieties in our area are poorly known, pending further field and herbarium investigation. [= C, F, FNA, HC, K, Z; < *A. longespica* – RAB, W, WV; > *A. intermedia* Scribner & Ball – F, G, S; > *A. longespica* – G]

Aristida longespica Poiret *var.* ***longespica***, Eastern Slim-spike Three-awn. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): disturbed areas; uncommon? August-October. The distribution and habitats of the 2 varieties in our area are poorly known, pending further field and herbarium investigation. [= C, F, FNA, HC, K, Z; < *A. longespica* – RAB, G, W, WV; = *A. longespica* – S]

Aristida mohrii Nash, Mohr's Three-awn. Cp (AL, FL, GA, SC): sandhills; rare. August-October. Panhandle FL and sw. GA west to s. AL; apparently disjunct in SC (Chesterfield and Richland counties). [= FNA, HC, K, S, Z]

Aristida oligantha Michaux, Prairie Three-awn. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): roadsides, fields, disturbed areas; common (uncommon in VA Mountains). August-October. VT west to SD, south to FL and TX, scattered elsewhere as a weed. [= RAB, C, F, FNA, G, HC, K, S, W, WV, Z]

Aristida palustris (Chapman) Vasey, Longleaf Three-awn. Cp (FL, GA, NC, SC): wet pine savannas, limesink depressions; uncommon. August-October. Se. NC south to FL, west to TX; apparently disjunct on the Cumberland Plateau of KY. [= C, FNA, K, S, Z; = *A. affinis* (Schultes) Kunth – RAB, F, G, GW, HC, misapplied]

Aristida patula Chapman ex Nash, Tall Three-awn. Cp (FL): dry to moist sandy soils of pond margins, pinelands, dunes; rare. Endemic to FL Panhandle (Dixie, Franklin, Gadsden, Leon, Taylor, and Wakulla counties) (Wunderlin & Hansen 2006) and peninsula. [= FNA, GW, HC, K, S]

Aristida purpurascens Poiret, Arrowfeather. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): dry habitats, especially in dry sandy soils; common. August-October. MA west to WI and KS, south to FL and TX. In the Sandhills occurring in two forms, one green, the other strongly glaucous-blue. [= RAB, C, G, HC, S, W, WV; > *A. purpurascens* var. *purpurascens* – F; > *A. purpurascens* var. *minor* Vasey – F; = *A. purpurascens* var. *purpurascens* – FNA, K, Z]

* ***Aristida purpurea*** Nuttall *var.* ***longiseta*** (Steudel) Vasey, Red Three-awn. Cp (SC): disturbed areas; rare, adventive from further west. August-October. Also reported from NC, but the collection is from a Soil Conservation Service test nursery, and there is no evidence of naturalization. [= C, FNA, K, Z; > *A. longiseta* var. *robusta* Merrill – F; = *A. longiseta* Steudel – G, HC]

Aristida ramosissima Engelmann ex A. Gray. Cp (FL): pine flatwoods; rare. East to Panhandle FL (Bay County) (Wunderlin & Hansen 2004), c. TN, and e. KY (FNA). [= C, F, FNA, G, HC, K, S]

Aristida rhizomorpha Swallen, Florida Three-awn. Cp (FL): wet pine flatwoods; rare. FL endemic, north to Baker, Duval, and Nassau counties. [= FNA, HC, K]

Aristida simpliciflora Chapman, Southern Three-awn, Chapman's Three-awn, Southern Three-awn. Cp (FL, GA, NC): wet pine savannas; rare (GA Special Concern, NC Rare). Sw. GA west through the FL Panhandle and c. AL to s. MS (Sorrie & Leonard 1999), and south into central Peninsular Florida; also in se. NC, where apparently disjunct (it should be searched for in SC). *A. simpliciflora* was believed to be a Gulf Coastal Plain endemic until found by R. LeBlond in 1999 in wet savannas in se. NC (Green Swamp savannas, Brunswick County; Old Dock Savanna, Columbus County; and The Neck Savanna, Pender County). It is reported for sw. GA (Jones & Coile 1988, Kartesz 1999). Harper also reports it for c. GA. [= FNA, HC, K, S, Z]

Aristida spiciformis Elliott, Bottlebrush Three-awn, Spike Three-awn. Cp (FL, GA, NC?, SC): wet pine savannas and seepage areas; rare (NC Watch List). August-October. E. SC (McMillan et al. 2002) south to FL, west to MS. Allred (1986) also reports this species from NC, but the documentation is unknown to me. [= RAB, FNA, GW, HC, K, S, Z]

Aristida stricta Michaux, Carolina Wiregrass, Pineland Three-awn. Cp (NC, SC), Pd (NC): Coastal Plain pinelands of nearly all sorts, ranging from the driest white-sand sandhills to seasonally saturated pine savannas dominated by a mixture of longleaf pine and pond pine, largely or entirely replaced in the wettest savannas by *Sporobolus teretifolius*, *Sporobolus pinetorum*, *Muhlenbergia expansa*, *Ctenium aromaticum*, and *Calamovilfa brevipilis*; also in Piedmont areas adjacent to the Coastal Plain and formerly supporting fire-maintained longleaf pine woodlands; common, rare in Piedmont. September-November. Ne. NC (south of Albemarle Sound and the Roanoke River), south to ne. SC (Lee and Kershaw counties). *A. stricta* was the keystone species of much of the upland Coastal Plain of the Carolinas. Its flammable foliage facilitated the spread of lightning-set fires that maintained the biologically rich pine savanna, sandhill, and pine flatwood ecosystems once widespread in our area. Though still locally common in parts of the Sandhill region and in portions of Brunswick, Pender, Onslow, and Carteret counties, NC, *A. stricta* is much rarer than formerly. The conversion of vast acreages of former pinelands to agriculture, pine tree farms, and developed areas has taken its toll over the years. In the twentieth century, suppression of fire has also led to the destruction of *A. stricta*. More recently, pine-straw raking is leading to the serious decline of A. *stricta* in its few remaining strongholds on public lands. *A. stricta* has little tolerance for ground disturbance. See Peet (1993) for discussion of the taxonomy and ecology of this species. Ward (2001) proposes varietal status for *A. stricta* and *A. beyrichiana*. [= K, Y; < *A. stricta* – RAB, FNA, GW, HC, S, V, Z (also see *A. beyrichiana*); = *A. stricta* var. *stricta* – X]

Aristida tenuispica A.S. Hitchcock, Southern Arrowfeather. Cp (FL, GA, NC, SC): sandy habitats; uncommon? August-October. NC south to FL and west to MS. [= HC, S; = *A. purpurascens* Poiret var. *tenuispica* (A.S. Hitchcock) Allred – FNA, K, Z]

Aristida tuberculosa Nuttall, Seabeach Needlegrass. Cp (FL, GA, NC, SC, VA): sandhills, coastal dunes (in VA), other dry, sandy habitats such as sandy roadsides; common, rare in VA (VA Watch List). August-October. Se. NH south to NJ and disjunct in e. VA in the outer Coastal Plain; from sc. NC south to Panhandle FL and west to s. MS (Sorrie & Leonard 1999), mostly in the inner Coastal Plain; and also near the Great Lakes in sw. MI, n. IN, n. IL, s. WI, se. MN, and e. IA. The curious trimodal distribution is unexplained. [= RAB, C, F, FNA, G, HC, K, S, Z]

Aristida virgata Trinius. Cp (FL, GA, NC, SC, VA), Pd (GA), Mt (NC): moist to wet savannas, mountain bogs (Henderson Co., NC), other moist habitats; common. August-October. S. NJ south to FL, west to TX, primarily on the Coastal Plain. [= RAB, C, F, G, GW, HC, S; = *A. purpurascens* Poiret var. *virgata* (Trinius) Allred – FNA, K, Z]

Allred (1986) reports the collection of several additional non-native species from our area, including *A. divaricata* Willdenow from sw. United States (from a Soil Conservation Service test nursery in Chapel Hill, NC) and uncertainly identified material of an Australian species (from a wool-combing mill at Jamestown, Berkeley County, SC). There is no evidence that either are naturalized.

Arrhenatherum Palisot de Beauvois 1812 (False Oatgrass)

A genus of about 6 species, perennials, of the Mediterranean region and e. Asia. References: Hatch in FNA (2007a); Tucker (1996)=Z.

1 Base of culm consisting of a series of adjacent (moniliform) corms 5-10 mm in diameter ..... ***A. elatius*** *var.* ***bulbosum***
1 Base of culm not swollen or cormose, 2-4 mm thick ..... ***A. elatius*** *var.* ***elatius***

* ***Arrhenatherum elatius*** (Linnaeus) J. & K. Presl *var.* ***bulbosum*** (Willdenow) Spenner, Tuber Oatgrass, Onion Couch. {VA}: habitat in our area not known; abundance not known, native of Europe. This variety was apparently cultivated for the edible tubers in Bronze Age Europe (Tucker 1996). Cited for VA in HC. [= C, F, G, HC, K, WV, Z; = *A. elatius* ssp. *bulbosum* (Willdenow) Schübl. & G. Martens – FNA; < *A. elatius* – GW, W; = *A. elatius* var. *tuberosum* Thiel. – S]

* ***Arrhenatherum elatius*** (Linnaeus) J. & K. Presl *var.* ***elatius***, Tall Oatgrass. Pd (GA, NC, VA), Mt (NC, VA), Cp (NC, VA): meadows, fields, roadsides; common, native of Europe. May-June. [= C, F, G, HC, K, S, WV, Z; < *A. elatius* – RAB, GW, W; = *A. elatius* ssp. *elatius* – FNA]

Arthraxon Palisot de Beauvois 1812 (Basket Grass)

References: van Welzen (1981)=Y; Thieret in FNA (2003a); Kiger (1971)=Z.

Identification notes: Sometimes confused (especially before flowering) with *Microstegium*, but *Arthraxon* has distinctly cordate-clasping leaves, which *Microstegium* lacks. Also vegetatively similar to *Oplismenus*.

* ***Arthraxon hispidus*** (Thunberg) Makino *var.* ***hispidus***, Basket Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): moist ditches, bottomlands, disturbed areas; common, native of se. Asia. September-October. Like *Microstegium*, *Arthraxon* appears to be steadily increasing its abundance in our area. [= FNA, Y; < *A. hispidus* – C, GW, K, Z; > *A. hispidus* var. *cryptatherus* (Hackel) Honda – RAB, F, G, HC, W]

Arundinaria Michaux 1803 (Cane)

A genus of 3 species, woody grasses (bamboos), native of se. United States. *Arundinaria* was much reduced by the foraging of free-range livestock in the eighteenth and early nineteenth centuries and by fire suppression in the late nineteenth century and

throughout the twentieth century. "Canebrakes," large areas dominated by cane, were described in many historical accounts and apparently occupied large parts of the landscape of the Coastal Plain, also occurring in the Piedmont and low Mountains. References: Clark & Triplett in FNA (2007a); Tucker (1988)=Y; McClure (1973)=Z; McClure (1963); Judziewicz et al. (2000)=X; Triplett, Weakley, & Clark (2006)=Q. The key is adapted from Q.

1 Primary branches with 0-1 compressed basal internodes; culm internodes usually sulcate; culm leaves deciduous; culms to 10 m tall; rhizomes lacking air canals ..... ***A. gigantea***
1 Primary branches with 2-5 compressed basal internodes; culm internodes usually terete; culm leaves persistent to tardily deciduous; culms to 4 m tall; rhizomes with or without longitudinal air canals (visible in cross-section as a cylinder of hollow canals 1 mm or less from the outer surface).
  2 Foliage blades chartaceous, deciduous, abaxial surfaces pilose or glabrous, weakly tessellate; primary branches usually < 35 cm long, basal nodes not developing secondary branches; top knot blades 12-22.5 cm long; rhizomes with or without air canals..... ***A. appalachiana***
  2 Foliage blades coriaceous, persistent, abaxial surfaces densely pubescent or glabrous, strongly tessellate; primary branches usually > 50 cm long, basal nodes developing secondary branches; top knot blades 20-30 cm long; rhizomes with air canals ..... ***A. tecta***

Arundinaria appalachiana Triplett, Weakley, & L.G. Clark, Hill Cane. Mt, Pd (GA, NC, SC): dry to moist forests on slopes; common. Noted as distinctive as long ago as 1900 by R.M. Harper, W.C. Coker, W.W. Ashe, and C.D. Beadle, this distinctive plant of the Appalachians has only recently been described as a species (Triplett, Weakley & Clark 2006). The short plants (often only knee-high, though sometimes head-high) on mountain slopes south of Asheville are autumn-deciduous, whereas both our other species are evergreen. [= FNA, Q; < *A. gigantea* (Walter) Walter – RAB, GW; < *A. gigantea* ssp. *tecta* (Walter) McClure – K, X, Z; < *A. tecta* – HC, S, Y; = *A. tecta* var. *decidua* Beadle in L.H. Bailey] {AL, TN}

Arundinaria gigantea (Walter) Muhlenberg, Giant Cane, River Cane. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): swamps, floodplains; common. April-July. Widespread in se. North America, ranging from s. OH south to FL and e. TX. There has been much disagreement over the recognition of one, two, or several taxa of cane in the Southeastern United States. This species reaches heights of 6-7 (-10) m and is supposed to flower only once every 40-50 years. *A. macrosperma* Michaux is controversial, sometimes considered to be a synonym of *A. gigantea* or to represent hybridization or introgression between *A. gigantea* and *A. tecta*. [= F, FNA, HC, Q, S, WV, Y; < *A. gigantea* – RAB, C, GW (also see *A. tecta*); = *A. gigantea* ssp. *gigantea* – K, Z; > *A. gigantea* ssp. *gigantea* – X; > *A. gigantea* (Walter) Muhlenberg ssp. *macrosperma* (Michaux) McClure – X; > *A. macrosperma* Michaux]

Arundinaria tecta (Walter) Muhlenberg, Switch Cane, Small Cane. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): savannas, pocosins, canebrakes, generally (but not solely) in wetlands; common. April-July. Primarily a Southeastern Coastal Plain endemic: e. MD to FL and s. AL. *A. tecta* is a smaller plant than *A. gigantea* (normally 1-2 m tall, but reaching heights of up to 4 m where fire-suppressed), and flowers more frequently, supposedly every 3-4 years (Tucker 1988), probably actually in response to fire. [= FNA, Q; < *A. gigantea* (Walter) Muhlenberg – RAB, C, GW; < *A. tecta* – F, HC, S, Y; < *A. gigantea* ssp. *tecta* (Walter) McClure – K, X, Z]

Arundo Linnaeus 1753 (Giant Reed)

A genus of 3 species, widespread in the tropics, subtropics and warm-temperate areas. References: Allred in FNA (2003a).

* ***Arundo donax*** Linnaeus, Giant Reed. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, VA): disturbed areas; uncommon, native of the Old World. September-October. Horticultural forms with leaves transversely striped white and green have been treated as var. *versicolor*, but are are better considered as only a form or cultivar. [= RAB, F, FNA, K, S; > *A. donax* var. *donax* – HC; > *A. donax* var. *versicolor* (P. Miller) Stokes – HC]

Avena Linnaeus 1753 (Oats)

A genus of about 29 species, native of temperate and boreal Eurasia and n. Africa. References: Baum in FNA (2007a); Tucker (1996)=Z.

1 Florets disarticulating from the glumes at maturity (the glumes remaining attached to the plant); lemmas pubescent with brown hairs; lemmas with long bent awns; callus bearded with hairs up to ¼ as long as the lemmas..... ***A. fatua***
1 Florets not disarticulating from the glumes at maturity; lemmas glabrous or scabrous (rarely spoarsely strigose); lemmas unawned or with relatively straight awns; callus glabrous ..... ***A. sativa***

* ***Avena fatua*** Linnaeus, Wild Oats. (VA). {needs herbarium checks; no records shown on VA Atlas}. [= C, F, G, HC, K]

* ***Avena sativa*** Linnaeus, Oats. Mt (NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): fields and disturbed areas; commonly cultivated, uncommonly escaping. May-June. An important crop, but apparently only a weed until transported from the Middle East to the moister central Europe, where cultivated beginning about 3000 BP (Hancock 2004). [= RAB, G, HC, K, S, W, Z; > *A. sativa* var. *orientalis* (Schreber) Alefeld – F; > *A. sativa* var. *sativa* – F]

Avenella Koch ex Steudel 1840 (Hairgrass)

A monotypic genus, perennial, circumboreal, formerly often included in *Deschampsia*. References: Chiapella (2007).

Avenella flexuosa (Linnaeus) Drejer, Common Hairgrass, Wavy Hairgrass. Mt (GA, KY, NC, SC, TN, VA), Pd (NC, VA), Cp (NC, VA): grassy balds, high elevation rocky summits, rocky or sandy woodlands; common (uncommon in Piedmont and Coastal Plain). April-August. Circumboreal, ranging south in North America to n. GA, OH, WI, and MN; disjunct in AR and OK, and in Mexico. [= *Deschampsia flexuosa* – RAB, C, FNA, G, HC, W, WV, Z; > *D. flexuosa* (Linnaeus) Trinius var. *flexuosa* – F, K; = *Aira flexuosa* Linnaeus – S]

Axonopus Palisot de Beauvois 1812 (Carpet Grass)

A genus of ca. 100 species, primarily tropical and subtropical. Phylogenetic studies suggest that *Axonopus* may be included in *Paspalum*. References: Barkworth in FNA (2003a).

1 Spikelets 4-6 mm long ..... ***A. furcatus***
1 Spikelets 1.5-2.8 mm long.
  2 Spikelets 1.5-2.2 mm long; leaf blades mostly 8-10 mm wide ..... ***A. compressus***
  2 Spikelets 2.2-2.8 mm long; leaf blades mostly 2-4 (-6) mm wide ..... ***A. fissifolius***

Axonopus compressus (Swartz) Palisot de Beauvois, Southern Carpet Grass. Cp (FL, GA, SC, VA?): lawns; rare, probably introduced. Reported for VA by HC. Sometimes used as a lawn grass in the deep South. [= FNA, HC, K, S; ***Paspalum***]

Axonopus fissifolius (Raddi) Kuhlm., Common Carpet Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): sandy forests, roadsides, lawns; common (rare in VA). June-October. VA south to FL, west to TX and OK, and extending into tropical America. [= FNA, K; ? *A. affinis* Chase – RAB, GW, HC, W; = ***Paspalum fissifolium*** Raddi]

Axonopus furcatus (Flügge) A.S. Hitchcock, Big Carpetgrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): sandy forests, bottomlands, roadsides, lawns; common. July-October. Se. VA south to FL, west to TX and AR. [= RAB, C, F, FNA, G, GW, HC, K, S; = ***Paspalum furcatum*** Flügge] {FL}

Bambusa Schreber 1789 (Bamboo)

A genus of ca. 100 species, trees and shrubs, native to tropical and subtropical Asia. References: Stapleton in FNA (2007a).

1 Culm leaves with auricles well-developed, to 5 cm long and 1.5 cm wide; basal internodes swollen, much shorter than the internodes above ... . ***[B. vulgaris]***
1 Culm leaves with auricles absent or very small and rounded; basal internodes not swollen, not much longer than those above.
  2 Culm internode surfaces hispid; culm internodes solid; culms 0.5-7 m tall, arching ..... ***B. multiplex***
  2 Culm internodes surfaces glabrous; culm internodes hollow; culms 6-15 m tall, erect ..... ***[B. oldhamii]***

* ***Bambusa multiplex*** (Loureiro) Raeuschel ex Schultes & Schultes f, Hedge Bamboo, Dwarf Bamboo. Cp (FL, GA): disturbed areas; rare, native of se. Asia. Reported as naturalized or persistent in portions of the southeastern United States, including GA, FL Panhandle, and FL peninsula. [= FNA, HC] {FL}

* *Bambusa oldhamii* Munro, Oldham's Bamboo. Native of China and Taiwan. Reported for NC (Kartesz 1999). {investigate} [= FNA; = *Sinocalamus oldhami* (Munro) McClure – HC; = *Sinocalamus latiflorus* (Munro) McClure – K, misapplied]
* *Bambusa vulgaris* Schrader ex J.C. Wendland, Common Bamboo. Native of tropical Asia. Reported for SC (Kartesz 1999). {investigate} [= FNA, HC, K] {FL}

Bothriochloa Kuntze 1891 (Beardgrass, Cane Bluestem)

A genus of ca. 35 species, widespread in tropical and subtropical regions of the Old and New World. References: Allred in FNA (2003a); Vega (2000)=Z; Allred & Gould (1983)=Y. Key adapted from Allred in FNA (2003a).

1 Sessile spikelets 4.5-8.5 mm long ..... ***B. barbinodis***
1 Sessile spikelets 3-4.5 mm long.
  2 Pedicellate spikelets much shorter than the sessile spikelets.
    3 Panicles reddish when mature; hairs below the sessile spikelets sparse and ca. ¼ as long as the spikelets, not obscuring the spikelets .... ***[B. bladhii]***
    3 Panicles silvery-white or tannish when mature, hairs below the sessile spikelets dense and > ½ as long as the spikelets, somewhat obscuring the spikelets ..... ***B. laguroides ssp. torreyana***
  2 Pedicellate spikelets about as long as the sessile spikelets.
    4 Rachises longer than the branches ..... ***[B. bladhii]***
    4 Rachises shorter than the branches.
      5 Lower glumes of the sessile spikelets with a dorsal pit ..... ***B. pertusa***
      5 Lower glumes of the sessile spikelets without a dorsal pit ..... ***B. ischaemum var. songarica***

* ***Bothriochloa barbinodis*** (Lagasca y Segura) Herter, Cane Bluestem, Pinhole Bluestem. Cp (FL, SC), Pd (SC): disturbed areas; rare, native of w. United States. [= FNA, K; > *Bothriochloa perforata* (Trinius ex E. Fourn.) Herter – Z; = *Andropogon*

barbinodis Lagasca y Segura – HC; > *Bothriochloa barbinodis* (Lagasca y Segura) Herter var. *perforata* (Trinius ex E. Fourn.) Gould; > *Andropogon perforatus* Trinius ex E. Fournier]

* ***Bothriochloa ischaemum*** (Linnaeus) Keng *var.* ***songarica*** (Ruprecht ex Fischer & C.A. Meyer) Celarier & Harlan, King Ranch Bluestem. Cp (FL, SC): disturbed places; rare, native of western North America. Reported for SC (Kartesz 1999). [= K, Z; < *B. ischaemum* – FNA]

* ***Bothriochloa laguroides*** (A.P. de Candolle) Herter *ssp.* ***torreyana*** (Steudel) Allred & Gould, Silver Bluestem. Cp (FL, GA, KY, SC, TN), Ip (KY, TN), Mt (TN), Pd (GA, VA): disturbed areas; rare, native of c. and sw. United States and Mexico. Reported for SC (Kartesz 1999), ne. GA (Jones & Coile 1988; Allred & Gould 1983), e. TN, and c. TN (Chester et al. 1993), in some cases as *B. saccharoides* var. *torreyana*. [= FNA, K, Y, Z; = *B. saccharoides* (Sw.) Rydberg var. *torreyana* (Steudel) Gould]

* ***Bothriochloa pertusa*** (Linnaeus) A. Camus, Pitted Bluestem. Cp (FL): disturbed areas; rare, native of {}. Introduced at scattered sites in e. North America, including FL, LA, MD, and MS (FNA, Kartesz 1999). [= FNA, K, Z; = *Andropogon pertusus* (Linnaeus) Willdenow – HC] {FL} {synonymy incomplete}

* *Bothriochloa bladhii* (Retzius) S.T. Blake, Australian Bluestem. Reported from e. TN (according to specimen cited by FNA and Z) and FL. [= FNA, K, Z] {FL} {synonymy incomplete}

Bouteloua Lagasca y Segura 1805 (Grama)

A genus of about 40 species, of the Western Hemisphere. References: Herrera Arrieta, Peterson, & de la Cerda Lemus (2004)=X; Columbus (1999)=Z; Gould (1979)=Y; Wipff in FNA (2003a); Snow in FNA (2003a). Key based in part on Wipff in FNA (2003a)

1 All spikelets unisexual, plants usually dioecious; [introduced species] ..... ***B. dactyloides***
1 Lowest floret in each spikelet bisexual, the upper staminate or sterile; [introduced or native species].
  2 Panicle branches deciduous; disarticulation occurring at the base of the branch (the branch therefore falling whole); spikelets 2-3 per branch, appressed to the branch; [native species of limestone habitats, also with introduced populations]; [subgenus *Bouteloua*] ..... ***B. curtipendula*** *var.* ***curtipendula***
  2 Panicle branches persistent; disarticulation occurring above the glumes (the individual florets therefore falling); spikelets >6 per branch, pectinately disposed; [rare introductions]; [subgenus *Chondrosum*].
    3 Panicle branches terminating in a spikelet ..... ***B. gracilis***
    3 Panicle branches extending beyond the base of the terminal spikelets ..... ***B. hirsuta*** *var.* ***hirsuta***

Bouteloua curtipendula (Michaux) Torrey *var.* ***curtipendula***, Side-oats Grama. Mt (GA, TN, VA), Pd (GA), Ip (KY, TN), Cp (FL): dry rocky slopes and bluffs over limestone or serpentine, limestone glades; uncommon. July-September. S. CT west to MT, south to VA, e. TN, nw. GA, AL, panhandle FL (Gadsden County), TX, AZ, and CA; also in Central and South America. The older literature refers to *B. curtipendula* as introduced in SC, but the single specimen documenting its occurrence there appears to be from experimental plantings at Clemson University; there is apparently no evidence of its establishment. *B. curtipendula* occurs on serpentine in the Piedmont of Georgia (Allison, pers. comm.). Var. *caespitosa* Gould & Kapadia is cespitose rather than rhizomatous and occurs in sw. United States. [= C, FNA, K, Y; < *B. curtipendula* – RAB, F, G, HC, S, W, WV]

* ***Bouteloua dactyloides*** (Nuttall) J.T. Columbus, Buffalo Grass. Mt (VA), Pd, Cp (GA): lawns, disturbed areas; rare, native of from w. North America. [= Z; = *Buchloe dactyloides* (Nuttall) Engelmann – C, F, FNA, G, HC, K]

* ***Bouteloua gracilis*** (Willdenow ex Kunth) Lagasca y Segura ex Griffiths, Blue Grama. Cp (SC): disturbed areas; rare, native of w. North America. Reported for SC (Gould 1979). [= F, FNA, K, Y; > *Bouteloua gracilis* var. *gracilis* – HC]

Bouteloua hirsuta Lagasca y Segura *var.* ***hirsuta***, Hairy Grama. Cp (FL, GA*, SC*): maritime grasslands (FL), disturbed areas; rare, native of w. North America. Present in the FL peninsula (Wunderlin & Hansen 2003), where considered native; reported for SC and GA (Kartesz 1999). [= K, Y; < *Bouteloua hirsuta* – F, HC; = *Bouteloua hirsuta* ssp. *hirsuta* – FNA].

Brachyelytrum Palisot de Beauvois 1812 (Shorthusk)

The only other species of the genus is *B. japonicum* Hackel, of s. Japan, Korea, and ec. China (Saarela et al. 2003, Tucker 1988). References: Stephenson & Saarela in FNA (2007a); Saarela et al. (2003)=Z; Tucker (1988)=Y; Stephenson (1971); Voss (1972); Campbell, Garwood, & Specht (1986). Key based in part on Saarela et al. (2003).

1 Lemmas hirsutulous or minutely scabrous, the longest hairs (0.06-) 0.08-0.14 (-0.2) mm long (not evident at 10×); lemma (0.7-) 0.8-1.2 (-1.4) mm wide; widest leaf blade (8-) 10-14 (-16) mm wide; second glume (0.6-) avg. 1.2 (-3.0) mm long; [plants of the Mountains]... ***B. aristosum***
1 Lemmas hirsute with hairs (0.2-) 0.4-0.8 (0.9) mm long (easily seen at 10×); lemma (0.8-) 1.1-1.5 (-1.8) mm wide; widest leaf blade (9-) 11-17 (-20) mm wide; second glume (0.2-) avg. 2.2 (7.0) mm long; [plants widely distributed in our area] ..... ***B. erectum***

Brachyelytrum aristosum (Michaux) Trelease in Branner & Coville, Northern Shorthusk. Mt (GA, NC, VA): moist forests, mostly at moderate to high elevations, such as northern hardwoods and spruce-fir; rare. July-August. Fairly widespread in ne. North America, south in the mountains to sw. NC and n. GA. In MI, *B. septentrionale* flowers about 10 days before co-occurring *B. erectum*, with strongly synchronized anthesis of each species occurring on a single day (Stephenson 1971)). Reputed intermediates and hybrids between the two taxa are apparently based on the use of ambiguous characters. [= FNA, Z; =

Brachyelytrum septentrionale (Babel) G. Tucker – K, Y; < *B. erectum* – RAB, G, HC, S, W; = *B. erectum* var. *septentrionale* Babel – F; = *B. erectum* var. *glabratum* (Vasey ex Millspaugh) Koyama & Kawano – C; > *B. aristosum* var. *glabratum* Vasey – WV]

Brachyelytrum erectum (Schreber ex Sprengel) Palisot de Beauvois, Common Shorthusk. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): mesic forests, in the Mountains at lower elevations than *B. septentrionale)*; common (uncommon in Piedmont, rare in Coastal Plain). June-August. MA, NY, OH, MI, and s. WI south to FL and TX. [= FNA, K, WV, Y, Z; < *B. erectum* – RAB, G, HC, S, W (also see *B. septentrionale*); = *B. erectum* var. *erectum* – C, F]

Brachypodium Palisot de Beauvois 1812

A genus of about 18 species , mainly Mediterranean Europe and n. Africa. References: Piep in FNA (2007a).

* ***Brachypodium sylvaticum*** (Hudson) Palisot de Beauvois *ssp.* ***sylvaticum***, Slender False Brome. Pd (VA): roadsides and yards; rare, native of Europe. [= FNA; < *B. sylvaticum* – HC, K]

Briza Linnaeus 1753 (Quaking Grass)

A genus of about 20 species, annuals and perennials, native of Eurasia and South America. References: Snow in FNA (2007a); Tucker (1996)=Z.

1 Plant perennial; ligules ca. 0.5 mm long ..... ***[B. media]***
1 Plant annual; ligules 3-13 mm long.
  2 Spikelets 10-20 mm long ..... ***B. maxima***
  2 Spikelets 2-7 mm long ..... ***B. minor***

* ***Briza maxima*** Linnaeus, Greater Quaking Grass. Cp (GA): disturbed areas; rare, native of the Mediterranean region. Reported in e. GA (Jones & Coile 1988). [= FNA, K] {synonymy incomplete}
* ***Briza minor*** Linnaeus, Lesser Quaking Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): fields, disturbed areas; common (rare in VA Coastal Plain), native of Europe. April-June. [= RAB, C, F, FNA, G, GW, HC, K, S, Z]

* *Briza media* Linnaeus, Perennial Quaking Grass, reported for scattered locations in PA (Rhoads & Klein 1993), MD, DE, and AL (Kartesz 1999). [= FNA, K] {synonymy incomplete}

Bromus Linnaeus 1753 (Brome-grass)

A genus of about 150 species, north temperate and South American. References: McNeill (1976); Sales (1993, 1994)=Z; Tucker (1996)=Y; Pavlick (1995)=X; McKenzie & Ladd (1995); Pavlick & Anderton in FNA (2007a).

1 Lemmas compressed and strongly keeled (the whole spikelet thus strongly laterally flattened); first glume 3-9-nerved; [section *Ceratochloa*]. ..... ***B. catharticus var. catharticus***
1 Lemmas rounded or weakly keeled (the whole spikelet therefore terete to somewhat laterally flattened); first glume either 3-5-nerved or 1-3-nerved.
  2 First glume 3-5 nerved (at least 3 nerves well-developed).
    3 Lemma awn 2-3 mm long; plant perennial; [native species of dry woodlands]; [section *Bromopsis*] ..... ***B. kalmii***
    3 Lemma awn 3-12 mm long (or 0-6 mm long in *B. secalinus*); plant annual; [introduced species of disturbed habitats]; [section *Bromus*].
      4 Panicle compact, the lateral branches erect or ascending, the pedicels < 10 mm long (shorter than the spikelets)
        5 Lemmas 3-5 mm wide; inflorescence ovoid in outline ..... ***B. hordeaceus ssp. hordeaceus***
        5 Lemmas 1.5-2 mm wide; inflorescence obovoid in outline ..... ***B. scoparius***
      4 Panicle relatively open, the lateral branches erect, ascending, or spreading, the pedicels > 15 mm long (longer than the spikelets).
        6 Margins of the lemmas involute in fruit, wrapping around the grain, exposing the rachilla ..... ***B. secalinus***
        6 Margins of the lemmas gaping, overlapping in fruit.
          7 Panicle branches erect or ascending, relatively stiff and straight ..... ***B. racemosus***
          7 Panicle branches spreading (at least the lower), either relatively stiff and straight, or flexuous and lax.
            8 Panicle branches stiff; lemma awns 5-12 mm long, straight ..... ***B. commutatus***
            8 Panicle branches flexuous and lax; lemma awns 7-15 mm long, flexuous ..... ***B. japonicus***
  2 First glume 1 (-3) nerved (only 1 nerve well-developed).
    9 Longer lemma awns 10-60 mm long; plants annual; [introduced species of disturbed habitats]; [section *Genea*].
      10 Panicle dense, spikelike ..... ***B. rubens***
      10 Panicle open, not spikelike.
        11 First glume 13-20 mm long; second glume 20-30 mm long; lemma awns 35-60 mm long ..... ***B. rigidus***
        11 First glume 5-14 mm long; second glume 8-17 mm long; lemma awns 10-30 mm long.
          12 First glume 7-14 mm long; second glume 9-17 mm long; lemma awns 18-30 mm long ..... ***B. sterilis***
          12 First glume 5-7 mm long; second glume 8-11 mm long; lemma awn (7-) 10-17 mm long ..... ***B. tectorum***
    9 Longer lemma awns 1-6 (-8) mm long; plants perennial; [native and introduced species, collectively of disturbed and natural habitats]; [section *Bromopsis*].
      13 Plants with creeping rhizomes, forming clonal colonies; both surfaces of leaves glabrous or glabrescent ..... ***B. inermis***

13 Plants not strongly rhizomatous, the stems solitary or tufted; surfaces of leaf blades usually pubescent (sometimes sparsely so).
14 Pedicels erect or ascending, mostly shorter than the spikelet; leaves 2-3 mm wide; [introduced, of disturbed habitats].....***B. erectus***
14 Pedicels ascending at first, later arching-drooping, mostly longer than the spikelet; leaves 4-15 mm wide; [native, mostly of forests].
15 Lemmas glabrous (or very minutely pubescent) on the back, hairy along the lower margins with long hairs..... ***B. ciliatus***
15 Lemmas uniformly hairy over the entire back-surface (or rarely entirely glabrous).
16 Culms with 10-20 leaves, often weak and leaning or reclining; junction of sheaths and base of leaf blades with 2 well-developed flanges prolonged into auricles or divergent spurs; second glume primarily 5-nerved; flowering late, with anthesis August-October.....***B. latiglumis***
16 Culms with 6-10 leaves, erect; junction of sheaths and base of leaf blades lacking flanges or auricles; second glume primarily 3-nerved; flowering earlier, anthesis from May-August.
17 Underleaf surfaces with a conspicuous satiny sheen (when fresh); summit of sheath opposite the ligule with a conspicuous tuft of hairs..... ***B. nottowayanus***
17 Underleaf surfaces lacking a conspicuous satiny sheen; summit of sheath opposite the ligule lacking a conspicuous tuft of hairs..... ***B. pubescens***

* ***Bromus catharticus*** Vahl *var.* ***catharticus***, Rescue Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): disturbed areas; common (uncommon in VA), native of South America. April-June. [= FNA; ? *B. catharticus* – RAB, F, G, HC, K, W, X, Y; ? *Bromus willdenowii* Kunth – C; ? *Bromus unioloides* Kunth – S]

Bromus ciliatus Linnaeus, Fringed Brome. Mt (NC, VA): seepage areas, edges of fens, moist areas near high elevation creeks, grassy balds, high elevation woodlands, mostly over amphibolite or other mafic rocks; rare. July-August. Widespread in n. North America: Labrador to AK, south in the east to PA, and in the mountains to NC. Known in NC only from Bluff Mountain and Long Hope Valley, Ashe and Watauga counties, and Roan Mountain, Mitchell County. [= RAB, C, FNA, G, HC, S, W, WV, X, Y; > *Bromus ciliatus* var. *ciliatus* – F, K; = *Bromopsis ciliata* (Linnaeus) Holub]

* ***Bromus commutatus*** Schrader, Hairy Chess, Meadow Brome. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA), Cp (FL, NC, SC, VA): disturbed areas; common, native of Europe. May-June. The relationship and relative distribution of this species and *Bromus racemosus* is poorly known for our area. See *Bromus racemosus* for further comments. [= C, F, FNA, HC, K, S, WV, X, Y; < *Bromus commutatus* – RAB (also see *Bromus racemosus*); < *Bromus racemosus* – G, W]

* ***Bromus erectus*** Hudson, Short-branched Brome. Mt, Pd (VA), Ip (KY): disturbed areas; rare, native of Europe. [= C, F, FNA, G, HC, K, S, WV, X; = *Bromopsis erecta* (Hudson) Fourr.]

* ***Bromus hordeaceus*** Linnaeus *ssp.* ***hordeaceus***, Soft Chess, Lopgrass. Mt (NC, VA), Pd (VA), Cp (SC, VA), Ip (KY): disturbed areas; rare, native of Europe. July. [= FNA, K, X; ? *Bromus mollis* Linnaeus – RAB, F, G, HC, misapplied; < *Bromus hordeaceus* – C, Y]

* ***Bromus inermis*** Leysser, Smooth Brome, Hungarian Brome. Cp (KY, NC, SC, VA), Mt (KY, NC, VA), Pd (VA), Ip (KY): disturbed areas; rare (uncommon in VA Piedmont and VA Mountains), native of Europe. June-July. [= RAB, C, FNA, G, HC, S, W, WV, X, Y; > *Bromus inermis* var. *inermis* – F; > *Bromus inermis* ssp. *inermis* var. *inermis* – K; = *Bromopsis inermis* (Leysser) Holub]

* ***Bromus japonicus*** Thunberg ex Murray, Japanese Chess. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA), Ip (KY): disturbed areas; common, native of Asia. May-June. [= RAB, C, FNA, G, K, S, W, WV, X, Y; > *Bromus japonicus* var. *japonicus* – F, HC; > *Bromus japonicus* var. *porrectus* Hackel – F, HC] {FL}

Bromus kalmii A. Gray, Kalm Brome. Mt (VA): shale woodlands and barrens, grassy ridgetop oak forests; rare. ME west to SD, south to MD, w. VA, and IA. Distinctive for its few leaves (usually 3-4) clustered near the base, the spikelets large and approximate to one another in a narrow, nodding panicle. [= C, F, FNA, G, HC, K, X]

Bromus latiglumis (Shear) A.S. Hitchcock, Riverbank Brome, Auricled Brome, Hairy Woodbrome, Flanged Brome. Mt (NC, VA), Pd (VA), Ip (KY): alluvial soils along rivers; uncommon (rare in NC, rare in VA Piedmont, rare in KY Interior Low Plateau). August-October. Widespread in ne. North America, from ME to MT, south to NC and OK. Flowering many weeks later than co-occurring *B. pubescens*. In NC apparently only along large rivers flowing west through the Appalachians into the Mississippi River drainage, notably the New and the French Broad. [= F, FNA, G, HC, K, WV, X; < *Bromus purgans* Linnaeus – RAB; = *Bromus altissimus* Pursh – C; < *Bromus latiglumis* – Y (also see *Bromus nottowayanus*)]

Bromus nottowayanus Fernald, Satin Brome, Nottoway River Brome, Virginia Brome. Pd (NC, VA), Cp (VA), Mt (VA), Ip (KY): moist forests, especially along small stream bottoms; rare. June-August. The range of this species is poorly known, owing to confusion between it, *B. pubescens* and *B. latiglumis*. It is apparently known from MD, VA, and NC, west to TN, IL, IN, MO, and AR. McKenzie & Ladd (1995) report on the biology and taxonomy of this species. [= C, F, FNA, HC, K, X; < *Bromus purgans* Linnaeus – RAB; < *Bromus latiglumis* – Y; = *Bromopsis nottowayana* (Fernald) Holub]

Bromus pubescens Muhlenberg ex Willdenow, Common Eastern Brome, Canada Brome. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, KY, VA), Ip (KY): mesic forests, generally on rocky slopes, common. May-August. Widespread in e. North America: s. Ontario west to Alberta, south to FL and AZ. [= C, FNA, K, W, X, Y; < *Bromus purgans* Linnaeus – RAB, S, misapplied (also see *Bromus latiglumis* and *Bromus nottowayanus*); = *Bromus purgans* Linnaeus – F, G, WV, misapplied; > *Bromus purgans* var. *purgans* – HC; > *Bromus purgans* var. *laeviglumis* (Scribner ex Shear) Swallen – HC; = *Bromus laeviglumis* – S, misapplied (?); = *Bromopsis pubescens* (Muhlenberg ex Willdenow) Holub]

* ***Bromus racemosus*** Linnaeus, Smooth Brome. Pd, Cp (NC, SC, VA), Mt (KY, NC?, SC?, VA?), Ip (KY): disturbed areas, native of Europe. May-June. The relative distribution, abundance, and habitats in our area of this species and *B. commutatus* poorly understood. Additional characters are as follows (from Stace 1997): lemmas 6.5-8 mm long (vs. 8-11 mm long in *B. commutatus*), anthers mostly 1.5-3 mm long (vs. mostly 1-1.5 mm long), spikelets 10-16 mm long (vs. 15-28 mm long), lowest rachilla segment mostly 0.7-1 mm long (vs. mostly 1.3-1.7 mm). [= C, F, FNA, HC, K, X; < *Bromus commutatus* – RAB; < *Bromus racemosus* – G, W (also see *Bromus commutatus*)]

* ***Bromus rigidus*** Roth, Ripgut Brome, Ripgut Grass. Cp (NC, SC, VA), Pd (GA, NC): disturbed areas; rare, native of Mediterranean Europe. April. [= RAB, C, F, G, HC, K; < *Bromus diandrus* Roth – FNA, Y; ? *Bromus diandrus* var. ?? – Z]

* ***Bromus rubens*** Linnaeus, Foxtail Chess, Red Brome. Cp (SC, VA): waste areas near wool-combing plants, other disturbed areas; rare, native of Mediterranean Europe. The SC occurrences come from areas around wool-combing plants, and were likely introduced on wool from w. United States, where this European species is well-established. Reported introduced in VA and MD (Kartesz 1999) as *B. madritensis*. [= C, FNA, G, X; ? *Bromus madritensis* Linnaeus – F, misapplied; < *B. rubens* – K; < *B. madritensis* Linnaeus – K; = *Bromus madritensis* ssp. *rubens* (Linnaeus) Husnot]

* ***Bromus secalinus*** Linnaeus, Cheat, Common Chess, Ryebrome. Cp (FL, GA, KY, NC, SC, VA), Pd, Mt (GA, NC, SC, VA), Ip (KY): disturbed areas; common (uncommon in KY and VA), native of Europe. May-June. [= RAB, C, F, FNA, G, HC, K, S, W, WV, X, Y]

* ***Bromus sterilis*** Linnaeus, Barren Brome, Poverty Brome, Cheatgrass. Pd (NC, VA), Mt (VA), Cp (VA), Ip (KY): disturbed areas; rare (common in VA Mountains), native of southern Europe. May-June. [= RAB, C, F, FNA, G, HC, K, S, W, WV, X, Y, Z]

* ***Bromus tectorum*** Linnaeus, Downy Brome, Downy Chess, Downy Cheat, Junegrass, Cheatgrass. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, KY, NC, SC, VA), Ip (KY): disturbed areas; common, native of Europe. April-June. [= RAB, C, F, FNA, G, HC, K, S, W, WV, X, Y; ? *Bromus tectorum* ssp. *tectorum* – Z]

* ***Bromus arvensis*** Linnaeus. Reported as introduced for nc. GA (Jones & Coile 1988), for VA, MD, PA, and NJ (Kartesz 1999), and for KY (Campbell 2007). {investigate} [= C, FNA, K] {not yet keyed}

* *Bromus briziformis* Fischer & C.A. Meyer, Rattlesnake Brome. Reported as an introduction in ne. North America, south to MD, NJ, PA, DE (Kartesz 1999). [= FNA, K; = *B. brizaeformis* – C, orthographic variant] {not yet keyed}

* ***Bromus carinatus*** Hooker & Arnott *var.* ***marginatus*** (Nees) Barkworth & Anderton, Mountain Brome. Reported by Jones & Coile (1988) for nc. GA and by FNA for MS. [= FNA; < *B. catharticus* – C; = *B. marginatus* Nees ex Steudel – K] {not yet keyed}

* *Bromus ramosus* Hudson. Introduced. Reported for DC and MS (Kartesz 1999). [= FNA, K] {not yet keyed}

* ***Bromus scoparius*** Linnaeus, Broom Brome. Pd, Mt (VA): disturbed areas; rare, native of s. Europe. [= FNA, K] {add to synonymy}

* *Bromus squarrosus* Linnaeus, Squarrose Brome. Reported for KY and NJ (Kartesz 1999). Native of Eurasia. [= FNA, K] {not yet keyed}

Calamagrostis Adanson 1763 (Reed-grass)

A genus of about 230 species, north and south temperate. References: Marr, Hebda, & Greene in FNA (2007a); Tucker (1996)=Z; Greene (1980). Key based on FNA.

1 Awns attached on the upper 2/5 of the lemmas, 0.5-2 mm long, straight ..... ***C. cinnoides***
1 Awns attached on the lower ½ of the lemmas, 0.9-6 mm long, straight or bent.
  2 Awns usually exserted, (2.8-) 3-6 mm long; callus hairs 0.3-0.7× as long as the lemma.
    3 Leaves (1-) 2-3 (-4) mm wide; plant densely tufted, delicate, culms 10-55 (-60) cm tall, with 2-3 nodes; [plants of high elevation rock outcrops and glades] ..... ***C. cainii***
    3 Leaves (2-) 3-8 (-12) mm wide; plant rhizomatous or loosely tufted, coarse, culms (60-) 75-120 cm tall, with 3-5 nodes; [plants of low to moderate elevation forests and woodlands].
      4 Leaves glaucous above and below; leaf collars glabrous ..... ***C. porteri ssp. insperata***
      4 Leaves glaucous above, dark green below; leaf collars with prominent tufts of hairs ..... ***C. porteri ssp. porteri***
  2 Awns usually not exserted, 0.9-3.1 (-4) mm long; callus hairs (0.5-) 0.7-1.2 (-1.5)× as long as the lemma.
    5 Glumes smooth (or scabrous on the keel only); awns stout, readily distinguished from the callus hairs ..... ***C. stricta ssp. inexpansa***
    5 Glumes scabrous on the keel and often also the surface; awns delicate, difficult to distinguish from the callus hairs.
      6 Spikelets 2.5-4 mm long; lemmas usually shorter than the glumes; glumes rounded to broadly keeled, with raised midveins; glume apices usually acute, rarely acuminate ..... ***C. canadensis var. canadensis***
      6 Spikelets 2-3 mm long; lemmas usually about as long as the glumes; glumes rounded, midveins not raised; glume apices acute ..... ***C. canadensis var. macouniana***

Calamagrostis cainii A.S. Hitchcock, Cain's Reed-grass. Mt (NC, TN): high elevation rocky summits; rare. July-September. Endemic to a few mountain-tops in the Southern Appalachians, *C. cainii,* once thought to be endemic to Mount LeConte, TN, was discovered at two sites in NC in 1989 and 1990 – Mount Craig, Yancey County, and Craggy Pinnacle, Buncombe County (Wiser 1991). This species is more likely to be mistaken (especially superficially) for an *Agrostis* than for any of the other *Calamagrostis* in our area, but is distinguishable by its larger spikelets (5-6 mm long, rather than 1.3-2 mm) and the presence of a callus beard. [= FNA, HC, K, W, Z]

Calamagrostis canadensis (Michaux) Palisot de Beauvois *var.* ***canadensis***, Bluejoint, Canada Reed-grass. Mt (GA, NC, VA): wet meadows along streams, high elevation openings, such as grassy balds and cliff bases; uncommon (rare in GA and NC). August. Widespread and common across n. North America, reaching its southern limit in the east in w. NC, e. TN (Chester et al. 1993), and ne. GA (Rabun Bald, Rabun County). [= FNA, G, HC, K; < *C. canadensis* – RAB, C, S, W, WV, Z; > *C. canadensis* var. *robusta* Vasey – F]

Calamagrostis canadensis (Michaux) Palisot de Beauvois *var.* ***macouniana*** (Vasey) Stebbins. Cp (KY): bottomlands; rare. Newfoundland and Alberta south to NJ, PA, VA?, OH, w. KY, IL, MO, NE, WY, OR. Reported for VA (FNA), the documentation unknown. Reported south to NJ and KY only (Kartesz 1999). {investigate} [= F, FNA, G, HC, K; < *C. canadensis* – C, Z; = *C. macouniana* (Vasey) Vasey]

Calamagrostis cinnoides (Muhlenberg) W.P.C. Barton, Nuttall's Reed-grass. Cp (NC, SC, VA), Mt (GA, KY, NC, SC, VA), Pd (NC, SC, VA), Ip (KY): savannas, bogs, and other wet sites; common (uncommon in KY). July-October. ME and NY south to n. GA (Jones & Coile 1988), AL, and LA, primarily on the Coastal Plain. The replacement of the familiar name *C.*

cinnoides has been suggested for nomenclatural reasons (Kartesz 1999). [= RAB, C, F, FNA, G, GW, HC, S, W, WV, Z; = *C. coarctata* Torrey ex Eaton – K]

Calamagrostis porteri A. Gray *ssp.* ***porteri***, Porter's Reed-grass. Mt (GA, KY, NC, SC, VA), Pd (VA), Ip (KY): dry to dry-mesic forests, forest edges, cliff bases; uncommon (rare in GA, KY, and NC). NY to AL, in the Appalachians, with disjunct populations s. MO and w. AR; it was first reported from NC by Ware (1973). This species is typically sterile unless disturbed by fire or mechanically; it is therefore probably more common than collections indicate. In addition to the key characters above, it can be distinguished from *C. canadensis* by its having leaf sheaths pubescent at the summit (Matthews & Radford 1985). [= FNA, K; = *C. porteri* – C, HC, W, WV; ? *C. porteri* – G, Z]

Calamagrostis porteri A. Gray *ssp.* ***insperata*** (Swallen) C.W. Greene. Ip (KY): {habitat}; rare. OK and MO south to TN and AR. [= FNA, K; = *C. insperata* Swallen – C, HC]

Calamagrostis stricta (Timm) Koeler *ssp.* ***inexpansa*** (A. Gray) C.W. Greene. Mt (WV): {habitat}; rare. Newfoundland and Labrador west to AK, south to NY, OH, n. WV (Preston and Randolph counties), IA, AZ, and CA; ne. Asia. [= FNA, K; < *C. stricta* – C; ? *C. neglecta* (Ehrhart) Gaertner, Mey., & Scherb. var. *neglecta* – F]

Calamovilfa (A. Gray) Hackel ex Scribner & Southworth 1890 (Sandreed)

A genus of 5 species, of e. and c. North America. Reeder & Ellington (1960) studied various anatomic features of *Calamovilfa*, and determined that its closest relative was *Sporobolus*. A molecular phylogenetic study of *Sporobolus* and closely related genera suggests that *Calamovilfa* should be included in *Sporobolus* (Ortiz-Diaz & Culham 2000). References: Thieret (1966)=Z. Key based in part on Thieret in FNA (in prep.).

Identification notes: Superficially somewhat similar to *Sporobolus pinetorum*, *S. floridanus*, and *S. curtissii* (herbarium specimens of the two species have been regularly confused), *Calamovilfa* is distinguished by its leaves tapered to either end and long-acuminate (vs. parallel-margined and abruptly acute in *Sporobolus*) and tendency to form larger, clonal patches (*Sporobolus* forms wiregrass-like bunches or clumps). In flower or fruit, the *Calamovilfa* can be distinguished by characters of the spikelet, by vegetative characters, or by its coarser, generally taller culms, with the panicle branches usually spreading (rather than always ascending in *Sporobolus*). The three have very similar bases, unlike any other grasses in our area – the lower leaf sheaths are indurated and shiny, forming a hard, polished, knotty, and fire-proof covering over the short-creeping rhizome. *Aristida stricta* has a somewhat similar base, but less indurated, less creeping, and with an unpolished appearance. *Calamovilfa brevipilis* also has a cartilaginous, pale yellow annulum surrounding the outer (abaxial) surface of the juncture of the sheath and leaf, a structure not visible in the other species. Positive identification in sterile condition is not difficult.

1 Panicles narrow, the branches appressed-ascending; [of the Coastal Plain of FL] ..... ***C. curtissii***
1 Panicles broad, the bracnches ascending-spreading; [either of the Coastal Plain of SC northwards, or of the interior].
  2 Spikelets 6.0-7.4 mm long; glumes acute to acuminate, usually arcuate; lemmas 5.5-7.0 mm long, usually arcuate; [of river scour areas in the rocky inland parts of the South] ..... ***C. arcuata***
  2 Spikelets 4.0-5.8 mm long; glumes acute, straight; lemmas 4.0-5.4 mm long, straight; [of pineland habitats of the Coastal Plain of SC northwards] ..... ***C. brevipilis***

Calamovilfa arcuata K.E. Rogers, Cumberland Sandreed. Mt (AL, KY, TN): riverside scours; rare. Ouachita Mountains of w. AR and e. OK; Cumberland Plateau of TN (Morgan and Cumberland counties), KY (McCreary County)), and AL (Blount County). [= FNA, K]

Calamovilfa brevipilis (Torrey) Scribner, Pinebarren Sandreed. Cp (NC, SC, VA), Pd (NC): savanna-pocosin ecotones, sandhill seepage bogs, pocosins, boggy powerline rights-of-way; rare. June-October. A "bimodal endemic", with two areas of distribution: Pine Barrens of NJ and the Coastal Plain (very rarely lower Piedmont) of e. NC, n. SC, and s. VA. Var. *heterolepis* Fernald, no longer considered valid, refers to the NC-SC material; var. *calvipes* Fernald, no longer considered valid, refers to the VA material. Like *Aristida stricta*, this grass is dependent on fire for flowering (it will also sometimes flower in response to mowing or other disturbance). Suppression of the natural fire regime has led to its substantial decline and the severe contraction of its range in the Southeast, since fire exclusion in its seepage or ecotone habitat leads to rapid invasion by shrubs and competitive elimination of *Calamovilfa* and many other herbs. [= RAB, C, FNA, G, GW, K, S, Z; > *C. brevipilis* var. *brevipilis* – F, HC; > *C. brevipilis* var. *heterolepis* Fernald – HC; > *C. brevipilis* var. *calvipes* Fernald – F, HC]

Calamovilfa curtissii (Vasey) Scribner, Curtiss's Sandreed. Cp (FL): moist pinelands and edges of natural ponds; rare. FL Panhandle and e. peninsular FL. *C. curtissii* is a closely related sibling species of *C. brevipilis*. [= FNA, GW, HC, K, S, Z]

Cenchrus Linnaeus 1753 (Burgrass, Sandspur)

A genus of about 16 species, primarily tropical and subtropical. References: Stieber & Wipff in FNA (2003a); Crins (1991)=Z. Key based in part on FNA.

Identifications note: Spikelets of *Cenchrus* are subtended by an involucre of spines and/or bristles which are (in most of our species) fused into a **bur**. Bristles are narrow-based and terete. Spines are broad-based, and somewhat flattened (not terete) in cross-section, at least basally.

1 Involucre of bristles only, these not fused into a bur; perennial, to 2 m tall ..... ***C. myosuroides***
1 Involucre of spines fused into a coherent bur, sometimes also with bristles; annual or perennials, to 1 m tall.
  2 Spines in a single whorl, subtended by numerous smaller, narrower, free outer bristles.
    3 Spines fused at the base only, the lower surfaces with 1-3 grooves ..... ***[C. biflorus]***
    3 Spines fused for >1/3 their length, the lower surfaces not grooved.

4 Rachis internodes 0.8-1.7 mm long; most of the outer bristles equal to or slightly longer than the flattened inner bristles (spines) ..... ***C. brownii***
4 Rachis internodes 2-4 mm long; most of the outer bristles much shorter than the flattened inner bristles (spines) ..... ***C. echinatus***
2 Spines in multiple whorls or irregular in their disposition (if few and in a single whorl, then not subtended by smaller, narrower bristles).
5 Plants perennial, long-lived, clump-forming; burs not imbricate, usually glabrous; leaf blades 1-3.5 mm wide ..... ***C. gracillimus***
5 Plants annual or perennial, short-lived and not clump-forming; burs imbricate, usually pubescent, leaf blades (1-) 3-14.2 mm wide.
6 Burs (excluding the spines) 9-16 mm long, 4-6 mm wide, the spines 4-8 mm long; spikelets 1 (-2) per bur, concealed; leaf blades 3-14 mm wide ..... ***C. tribuloides***
6 Burs (excluding the spines) 5.5-12 mm long, 2.5-6 mm wide, the spines 2-7 mm long; spikelets 2-4 per bur, exserted at the tip; leaf blades 1-5 (-7) mm wide.
7 Spines slender, 45-75, 3.5-7 mm long; spikelets 6-8 mm long ..... ***C. longispinus***
7 Spines stout, 6-10 (-40), 2-5 mm long; spikelets 3.5-6 mm long ..... ***C. spinifex***

*? ***Cenchrus brownii*** Roemer & J.A. Schultes. Cp (FL, GA, NC): maritime grasslands; rare. Se. United States (NC, GA, AL, and FL); West Indies, Central America, n. South America. The sole known NC specimen was collected in 1885 by Gerald McCarthy in NC "in locis navalibus et vastis." [= FNA, K; ? *C. viridis* Sprengel – HC, S]

Cenchrus echinatus Linnaeus, Southern Sandspur, Bristly Sandspur, Hedgehog Grass. Cp (FL, GA, NC, SC), Pd (GA, SC), Mt? (VA?): fields, roadsides, disturbed areas; common (uncommon in NC). June-October. NC (and DC?) south to FL, west to CA, south into the tropical America. The basis for the record for w. VA in FNA is not clear. [= RAB, C, FNA, HC, K, S, Z]

Cenchrus gracillimus Nash. Cp (FL, GA): longleaf pinelands, other sandy habitats; uncommon. N. FL, s. and e. GA, s. AL, and s. MS; West Indies (Cuba, Jamaica). [= FNA, HC, K, S]

Cenchrus longispinus (Hackel) Fernald, Northern Sandspur, Common Sandspur. Cp (FL?, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas, lawns; common (uncommon in Mountains). June-October. ME west to OR, south to FL, TX, and CA. [= RAB, C, F, FNA, K, W, Z; = *C. pauciflorus* Bentham – G, HC, S, WV, misapplied]

* ***Cenchrus myosuroides*** Kunth. Cp (FL, SC): roadsides, disturbed areas; rare, native of further south. December. SC south to FL, west to TX, south into the West Indies and other parts of tropical America. [= RAB, FNA, HC, K, S, Z]

Cenchrus spinifex Cavanilles, Coastal Sandspur. Cp (FL, GA, NC, SC, VA), Pd (GA, SC, VA), Mt (VA): fields, roadsides, disturbed areas; common (rare in NC and VA). July-October. VA south to FL, west to AR and KS, south into tropical America. [= FNA, K; > *C. incertus* M.A. Curtis – RAB, C, F, G, HC, S, Z]

Cenchrus tribuloides Linnaeus, Dune Sandspur. Cp (FL, GA, NC, SC, VA), Pd*, Mt* (VA): dunes, sandy fields, sandy woodlands in the outer Coastal Plain; common (rare in VA Piedmont and VA Mountains). August-October. NY (Long Island) south to FL, west to TX, south into tropical America. This is the sandspur so familiar to (and disliked by) beach-goers in our area. [= RAB, C, F, FNA, HC, K, S, W, Z]

* *Cenchrus biflorus* Roxburgh, Indian Sandbur. Introduced in s. AL; native of Africa and s. Asia. [= FNA] {AL}

Chasmanthium Link 1827 (Spanglegrass, Spikegrass)

A genus of 5 species endemic to se. North America. References: Sánchez-Ken & Clark in FNA (2003a); Yates (1966a, 1966c)=Z.

1 Panicle branches elongate, pendulous; spikelets (15-) 20-40 mm long, with 6-20 flowers ..... ***Ch. latifolium***
1 Panicle branches short, erect or ascending; spikelets 5-18 mm long, with 2-8 (-11) flowers.
2 Fully-developed spikelets 12-18 mm long, 8-12 mm wide.
3 Axils of the spikelets and panicle branches glabrous; empty lemmas 9 (-12); [se. NC south to c. peninsular FL and e. FL panhandle] ..... ***Ch. nitidum***
3 Axils of the spikelets and panicle branches with a tuft of long hairs; empty lemmas 2-4; [w. FL Panhandle west to e. LA (Florida parishes)] ..... ***Ch. ornithorhynchum***
2 Fully-developed spikelets 4-9 mm long, 3-7 mm wide.
4 Collar (junction of leaf and sheath) glabrous or nearly so; leaves 3-7 mm wide ..... ***Ch. laxum***
4 Collar (junction of leaf and sheath) pilose; leaves 6-12 mm wide.
5 Inflorescence with divergent branches; [in outer Coastal Plain calcareous sites from SC southwards] ..... ***Ch. sessiliflorum*** *var. 1*
5 Inflorescence with appressed branches; [more widespread in our area] ..... ***Ch. sessiliflorum*** *var.* ***sessiliflorum***

Chasmanthium latifolium (Michaux) Yates, River Oats, Fish-on-a-pole. Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA), Ip (KY): riverbanks, streambanks, bottomland forests, seepages and glades over mafic or calcareous rock, usually in nutrient-rich soils; common (uncommon in Coastal Plain and Mountains). June-October. Widespread in se. North America, north to NJ, OH, IL, and KS. [= C, FNA, GW, K, W, Z; = *Uniola latifolia* Michaux – RAB, F, G, HC, S, WV]

Chasmanthium laxum (Linnaeus) Yates, Slender Spikegrass. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Ip (KY): savanna-pocosin ecotones, sandhill-pocosin ecotones, moist hardwood swamps, other moist habitats; common (rare in Mountains, rare in KY Coastal Plain). June-October. Widespread in se. North America, north to s. NY, KY, and OK. See *Ch. sessiliflorum* for comments on the suggestion that these two taxa are only varietally distinct. [= C, FNA, GW, K, W, Z; = *Uniola laxa* (Linnaeus) Britton, Sterns, & Poggenburg – RAB, F, G, HC, S; = *Chasmanthium laxum* var. *laxum*]

Chasmanthium nitidum (Baldwin) Yates, Shiny Spanglegrass. Cp (AL, FL, GA, NC, SC): blackwater swamp forests; rare. September-November. A Southeastern Coastal Plain endemic: se. NC south to c. FL and west to se. AL. [= FNA, GW, K, Z; = *Uniola nitida* Baldwin – RAB, HC, S]

Chasmanthium ornithorhynchum (Steudel) Yates, Birdbill Spikegrass. Cp (AL, FL, LA, MS): blackwater swamp forests; uncommon. S. AL and w. FL Panhandle west to e. LA (Florida Parishes). Also reported for NC and SC (FNA 2003a). {investigate} [= FNA, GW, K, Z; = *Uniola ornithorhyncha* Steudel – S]

Chasmanthium sessiliflorum (Poiret) Yates *var. 1*, Coastal Hammock Longleaf Spikegrass. Cp (GA, SC): calcareous hammocks; rare. August-October. An additional taxon warrants recognition: it is characterized by divergent panicle branches and occurs in outer Coastal Plain calcareous sites (J. Allison, pers. comm.). [< *Chasmanthium sessiliflorum* (Poiret) Yates – C, FNA, GW, K, Z; < *Uniola sessiliflora* Poiret – RAB, F, G, HC; < *Uniola longifolia* Scribner – S; < *Chasmanthium laxum* (Linnaeus) Yates var. *sessiliflorum* (Poiret) L. Clark]

Chasmanthium sessiliflorum (Poiret) Yates *var. sessiliflorum*, Longleaf Spikegrass. Cp (AL, GA, NC, SC, VA), Pd (GA, SC): moist hardwood forests, swamps, other moist habitats; common (uncommon north of SC). August-October. Widespread in se. North America, north to se. VA, TN, AR, and OK. This species and *Ch. laxum* are morphologically somewhat similar, but their treatment as varieties of a single species is completely unwarranted. They frequently co-occur (especially on the Gulf Coastal Plain), growing side by side, and show no sign of intergradation. [< *Chasmanthium sessiliflorum* – C, FNA, GW, K, W, Z; < *Uniola sessiliflora* Poiret – RAB, F, G, HC; < *Uniola longifolia* Scribner – S; < *Chasmanthium laxum* (Linnaeus) Yates var. *sessiliflorum* (Poiret) L. Clark]

Chloris Swartz 1788 (Finger-grass, Chloris)

[also see *Eustachys*]. Key based partly on C.

1 Inflorescence verticillate, typically the panicle branches in 2-5 verticels; perennial; fertile lemma inconspicuously appressed-pilose; spikelets not imbricate ..... ***Ch. verticillata***
1 Inflorescence digitate, the panicle branches in a single verticel at the apex of the culm; annual; lemma conspicuously long-ciliate; spikelets imbricate ..... ***Ch. virgata***

* ***Chloris verticillata*** Nuttall, Windmill-grass. Mt (VA), {SC}: disturbed areas, bottomland fields; rare, native of further west. [= C, F, G, HC, K]
* ***Chloris virgata*** Swartz, Feather Finger-grass, Showy Chloris. Pd (GA, NC, SC, VA), Cp (FL, GA): disturbed areas; rare, native of tropical America. [= RAB, C, F, G, HC, K]

* ***Chloris barbata*** Sw. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of {}. [= K] {FL} {not keyed}
* ***Chloris canterei*** Arech. *var.* ***grandiflora*** (Roseng. & Izag.) D.E. Anderson. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of Paraguay. [= K; < *Ch. cantérai* – HC] {not keyed}
* ***Chloris cucullata*** Bisch. Cp (FL, SC): waste areas near wool-combing mills, other disturbed areas; rare, perhaps only a waif, native of sc. United States and Mexico. [= K] {not keyed}
* ***Chloris divaricata*** R. Brown. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of {}. [= K] {not keyed}
* ***Chloris gayana*** Kunth, Rhodes Grass. Cp (FL, SC): waste areas near wool-combing mills, other disturbed areas; rare, perhaps only a waif, native of Africa. [= F, HC, K, S] {not keyed}
* ***Chloris pectinata*** Bentham. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of {}. [= K] {not keyed}
* ***Chloris truncata*** R. Brown, Stargrass. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of Australia. [= HC, K] {not keyed}
* ***Chloris ventricosa*** R. Brown. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of Australia. Also reported for VA (Hitchcock & Chase 1950; Kartesz 1999). [= HC, K] {not keyed}

Chrysopogon Trinius 1820 (Goldbeard)

A genus of about 26 species, tropical and subtropical, all species except *Ch. pauciflorus* native to the Old World. References: Hall & Thieret in FNA (2003a); Veldkamp (1999).

Chrysopogon pauciflorus (Chapman) Bentham ex Vasey, Florida Goldbeard, Florida Rhaphis. Cp (FL, NC): sandhill; rare (NC Watch List), perhaps only introduced. FL and Cuba; its occurrence in se. NC (at Carolina Beach State Park) is plausible either as a native, disjunct occurrence or as an introduction. [= FNA, HC, K; = *Rhaphis pauciflora* (Chapman) Nash – S]

Cinna Linnaeus 1753 (Woodreed)

A genus of about 4 species, of temperate Eurasia, North America, and South America. References: Brandenburg in FNA (2007a); Brandenburg, Blackwell, & Thieret (1991); Tucker (1996)=Z; Brandenburg & Thieret (2000). [also see *Limnodea*]

1 Spikelets (3.5-) 4-6 (-7.5) mm long; glumes firm, subherbaceous, rather dull, hyaline only narrowly and marginally, the upper glume prominently 3-nerved ..... ***C. arundinacea***
1 Spikelets (2-) 2.5-4 (-5) mm long; glumes (at least the first and sometimes the second as well) glistening, hyaline except the midrib, the upper glume 1-nerved (very rarely 3-nerved) ..... ***C. latifolia***

Cinna arundinacea Linnaeus, Common Woodreed, Sweet Woodreed. Cp (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA): bottomland forests, rocky bars in rivers, other low, wet habitats; common. August-October. New Brunswick and MN south to south to GA and TX. [= RAB, C, FNA, G, GW, K, S, W, WV, Z; > *C. arundinacea* var. *inexpansa* Fernald & Griscom – F, HC]

Cinna latifolia Grisebach, Drooping Woodreed, Slender Woodreed. Mt (NC, VA): moist forests at high elevations; rare. June-August. Circumboreal, occurring in n. Eurasia and n. North America, south in North America to NC, TN, n. IL, MN, UT, NM, and CA. [= RAB, C, F, FNA, G, HC, K, W, WV, Z]

Coelorachis Brongniart 1831 (Jointgrass)

A genus of about 20 species, widespread in the Old World and New World tropics and subtropics. Generic circumscription has been controversial and uncertain. References: Allen in FNA (2003a); Veldkamp, Koning, & Sosef (1986)=Z.

1 Culms round in cross-section ..... ***C. cylindrica***
1 Culms compressed-keeled in cross-section.
  2 Lower glume with rectangular pits ..... ***C. tesselata***
  2 Lower glume smooth or with transverse ridges.
    3 Lower glume with transverse ridges ..... ***C. rugosa***
    3 Lower glume smooth ..... ***C. tuberculosa***

Coelorachis cylindrica (Michaux) Nash, Carolina Jointgrass. Pd (GA, NC, SC), Cp (FL, GA): open woodlands and roadsides, probably in areas formerly prairie-like and fire-maintained, perhaps now extirpated in portion sof our area (including NC); rare. June-August. Fairly widespread in se. North America, north to NC and SC (at least formerly), MS, MO, and TX. [= C, FNA, K; = *Manisuris cylindrica* (Michaux) Kuntze – RAB, F, G, GW, HC; = *Manisuris campestris* (Nuttall) A.S. Hitchcock – S; = *Mnesithea cylindrica* (Michaux) Koning & Sosef – Z]

Coelorachis rugosa (Nuttall) Nash, Wrinkled Jointgrass. Cp (FL, GA, NC, SC, VA), Pd (GA): limesink ponds (dolines), depression meadows, clay-based Carolina bays, wet savannas, disturbed areas (such as seeps in powerline rights-of-way), always in places with a seasonally high water-table; uncommon (rare in NC, SC, VA). June-October. A Southeastern Coastal Plain endemic: s. NJ south to FL and west to TX. [= C, FNA, K; = *Manisuris rugosa* (Nuttall) Kuntze – RAB, F, G, GW, HC, S; = *Mnesithea rugosa* (Nuttall) Koning & Sosef – Z]

Coelorachis tesselata (Steudel) Nash, Pitted Jointgrass. Cp (FL, GA): wet savannas and bogs; rare. Southeasatern Coastal Plain endemic: sw. GA and FL west to e. LA. [= FNA, K; = *Manisuris tesselata* (Steudel) Scribner – GW, HC, S; = *Mnesithea tesselata* (Steudel) Koning & Sosef – Z]

Coelorachis tuberculosa (Nash) Nash, Smooth Jointgrass. Cp (FL, GA): pond margins; rare. Southeastern Coastal Plain endemic: sw. GA (Mitchell County) (Sorrie 1998b) west to s. AL, and in the Florida peninsula. [= FNA, K; = *Manisuris tuberculosa* Nash – GW, HC, S; = *Mnesithea tuberculosa* (Nash) Koning & Sosef – Z]

Coix Linnaeus 1753 (Job's-tears)

A genus of about 5 species, native to tropical Asia. References: Thieret in FNA (2003a).

* *Coix lacryma-jobi* Linnaeus, Job's-tears, reported for se. PA by Rhoads & Klein (1993), TN (Thieret in FNA 2003a), and NJ (Kartesz 1999). [= FNA, K]

Cortaderia Stapf 1897 (Pampasgrass)

A genus of ca. 20 species, native to South America. References: Allred in FNA (2003a).

* ***Cortaderia selloana*** (J.A. & J.H. Schultes) Ascherson & Graebner, Pampasgrass. Cp (GA, SC), Pd (GA): disturbed areas; rare, native of South America. This grass is a popular ornamental, rarely escaping. [= RAB, FNA, HC, K]

Ctenium Panzer 1813 (Toothache Grass)

A genus of about 20-22 species, of tropical and subtropical Africa and the Americas. References: Barkworth in FNA (2003a); Longhi-Wagner & Renvoize (2004).

1 Spikelets with numerous glands in rows on the back of the second glume; plant short-rhizomatous (nearly cespitose); [widespread in the Coastal Plain] ..... ***Ct. aromaticum***
1 Spikelets with very few or no glands on the back of the second glume; plant rhizomatous (the rhizomes slender and scaly); [restricted to se. GA and ne. FL] ..... ***Ct. floridanum***

Ctenium aromaticum (Walter) Wood, Toothache Grass, Orange Grass. Cp (FL, GA, NC, SC, VA): wet savannas, pocosin-savanna ecotones, seepage bogs, sandhill-pocosin ecotones, sandhill seeps; common (rare in VA). June-August (or later in response to late summer fires). Southeastern Coastal Plain endemic: se. VA south to FL and west to LA and e. TX (Singhurst, Keith, & Holmes 2005). The entire plant is aromatic and numbs the mouth, tongue, and lips when chewed, hence the specific epithet and common names. Like many species of the longleaf pine ecosystem, toothache grass generally flowers only following fire (MacRoberts & MacRoberts 1992). Sterile clumps can be recognized by the rather broad, bicolored leaves (bluish on the upper surface, bright green on the lower surface). [= RAB, C, F, FNA, G, GW, HC, K; = *Campulosus aromaticus* (Walter) Trinius – S]

Ctenium floridanum (A.S. Hitchcock) A.S. Hitchcock, Florida Toothache Grass. Cp (FL, GA): dry pinelands, sandhills, upper ecotones of pineland pools; rare. June-September. Southeastern Coastal Plain endemic: se. GA to ne. FL. Like *Ct. aromaticum*, generally flowering only following fire. [= FNA, GW, HC, K; = *Campulosus floridanus* A.S. Hitchcock – S]

Cynodon L.C. Richard 1805 (Bermuda Grass)

A genus of ca. 9 species, native to the tropical Old World. References: Barkworth in FNA (2003a).

* ***Cynodon dactylon*** (Linnaeus) Persoon *var.* ***dactylon***, Bermuda Grass, Scutch Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Ip (KY): lawns, gardens, roadsides, pastures, fields, disturbed areas; common, native of Eurasia. May-October. [= FNA; < *C. dactylon* – RAB, C, F, G, HC, K, W, WV; < *Capriola dactylon* (Linnaeus) Kuntze – S]

Cynosurus Linnaeus 1753 (Dogtail)

A genus of 8 species, annuals and perennials, native of the Mediterranean region and w. Asia. References: Long in FNA (2007a); Tucker (1996)=Z.

1 Panicle linear-oblong, 1-10 (-14) cm long, 0.4-1 cm wide; leaves 1-3 (-4) mm wide; perennial; fertile lemma 3-4 mm long, plus a 0-1 mm long mucro; [section *Cynosurus*] ..... ***C. cristatus***
1 Panicle ovoid, 1-4 (-8) cm long, 0.7-2 cm wide; leaves (2-) 3-10 mm wide; annual; fertile lemma 4.5-7 mm long, plus a 6-16 mm long awn; [section *Falona*] ..... ***C. echinatus***

* ***Cynosurus cristatus*** Linnaeus, Crested Dogtail. Mt (NC), {VA?}: lawns, roadsides; rare, native of Eurasia. June-July. [= RAB, C, F, FNA, G, HC, K, WV, Z]
* ***Cynosurus echinatus*** Linnaeus, Rough Dogtail, Bristly Dogtail. Cp (NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): lawns, roadsides; rare, native of Eurasia. May-June. [= RAB, C, F, FNA, HC, K, WV, Z]

Dactylis Linnaeus 1753 (Orchard Grass)

A genus of 1 variable species, perennial, native of Eurasia. References: Allred in FNA (2007a); Tucker (1996)=Z.

* ***Dactylis glomerata*** Linnaeus, Orchard Grass, Cock's-foot. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Ip (KY), Cp (FL, KY, NC, SC, VA): pastures, fields, woodland edges, roadsides; common (rare in FL, uncommon in NC, SC, and GA Coastal Plain), native of Europe. May-October. In Europe there are various chromosome races, often accorded subspecies or species status. Their status in North America has been little investigated. See various references cited in Tucker (1996) for further information about these taxa in Europe. [= RAB, C, FNA, G, HC, S, W, WV; > *D. glomerata* var. *glomerata* – F; > *D. glomerata* var. *detonsa* Fries – F; > *D. glomerata* var. *ciliata* Petermann – F; > *D. glomerata* ssp. *glomerata* – K, Z; > *D. glomerata* ssp. *aschersoniana* (Graebner) Thellung – K; > *D. aschersoniana* Graebner] {FL}

Dactyloctenium Willdenow 1809 (Crowfoot Grass)

A genus of 1-13 species, of Africa and Australia. References: Hatch in FNA (2003a).

1 Panicle branches 1.5-6 cm long, well-separated from each other at their tips ..... ***D. aegyptium***
1 Panicle branches 0.4-1.5 cm long, the spikelets of each mostly in contact with the spikelets of adjacent branches ..... ***D. radulans***

* ***Dactyloctenium aegyptium*** (Linnaeus) Willdenow, Crowfoot Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): lawns, roadsides, disturbed areas; common (rare in VA), native of Old World tropics. June-November. [= RAB, C, F, FNA, G, HC, K, S]
* ***Dactyloctenium radulans*** (R. Brown) Palisot de Beauvois, Buttongrass. Cp (SC): waste areas at wool-combing mills; rare, native of Australia. May-July. Collected repeatedly from 1957-1960 at the Santee Wool Combing Mill, Jamestown, Berkeley County, SC. [= FNA, K]

Danthonia A.P. de Candolle 1805 (Oat-grass)

A genus of about 20 species, of North America, Europe, and the Americas, but the generic limits are unclear. References: Darbyshire in FNA (2003a).

1 Lemma teeth (flanking the awn) 0.8-1.8 mm long, triangular, acuminate; glumes 8-13 mm long ..... ***D. spicata***
1 Lemma teeth (flanking the awn) (1.8-) 2.0-4.5 mm long, setaceous; glumes 9-19 mm long.
  2 Lemma awn 4-10 mm long; glumes 9-13 mm long ..... ***D. compressa***
  2 Lemma awn 11-18 mm long; glumes 11-19 mm long.
    3 Sheaths villous; lemmas herbaceous in texture, villous on the back and sides; awn twisted at base several times, forming an awn column 2.5-3 mm long ..... ***D. sericea***
    3 Sheaths glabrous; lemmas membranaceous in texture, villous only on the margins and towards the base; awn twisted at base a single time, forming a loose awn column 0.5-1.5 mm long ..... ***D. epilis***

Danthonia compressa Austin ex Peck, Mountain Oat-grass. Mt (GA, KY, NC, SC, TN, VA), Pd (GA, NC, SC, VA), Cp (VA), Ip (KY, TN): grassy balds, thin soils around rock outcrops, woodlands; common (uncommon in upper Piedmont, rare in Coastal Plain and Interior Low Plateau). June-August. Fairly widespread in e. North America, primarily Appalachian, from s. Canada to SC and TN. [= RAB, C, F, FNA, G, HC, K, S, W, WV] {TN}

Danthonia epilis Scribner, Bog Oat-grass. Cp (NC, SC, VA), Mt (AL, GA, NC, TN, VA?), Pd (NC): peaty bogs in the Coastal Plain and Mountains, seeps around rock outcrops in the Piedmont and Mountains, granitic domes; rare. April-June. The range is apparently bogs in pinelands from NJ to SC, in mountain bogs in NC, VA (?), and GA, in seepage in the Cumberland Plateau and Blue Ridge of TN and AL. This taxon appears to be valid, with a distinct range, habitat, and variety of morphologic characters separating it from *D. sericea*, but further study is needed. Material from the mountains seems to differ from Coastal Plain material. RAB's description of the habitat as "dry woods, rare; pied. of N.C." appears to be in error. Blomquist listed the taxon (as a variety) for bogs in the mountains of sw. NC. It has since been found in bogs in the Sandhills region of NC and in seepage bogs in the adjacent Piedmont. [= F, HC, K, S; = *D. sericea* var. *epilis* (Scribner) Blomquist – RAB, C; < *D. sericea* Nuttall – FNA]

Danthonia sericea Nuttall, Silky Oat-grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, TN, VA), Ip (KY, TN): dry woodlands, especially common in sandy soils in the Coastal Plain, dry oak, oak-pine, and pine forests in the Piedmont and low Mountains; common (uncommon in the Mountains and Interior Low Plateau). April-June. Primarily a Coastal Plain species northwards, ranging from e. MA south to FL and west to LA. [= F, HC, K, S, W; = *D. sericea* var. *sericea* – RAB, C, G; < *D. sericea* – FNA] {AL, LA, MS}

Danthonia spicata (Linnaeus) Palisot de Beauvois ex Roemer & J.A. Schultes, Poverty Oat-grass. Mt (GA, KY, NC, SC, TN, VA), Pd (GA, NC, SC, VA), Cp (FL, KY, NC, SC, TN, VA), Ip (KY, TN): dry woodlands, rock outcrops, shale barrens; common (rare in FL). May-July. Newfoundland and British Columbia south to FL and NM. [= RAB, C, FNA, G, HC, K, S, W, WV; > *D. spicata* var. *longipila* Lamson-Scribner & Merrill – F; > *D. spicata* var. *spicata* – F; < *D. allenii* Austin – F]

Deschampsia Palisot de Beauvois 1812 (Hairgrass)

A genus of about 20-40 species, perennials and annuals, north and south temperate. References: Barkworth in FNA (2007a); Tucker (1996)=Z. [also see *Avenella*]

1 Awn 4-8 mm long, geniculate, exserted beyond the tips of the glumes; lemmas minutely scabrous, dull; leaf blades involute, appearing filiform (rounded in cross-section); ligule 0.5-3 (-5) mm long; [section *Avenaria*] ..... [see ***Avenella***]
1 Awn 2-3 mm long, straight or nearly so, scarcely (or not at all) exserted beyond the tips of the glumes; lemmas smooth, shiny; leaf blades flat or folded at the midvein (V-shaped in cross-section); ligule 3-10 (-17) mm long ..... ***D. cespitosa ssp. glauca***

Deschampsia cespitosa (Linnaeus) Palisot de Beauvois *ssp.* ***glauca*** (Hartman) Hartman, Tufted Hairgrass. Mt (NC, VA), Ip (KY): thin soil of rock outcrops or barrens over calcareous, mafic, and ultramafic rocks (such as serpentinized olivine, amphibolite, limestone, and dolostone); rare (NC Rare, VA Rare). June-July. *D. cespitosa* is a complex species, with a complicated polyploid and aneuploid series, variously subdivided (or not) by various taxonomists. As a whole, *D. cespitosa* is circumboreal, ranging south in North America to NJ, sw. NC, WV, c. KY, IL, MN, and AZ. Ssp. *glauca* is the most widespread American subspecies, and extends the farthest south. Other subspecies occur farther north and in Eurasia. In our area, *D. cespitosa* is at its southern limit and is a rare species limited to barrens and outcrops over mafic or ultramafic rocks. Barkworth in FNA (2007a) ststes that there is no legitimate name available for this taxon. [= K; = *D. caespitosa* var. *glauca* (Hartman) Lindman f. – RAB, F, WV; < *D. cespitosa* ssp. *cespitosa* – FNA; < *D. cespitosa* – C, Z; < *D. cespitosa* var. *cespitosa* – G; < *D. caespitosa* var. *caespitosa* – HC; = *D. cespitosa* ssp. *cespitosa* var. *glauca* (Hartman) Lindman f.; < *Aira caespitosa* Linnaeus – S; < *D. caespitosa* – W]

* *Deschampsia elongata* (Hooker) Munro, Slender Hairgrass. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of w. North America. [= FNA, HC, K] {not keyed}

Desmazeria Dumortier 1822

A genus of about 7 species, annuals, native of the Mediterranean region. References: Tucker in FNA (2007a); Soreng et al. (2003)=Z.

* ***Desmazeria rigida*** (Linnaeus) Tutin, Fern Grass. Cp (FL, SC): waste areas around wool-combing mills, other disturbed areas; rare, perhaps only a waif, native of Mediterranean Europe. [= FNA, K; = *Catapodium rigidum* (Linnaeus) Dony – Z; = *Scleropoa rigida* (Linnaeus) Grisebach]

Diarrhena Palisot de Beauvois 1812 (Beakgrain)

Depending on circumscription, a genus of either 2 species of perennial grasses of e. North America, or of ca. 6 species of e. North America and e. Asia. References: Brandenburg in FNA (2007a); Brandenburg, Estes, & Collins (1991)=Z. Key from Z.

1 Callous pubescent on all mature lemmas except the first; lemmas widest below the middle and gradually tapering into a cusp at the apex, those of the first floret 7.1-10.8 mm long; mature fruit 1.3-1.8 mm broad, gradually tapering into a broad, blunt beak ..... ***D. americana***
1 Callous glabrous on all mature lemmas; lemmas widest near or above the middle and more-or-less abruptly contracted into a cusp at the apex, those of the first floret 4.6-7.5 mm long; mature fruit 1.8-2.5 mm broad, abruptly contracted into a bottlenose-shaped beak..... ***D. obovata***

Diarrhena americana Palisot de Beauvois, Eastern Beakgrain. Ip (KY, TN), Mt (GA, NC, TN, VA): rich moist forests, usually over calcareous rocks; uncommon (rare in NC and VA, rare in TN Mountains). July-August; August-October. W. VA and WV west to IN, south to TN, sw. NC, and nw. GA (Jones & Coile 1988); disjunct in MO. [= K, Z; = *Diarrhena americana* var. *americana* – C, G, WV; < *Diarrhena americana* – F, HC, W (also see *Diarrhena obovata*); < *Diarina festucoides* Rafinesque – S (also see *Diarrhena obovata*]

Diarrhena obovata (Gleason) Brandenburg, Western Beakgrain. Pd (VA), Ip (KY, TN): alluvial forests, other moist forests; rare. July-August; August-October. Sw. PA and IN west to SD, KA, south to w. VA, c. TN, and ne. TX. First reported for VA by Fleming & Ludwig (1996). The floodplain of the Potomac River (in Fairfax County, VA) has a number of disjuncts of species with more midwestern affinities, including *Diarrhena obovata, Erigenia bulbosa, Valeriana pauciflora,* and *Erythronium albidum* (Fleming & Ludwig 1996). [= K, Z; = *Diarrhena americana* var. *obovata* Gleason – C, G, WV; < *Diarrhena americana* – F, HC, W; < *Diarina festucoides* Rafinesque – S]

Dichanthelium (A.S. Hitchcock & Chase) Gould 1974 (Witch-grass)
(by Richard J. LeBlond)

A genus of 70-100 species, perennials, of temperate and tropical America. References: Gould and Clark (1978)=Z; Freckmann (1981)=Y; Lelong (1984)=X; LeBlond (2001)=Q; Davidse and Polh (1992); Hansen & Wunderlin (1988); Hitchcock & Chase (1910); Freckmann & Lelong (2002). The treatment of *Dichanthelium* sect. *Lanuginosa* (=*D. acuminatum* group) is based closely on Y. The contributor must take responsibility for the treatment of sect. *Angustifolia* (including *D. hirstii*), sections *Dichotoma* and *Ensifolia* (the *D. dichotomum* group), and for sect. *Lancearia*. Other treatments are based largely on Z.

"We admit that our failure to distinguish the several named taxa ... was born of despair!" – Godfrey & Wooten (1979).

"The recognition of only four species and six varieties in this complex [*sabulorum*] to which almost 50 species names have been applied admittedly is somewhat arbitrary and certainly not entirely satisfactory." – Gould & Clark (1978).

Identification notes: *Dichanthelium* has often been treated as subgenus *Dichanthelium* of *Panicum*. It is most readily (though not consistently) separated from *Panicum* by the following combination of features: plants producing over-wintering rosettes of leaves often shorter and broader than the culm leaves; plants producing simple culms with terminal panicles in spring, the culms branching and producing panicles only on branches in the summer and autumn.

Perhaps the most complex and confusing genus in our region, *Dichanthelium* requires careful collection and close observation of several characters to determine to which taxon a specimen belongs, or at least to which taxa it seems most closely aligned. A taxon that is distinct in one part of its range may be indistinguishable from another taxon elsewhere. This is particularly true of Coastal Plain species adapted to natural (and now human) disturbances. Although hybridization is frequently suspected in *Dichanthelium*, documentation of natural hybrids is rare.

When collecting specimens in the field, mature spikelets are essential. This is determined by examining the usually whitish fertile lemma, which is firm and plump at maturity. Immature spikelets often are longer than mature ones (they shorten as they fatten); only mature spikelet length is used in the various manuals and keys. It is also important to note whether a plant is in its "vernal" or "autumnal" fruiting phase before collecting. "Vernal" plants produce panicles only at the summits of the culms (typically April-June). "Autumnal" plants produce panicles from leafy axillary branches below the summit (typically July-September). The autumnal panicles in most species are much smaller than the vernal panicles (and often hidden by fascicled leaves), but the spikelets are the same. When collecting autumnal plants, it is important to select specimens still possessing their vernal leaf blades and panicles, even though these will likely be senescent. It is also important to collect the whole plant, with the basal rosette intact (whether senescent or of current year's growth). When several plants are growing together, compare the culm, leaf, and spikelet features for differences; *Dichanthelium* taxa are gregarious.

When analyzing the character of the culm internodes and nodes, look at the first elongate internode above the base (the lowest internode is often very short and uncharacteristic). Determining whether a node is bearded is often difficult. A bearded node usually is characterized by pubescence that is longer and of a different orientation or structure than that of the internodes and sheaths. Nodes with short pubescence

generally are not regarded as bearded. Lower nodes are more likely to be bearded than upper nodes. When analyzing sheaths, look at those on the lower half of the culm. Senescent vernal sheaths often lose their pubescence (though in some species hair papillae are evident). All references in the key to sheath glabrousness or pubescence is without regard to the presence or absence of marginal hairs (cilia). A sheath that is glabrous except for marginal cilia is called glabrous. All culm leaves should be analyzed for blade characters; in general, the key relies on the size and character of the vernal blades. A "cordate" blade is one where the basal lobes of the blade extend outward and partially surround the culm when the culm is enclosed by the sheath. As with sheaths, references in the key to blade glabrousness or pubescence is without regard to marginal cilia. The ligule is an important diagnostic character for many *Dichanthelium* taxa; at least three ligules per specimen should be examined before making conclusions about its structure and length. Ligules form a distinct ring from a cartilaginous base at the inner summit of the sheath; in some species the ligule is membranous, but in most it is pubescent. Care must be taken to distinguish the pubescence of the ligule from any pubescence emanating from the inner surface of the blade base, and from marginal cilia. Ligules of senescent vernal leaves frequently lose their integrity. Spikelet shape as well as length should be determined only from mature spikelets. Measure the length from the base of the first glume (usually at an articulation) to the apex of the second glume or sterile lemma (whichever is longer). A micrometer is essential for determining the length of spikelets, first glumes, ligules, and various pilosity features. Sometimes one-tenth of a millimeter is all that separates two *Dichanthelium* taxa.

Certain characters, particularly node bearding, cordate/non-cordate blade bases, and ligule length, can be quite variable, and an effort has been made to account for this variability in the key. Nonetheless, some specimens just won't "fit," and the road not taken may have to be reconsidered.

1 Plants densely tufted, often cushion-forming; leaves basally disposed, the blades ascending or spreading-ascending, not forming a distinct rosette of basal leaves shorter than the culm leaves; autumnal culms branching basally or from the lower nodes ..... **Key A**
1 Plants less densely or sparsely tufted, not cushion-forming; leaves well-distributed on the culm, usually much longer than the short, often broad and spreading basal rosette leaves; autumnal culms usually branching from the mid and upper nodes.
  2 Spikelets 3.3-5.2 mm long ..... **Key B**
  2 Spikelets 0.8-3.2 mm long.
    3 Spikelets 0.8-2.0 mm long.
      4 Lower culm internodes variously hairy ..... **Key F**
      4 Lower culm internodes glabrous ..... **Key G**
    3 Spikelets 2.1-3.2 mm long.
      5 Larger culm blades 13-25 mm wide ..... **Key C**
      5 Larger culm blades < 13 mm wide.
        6 Culm nodes (at least the lower) bearded ..... **Key D**
        6 Culm nodes not bearded, the lowermost sometimes puberulent or sparsely hairy ..... **Key E**

Key A - Plants densely tufted, often cushion-forming; leaves basally disposed, the blades ascending or spreading-ascending, not forming a distinct rosette of basal leaves shorter than the culm leaves; autumnal culms branching basally or from the lower nodes

1 Spikelets 2.4-4.5 mm long.
  2 Nodes, internodes, and sheaths glabrous; blades 4-13 cm, 5-8 mm, the surfaces smooth, glabrous; spikelets 2.4-2.9 mm long, glabrous; not known to produce axillary (autumnal) inflorescences ..... ***[D. nudicaule]***
  2 Nodes bearded or otherwise pubescent; internodes and sheaths variously pubescent to glabrate; blades 6-35 cm, 2-5 mm, one or both surfaces scabrous and often pubescent; spikelets 1.7-4.5 mm long, glabrous or pubescent; plants produce axillary (autumnal) inflorescences.
    3 Spikelets 2.8-3.8 (-4.5) mm long, the second glume and sterile lemma pointed or beaked and extended beyond the summit of the fertile lemma; first glume 1.2-2 mm long ..... ***D. depauperatum***
    3 Spikelets 1.7-2.8 mm long, the second glume and sterile lemma blunt or broadly pointed, not extending beyond the summit of the fertile lemma; first glume 0.7-1.2 mm long ..... ***D. linearifolium***
1 Spikelets 0.9-2.3 mm long.
  4 Longer blades > 6 cm; if only 6 cm, then sheaths retrorsely long-pilose (*D. laxiflorum*).
    5 Spikelets 1.2-1.5 mm long, glabrous ..... ***[D. dichotomum** var. **glabrifolium]***
    5 Spikelets 1.7-2.3 (-2.8) mm long, pubescent.
      6 Longer blades 10-35 cm long, 2-4 mm wide; sheaths glabrous to variously pilose, but not conspicuously retrorsely long-pilose; nodes variously pubescent to glabrate; spikelets 1.7-2.3 (-2.8) mm long ..... ***D. linearifolium***
      6 Longer blades 6-18 cm long, 7-12 mm wide; sheaths conspicuously retrorsely long-pilose; nodes bearded with retrorse or spreading hairs; spikelets 1.9-2.3 mm long ..... ***D. laxiflorum***
  4 Longer blades 1.5-6 cm; sheaths glabrous or pubescent, but not retrorsely long-pilose.
    7 Blades 1-3 mm wide, glabrous, eciliate or basally ciliate; spikelets 0.9-1.4 mm long.
      8 Spikelets pubescent, 1.2-1.4 mm long; blades involute, often falcate, 2.5-6 cm long ..... ***[D. chamaelonche** ssp. **breve]***
      8 Spikelets glabrous, 0.9-1.2 mm long; blades flat, not falcate, 1.5-4 (-5) cm long ..... ***D. chamaelonche** ssp. **chamaelonche***
    7 Blades 3-8 mm wide; spikelets 1.1-2.1 mm long (if < 1.5 mm, then blades either pubescent on one or both surfaces or ciliate to the apex).
      9 Spikelets pubescent, 1.5-2.1 mm long; blade surfaces glabrous ..... ***D. strigosum** var. **leucoblepharis***
      9 Spikelets glabrous, 1.1-1.8 mm long; blade surfaces pubescent or glabrous.
        10 Blades pilose; spikelets 1.1-1.6 mm long ..... ***D. strigosum** var. **strigosum***
        10 Blades glabrous, or sparsely pilose only near the adaxial base; spikelets 1.4-1.8 mm long ..... ***D. strigosum** var. **glabrescens***

Key B - Spikelets 3.3-5.2 mm long

1 Nodes (at least lower) densely bearded with retrorse hairs; spikelets 3.7-5.2 mm long.
  2 Ligule 2.5-4 mm long; internodes pubescent with long ascending or spreading hairs; blades 8-15 cm long, 10-25 mm wide; first glume 1.8-2.5 mm long ..... ***D. ravenelii***
  2 Ligule 0.4-0.9 (-1.3) mm long; internodes glabrous to puberulent; blades 7-12 cm long 12-40 mm wide; first glume 1.5-2.2 mm long ..... ***D. boscii***
1 Nodes glabrous, pubescent, or sparsely pilose; spikelets (2.4-) 3.3-4.2 mm long.
  3 Ligule 1.6-3 mm long; blades 4-9 mm wide, > 10× as long as wide ..... ***D. oligosanthes*** *var.* ***oligosanthes***
  3 Ligule 0.3-1.5 mm long; if larger blades < 9 mm wide and mostly 15× or more as long, then ligule 0.5-1 mm long (*D. fusiforme*).
    4 Larger blades 2-6 (-8) mm wide, mostly 15× or more as long as wide; spikelets fusiform to elliptic, acute, basally constricted ..... ***D. fusiforme***
    4 Larger blades 6-35 mm wide, mostly 10× or less as long as wide; spikelets broadly elliptic to obovate, rounded to sub-acute, not basally constricted.
      5 Spikelets strongly papillose-hispid with spreading hairs 0.5-1 mm long; blades papillose-hispid ..... ***[D. leibergii]***
      5 Spikelets glabrous to pubescent with hairs < 0.5 mm long; blades glabrous, scabrous, or pubsecent.
        6 Ligules 1-1.5 mm long; blades 5-10 cm long by 6-15 mm wide, glabrous or pubescent, basally rounded; spikelets glabrous to pubescent ..... ***D. oligosanthes*** *var.* ***scribnerianum***
        6 Ligules 0.3-1 mm long; blades 7-35 cm long by 8-35 mm wide, glabrous or scabrous, basally cordate or rounded; spikelets pubescent to glabrate.
          7 Sheaths (at least lower) papillose-hispid with spreading hairs; ligule 0.5-1.2 mm long, an eciliate membrane; culm blades 10-28 cm long; spikelets 2.4-3.6 mm long; first glume 1.2-.18 mm long ..... ***D. clandestinum***
          7 Sheaths glabrous or pubescent (the upper papillose-pubescent in *D. xanthophysum*); ligules 0-0.7 mm long, ciliate if more than 0.3 mm long; culm blades 5-18 cm long; spikelets 2.2-4.1 mm long; first glume 0.7-2.6 mm long.
            8 Upper sheaths glabrous to softly villous basally; ligules 0.4-0.7 mm long, ciliate; culm blades 15-40 mm wide, the bases cordate-clasping; panicle usually more than half as wide as long ..... ***D. latifolium***
            8 Upper sheaths glabrous, puberulent, or papillose-pubescent; ligules 0-0.5 mm long, eciliate or ciliate; culm blades 5-25 mm wide, the bases cordate-clasping or rounded; panicles less or more than half as wide as long.
              9 Upper sheaths glabrous or puberulent; ligules 0.1-0.3 mm long, eciliate; culm blade bases cordate-clasping; panicles usually more than half as wide as long; spikelets 2.2-3.7 mm long, ellipsoid, pointed ... ***D. commutatum*** *var.* ***commutatum***
              9 Upper sheaths papillose-pubescent; ligules 0.3-0.5 mm long, ciliate; culm blade bases rounded; panicles usually less than half as wide as long; spikelets 3.2-4.1 mm long, obovoid, blunt ..... ***[D. xanthophysum]***

Key C - Spikelets 2.1-3.2 mm long, larger leaves 13-25 mm wide

1 Culm nodes, at least the lower, bearded (often retrorsely).
  2 Ligule a stramineous to light brown membrane (with or without ciliate or lacerate extensions); peduncle and often internodes scabrous ***D. scabriusculum***
  2 Ligule entirely of white hairs; peduncle and internodes either smooth or densely hairy (velvety).
    3 Lower internodes glabrous, without a viscid band below the nodes; larger blades 7-14 mm wide ..... ***D. dichotomum*** group
    3 Lower internodes densely hairy except for a viscid band below the nodes; larger blades 10-20 mm wide ..... ***D. scoparium***
1 Culm nodes glabrous or slightly hairy, but not bearded.
  4 Second glume and sterile lemma acute to short-acuminate, conspicuously longer than the fertile lemma; spikelets glabrous (occasionally sparsely pubescent in *D. scabriusculum*).
    5 Panicle rachis pellucid-punctate; ligule a stramineous to light brown membrane, with or without terminal ciliations; peduncle and often internodes scabrous; first glume 0.3-0.6 (-0.8) mm long, reniform to suborbicular ..... ***D. scabriusculum***
    5 Panicle rachis not pellucid-punctate; ligule entirely of white hairs; peduncle and internodes smooth; first glume 0.7-1.2 mm long, ovate to lanceolate ..... ***D. yadkinense***
  4 Second glume and sterile lemma blunt to subacute, shorter than, equaling, or barely exceeding the fertile lemma; spikelets pubescent (sometimes sparsely so in *D. clandestinum*).
    6 Sheaths, at least the lower, papillose-hispid with spreading hairs; blades 10-28 cm long ..... ***D. clandestinum***
    6 Sheaths glabrous, puberulent, finely pubescent, or sparsely pilose; blades 5-18 cm long.
      7 Ligule 0-0.3 mm long; spikelets 2.2-3.7 mm long, 1.1-1.3 mm wide; first glume 0.6-2.6 mm long ..... ***D. commutatum var. commutatum***
      7 Ligule 0.4-0.7 mm long; spikelets 2.9-3.9 mm long, 1.6-2.0 mm wide; first glume 1.5-2.2 mm long ..... ***D. latifolium***

Key D - Spikelets 2.1-3.2 mm long, larger culm blades < 13 mm wide, at least the lower culm nodes bearded with a usually spreading-ascending collar of dense and/or longish hairs

1 Ligule with a dense ring of short hairs 0.5-1 mm long in front of a usually less dense ring of longer hairs (pseudoligule) 1-5 mm long.
  2 Nodes retrorsely bearded; internode and sheath hairs spreading to restrorse; blade surfaces velvety-pubescent or long-pilose.
    3 Spikelets 2.5-3.2 mm long; longer hairs of pseudoligule 1-3 mm long; blade surfaces velvety-pubescent; panicle rachis densely pubescent; [of cedar glades and dry limestone soils] ..... ***[D. malacophyllum]***
    3 Spikelets 1.8-2.5 mm long; longer hairs of pseudoligule 3-5 mm long; blade surfaces long-pilose; panicle rachis sparsely pilose; [of dry sandy soil of pine and oak woodlands] ..... ***D. villosissimum*** *var.* ***villosissimum***
  2 Node beard hairs spreading to ascending; internode and sheath hairs ascending to appressed; blade surfaces glabrate to appressed-pubescent.
    4 Spikelets 2.5-3.1 mm long; lower culm blades usually glabrous adaxially except for long hairs at or near the margin (appearing ciliate), appressed-pubescent abaxially ..... ***D. ovale*** *var.* ***ovale***
    4 Spikelets 2.1-2.6 mm long; lower culm blades usually sparsely appressed-pubescent on both surfaces, eciliate or ciliate at the base only. ..... ***D. ovale*** *var.* ***addisonii***
1 Ligule a single structure, without a pseudoligule.
  5 Ligule 2-5 mm long, ciliate ..... ***D. acuminatum*** **group**

5 Ligule < 2 mm long, ciliate or membranous.
6 Ligule a stramineous to light brown membrane, with or without terminal ciliations; peduncle scabrous but not hairy.
7 Panicle rachis smooth, pellucid-punctate; first glume 0.3-0.6 (-0.8) mm; larger leaves 10-25 cm long, 8-15 mm wide; ligule 0.5-1.3 mm long; lowest elongate culm internode > 2 mm in diameter; lowest nodes usually glabrous or pubescent ..... ***D. scabriusculum***
7 Panicle rachis scabrous, not pellucid-punctate; first glume 0.7-1.1 mm long; larger leaves 7-12 cm long, 6-9 mm wide; ligule 0.3-0.6 mm long; lowest elongate culm internode < 1.7 mm in diameter; lowest nodes usually retrorsely bearded ..... ***D. species 9 (= cryptanthum)***
6 Ligule entirely of white hairs; peduncle variously hairy or glabrous, but not scabrous.
8 Culms to 1.5 m tall, with a broad, glabrous, viscid band below the nodes; blades of the lower leaves typically villous or velvety-pubescent ..... ***D. scoparium***
8 Culms rarely exceeding 1 m, without a viscid band below the nodes; blades various.
9 Sheaths retrorsely pilose with hairs 2-3 mm long; basal leaves usually numerous, ascending, similar in size and shape to the culm leaves; culms branching only at the base ..... ***D. laxiflorum***
9 Sheaths glabrous or pilose (if pilose, then hairs not both retrorse and 2-3 mm long); basal leaves rosette-forming, usually much smaller than the culm leaves; culms branching at the nodes in age.
10 Culm internodes glabrous to sparsely pilose; culm nodes bearded with long retrorse hairs; blade surfaces glabrous to velvety-pubescent ..... ***D. dichotomum* group**
10 Culm internodes, at least the lower, strigose, pilose, or villous; culm nodes bearded with ascending or spreading hairs; blade surfaces glabrous or variously hairy.
11 Lower nodes bearded with erect-ascending, soft, and long hairs; mid-culm blades usually 20× or more as long as wide.
12 Spikelets 2.9-4.0 mm long, fusiform to elliptic, acute, basally constricted; first glume 1.4-2.6 mm long ..... ***D. fusiforme***
12 Spikelets 1.5-3.1 mm long, obovate to elliptic-obovate, obtuse to sub-acute, not basally constricted; first glume 0.6-1.5 mm long.
13 Spikelets 1.5-2.2 mm long; first glume 0.6-0.8 mm long; blades to 8 cm long, usually involute ..... ***D. aciculare***
13 Spikelets 2.1-3.1 mm long; first glume 0.8-1.5 mm long; blades to 12 cm long, usually flat except at tip ..... ***D. angustifolium***
11 Lower and often mid-culm nodes bearded with spreading, stiffish, and short-to-long hairs; mid-culm blades usually 15× or less as long as wide.
14 Blades stiff, often longitudinally ribbed, at least the lower villous or strongly pilose on the abaxial surface, and usually strongly pilose at least basally on the adaxial surface ..... ***D. consanguineum***
14 Blades not noticeably stiff nor longitudinally ribbed, pubescent or strigose underneath, glabrous above or with a few long hairs near the base.
15 Spikelets 2.5-3.1 mm long; lower culm blades usually glabrous adaxially except for long hairs at or near the margin (appearing ciliate), appressed-pubescent abaxially ..... ***D. ovale* var. *ovale***
15 Spikelets 2.1-2.6 mm long; lower culm blades usually sparsely appressed-pubescent on both surfaces, eciliate or ciliate at the base only ..... ***D. ovale* var. *addisonii***

Key E - Spikelets 2.1-3.2 mm long, larger culm blades < 13 mm wide, culm nodes not bearded, the lowermost sometimes puberulent or sparsely pilose

1 Ligule 1.6-4 mm long ..... ***D. oligosanthes* var. *oligosanthes***
1 Ligule < 1.5 mm long.
2 Blades, at least the lower, cordate or subcordate at the base, mostly 6-12 mm wide.
3 Spikelets obpyriform when viewed dorsally, strongly plano-convex when viewed laterally, usually markedly reddish-purple basally; fertile lemma papillose ..... ***D. species 2 (=webberianum)***
3 Spikelets elliptic to elliptic-obovoid when viewed dorsally or laterally, greenish to faintly purple-tinged basally; fertile lemma not papillose.
4 Lowermost internodes crisp-puberulent; ligules 0-0.3 mm long, eciliate; larger culm blades 4-8 (-11) cm long, 5-10 (-12) mm wide, broadest near the base; spikelets 2.1-2.7 mm long; first glumes 0.7-0.9 mm long ..... ***D. commutatum* var. *ashei***
4 Lowermost internodes glabrous to sparsely pubescent; ligules either 0-0.3 mm long and eciliate, or about 0.5 mm long and ciliate; larger culm blades 5-16 mm long, 6-25 mm wide, broadest above the base or broadly linear; spikelets 2-3.7 mm long; first glumes 0.5-2.6 mm long.
5 Ligule 0-0.3 mm long, eciliate; larger culm blades 5-25 mm wide; spikelets 2.2-3.7 mm long; first glumes 0.6-2.6 mm long ..... ***D. commutatum* var. *commutatum***
5 Ligule about 0.5 mm long, ciliate; larger culm blades 6-13 mm wide; spikelets 2-3 mm long; first glumes 0.5-1 mm long ..... ***D. boreale***
2 Blades tapering to the base, 2-12 mm wide.
6 Ligule a stramineous to light brown membrane, with or without terminal ciliations.
7 Panicle rachis smooth, pellucid-punctate; first glume 0.3-0.6 (-0.8) mm long; larger leaves 10-25 cm long, 8-15 mm wide; ligule 0.5-1.3 mm long; lowest elongate culm internode > 2 mm in diameter; lowest nodes usually glabrous or pubescent ..... ***D. scabriusculum***
7 Panicle rachis scabrous, not pellucid-punctate; first glume 0.7-1.1 mm long; larger leaves 7-12 cm long, 6-9 mm wide; ligule 0.3-0.6 mm long; lowest elongate culm internode < 1.7 mm in diameter; lowest nodes usually retrorsely bearded ..... ***D. species 9 (= cryptanthum)***
6 Ligule of short white hairs or absent.
8 Leaves basally disposed, usually matted or cushion-forming, larger than the mid and upper culm leaves; blade margins uniformly papillose-ciliate; culms branching only at the base, 0.5-3.5 dm tall; internodes glabrous or sparsely pubescent ..... ***D. strigosum* var. *leucoblepharis***
8 Basal leaves rosette-forming, usually much smaller than culm leaves; blade margins glabrous, or ciliate only below the middle (or papillose-ciliate throughout in =*lancearium*, which has densely puberulent internodes); culms branching at the nodes in age, 1.5-7.5 mm tall.

9 Blades of mid-culm leaves typically long and stiff, acuminate, linear or narrowly lanceolate, usually > 10× as long as wide, only 2-5 mm wide when < 8 cm long.
10 Spikelets 2.9-4.0 mm long, fusiform to elliptic, acute, basally constricted; first glume 1.4-2.6 mm long ..... ***D. species 8 (=fusiforme)***
10 Spikelets 1.5-3.1 mm long, obovate to elliptic-obovate, obtuse to sub-acute, not constricted basally; first glume 0.6-1.5 mm long.
11 Spikelets 1.5-2.2 mm long; first glume 0.6-0.8 mm long; blades to 8 cm long, usually involute ..... ***D. aciculare***
11 Spikelets 2.1-3.1 mm long; first glume 0.8-1.5 mm long; blades to 12 cm long, usually flat except at tip ..... ***D. angustifolium***
9 Blades of mid-culm leaves lanceolate, thin or firm but not stiff, usually < 10× as long as wide, usually 7 mm or more wide when as much as 8 cm long.
12 Spikelets 2.9-3.8 mm long, broadly elliptic, rounded at the summit, with broad and thick nerves ..... ***D. oligosanthes var. scribnerianum***
12 Spikelets 2.1-2.9 mm long, elliptic or obovate, rounded or pointed at the summit, the nerves often raised, but not broad and thick.
13 Culm internodes and sheaths glabrous or sparsely pilose.
14 Spikelets obpyriform when viewed dorsally, strongly plano-convex when viewed laterally; first glume and base of second glume usually strongly reddish-purple ..... ***D. species 2 (=webberianum)***
14 Spikelets variously shaped but not obpyriform when viewed dorsally, biconvex to elliptic when viewed laterally; first and second glumes various.
15 Culms tending to be stiffly erect; blades erect or erect-spreading, broad, usually but not always tapering from just below the middle to both ends, often yellowish green; plants not or only sparingly branched in age, not developing leafy fascicles of reduced leaves and inflorescences ..... ***D. boreale***
15 Culms not stiffly erect; leaves usually spreading, broad or narrow, dark to bright green; plants often freely branched in age, becoming top-heavy with a mass of fascicled, reduced leaves and inflorescences ..... ***D. dichotomum*** group
13 Culm internodes crisp-puberulent (sparsely so in *D. species 2 (=webberianum)*; sheaths puberulent or glabrous.
16 Spikelets elliptic, sub-acute to pointed, greenish or faintly purple-tinged basally ..... ***D. commutatum var. ashei***
16 Spikelets strongly plano-convex when viewed laterally, obpyriform when viewed dorsally, broadly rounded, usually markedly reddish-purple basally.
17 Fertile lemma and palea papillose; spikelets 2.2-2.6 mm long; lower culm blades 6-12 mm wide, glabrous ..... ***D. species 2 (=webberianum)***
17 Fertile lemma and palea smooth (minutely reticulate but not papillose); spikelets (1.8) 1.9-2.2 (-2.3) mm long; lower culm blades 4-8 mm wide, glabrous, glabrate, or puberulent (especially abaxially) ..... ***D. species 3 (=lancearium)***

Key F - Spikelets 0.8-2.0 mm long, lower culm internodes variously hairy

1 Longer hairs of ligule 2-5 mm long.
2 Ligule without a distinct ring of short hairs in front of the long hairs ..... ***D. acuminatum*** **group**
2 Ligule with a distinct ring of short hairs in front of the long hairs.
3 Peduncle, panicle axis, and sheaths puberulent with hairs 0.1 mm long; larger blades 3-6 cm long, 3-5 mm wide; spikelets 1.3-1.7 mm long ..... ***D. meridionale***
3 Peduncle panicle axis hairs >.0.1 mm long; sheaths and internodes densely clothed with straight retrorse (occasionally spreading to spreading-ascending) hairs often > 4 mm long ..... ***D. villosissimum var. villosissimum***
1 Longer hairs of ligule < 2 mm long.
4 Culm leaves basally crowded, ascending, usually matted or cushion-forming, larger than the mid and upper culm blades.
5 Sheaths conspicuously retrorsely long-pilose; longer blades 6-18 cm long and 7-12 mm wide; spikelets 1.9-2.3 mm long ... ***D. laxiflorum***
5 Sheaths variously pubescent or glabrous, but not conspicuously retrorsely long-pilose; longer blades 2-6 cm long and 1-8 mm wide; spikelets 0.9-2.1 mm long.
6 Blades 1-4 mm wide, glabrous, the margins eciliate or basally ciliate; spikelets 0.9-1.5 mm long, glabrous; autumnal form branched from lower and mid nodes as well as from basal nodes.
7 Blades 1.5-4 (-5) cm long; spikelets 0.9-1.2 mm long ..... ***D. chamaelonche***
7 Blades 4-12 (-20) cm long, some at least 7 cm long; spikelets 1.2-1.5 mm long ..... ***[D. dichotomum var. glabrifolium]***
6 Blades 2-10 mm wide, pubescent or glabrous, the margins coarsely papillose-ciliate throughout; spikelets 1.1-2.1 mm long, glabrous or pubescent; autumnal form branched from basal nodes only.
8 Spikelets pubescent, 1.5-2.1 mm long; blade surfaces glabrous ..... ***D. strigosum var. leucoblepharis***
8 Spikelets glabrous, 1.1-1.8 mm long; blade surfaces pubescent or glabrous.
9 Blades pilose; spikelets 1.1-1.6 mm long ..... ***D. strigosum var. strigosum***
9 Blades glabrous, or sparsely pilose only near the adaxial base; spikelets 1.4-1.8 mm long ..... ***D. strigosum var. glabrescens***
4 Culm leaves not basally crowded, the lowest leaves spreading and rosette-forming, usually smaller than the culm leaves.
10 Blades of mid-culm leaves typically long and stiff, acuminate, linear or narrowly lanceolate, often involute, only 2-5 mm wide when < 8 cm long ..... ***D. aciculare***
10 Blades of mid-culm leaves lanceolate, thin or firm but not stiff, usually > 5 mm when > 8 cm long.
11 Internodes crisp-puberulent.
12 Ligule 0.7-1.5 mm long; first glume acute; spikelets elliptic when viewed dorsally, biconvex or elliptic when viewed laterally, not strongly nerved ..... ***D. columbianum***
12 Ligule < 0.5 mm long; first glume obtuse to truncate; spikelets obovate when viewed dorsally, plano-convex when viewed laterally, strongly nerved.
13 Spikelets 1.5-1.8 mm long; first glume 0.5-0.8 mm long; lower culm blades 2-5 mm wide ..... ***D. portoricense***
13 Spikelets (1.8-) 1.9-2.2 (-2.3) mm long; first glume 0.8-1.2 mm long; lower culm blades 4-8 mm wide ..... ***D. species 3 (=lancearium)***
11 Internodes variously hairy but not crisp-puberulent.

14 Internodes (sparsely-) moderately to densely pubescent to pilose; ligule 1-5 mm long; blade margins either weakly ciliate, papillose-ciliate basally only, or eciliate, lacking a white-beige cartilagionous edge 0.2 mm wide.
15 Larger mid-culm blades 4-7 cm long, 4-7 mm wide, glabrous to sparsely pubescent adaxially; ligule 1-5 mm long; spikelets 1.1-1.5 mm long ..... ***D. leucothrix***
15 Larger mid-culm blades 3-6 cm long, 3-5 mm wide, long-pilose adaxially; ligule often with a ring of hairs < 1 mm and scattered longer hairs to 4 mm; spikelets 1.3-1.7 mm long ..... ***D. meridionale***
14 Internodes sparsely pilose; ligule < 1 mm long; blade margins **either** coarsely papillose-ciliate throughout **or** glabrous with a white-beige cartilaginous edge about 0.2 mm wide.
16 Blades with white-beige cartilaginous margins 0.2 mm wide; spikelets 1.4-1.7 mm long; autumnal form branching from middle and upper nodes ..... ***D. tenue***
16 Blade margins coarsely papillose-ciliate throughout; spikelets 1.1-2.1 mm long; autumnal form branching from the base.
17 Spikelets pubescent, 1.5-2.1 mm long; blade surfaces glabrous ..... ***D. strigosum** var. **leucoblepharis***
17 Spikelets glabrous, 1.1-1.8 mm long; blade surfaces pubescent or glabrous.
18 Blades glabrous, or sparsely pilose only near the adaxial base; spikelets 1.4-1.8 mm long .... ***D. strigosum** var. **glabrescens***
18 Blades pilose; spikelets 1.1-1.6 mm long ..... ***D. strigosum** var. **strigosum***

Key G - Spikelets 0.8-2.0 mm long, lower culm internodes glabrous

1 Ligule 1-5 mm long.
2 Ligule 1-2 mm long; sheaths sparsely to moderately spreading short-pilose; internodes glabrous; nodes retrorsely bearded; leaves 1-4 cm long, 2-5 mm wide; spikelets 1.2-1.4 mm long ..... ***D. species 10 (=curtifolium)***
2 Ligule (1.5-) 2-5 mm long; sheaths glabrous to variously pubescent; internodes glabrous or pubescent; nodes glabrous, or bearded with ascending, spreading, or tangled hairs; leaves 3-10 cm long, 3-10 mm wide; spikelets 0.8-1.9 mm long ..... ***D. acuminatum* group**
1 Ligule < 1 mm long.
3 Basal leaves rosette-forming, usually much smaller than the culm leaves, not matted or cushion-forming; culms branching at the mid and upper nodes in age.
4 Blades of mid-culm leaves typically long and acuminate, linear or narrowly lanceolate, usually 10-20× as long as wide, only 2-5 mm wide when < 8 cm long.
5 Spikelets papillose-pubescent; blades 1-2 (-3) mm wide; panicle 2-3 cm wide; first glume 0.8-1.0 mm long, acute; culms to 4 dm tall ..... ***D. species 5 (=neuranthum)***
5 Spikelets glabrous; blades 3-8 mm wide; first glume 0.3-1.1 mm long, truncate to acute; culms to 10 dm tall.
6 Leaves 3-8 mm wide; panicle (8-) 20-40 mm wide; first glume 0.6-1.1 mm long, blunt to acute ..... ***D. dichotomum* group**
6 Leaves 3-5.5 mm wide; panicle 2-5 mm wide; first glume 0.3-0.4 mm long, truncate to obtuse ..... ***D. hirstii***
4 Blades of mid-culm leaves lanceolate, mostly 10× or less as long as wide, usually 7 mm or more wide when as much as 8 cm long.
7 Spikelets elliptic, oblong, or obovate; lower culm blades 3-12 (-15) mm wide, thin, tapered to the base; plants often freely branching in age, becoming top-heavy with a mass of fascicled, reduced leafy branches and inflorescences ..... ***D. dichotomum* group**
7 Spikelets broadly elliptic to suborbicular; lower culm blades 6-30 mm wide, thickish, broad, and cordate to subcordate at the base; plants sparingly branched in age, not becoming top-heavy with fascicled, reduced leafy branches and inflorescences.
8 Spikelets 0.9-1.2 mm long; longer blades 6-8 cm long, erect to erect-ascending ..... ***D. erectifolium***
8 Spikelets 1.2-1.9 mm long; longer blades 8-20 cm long, ascending or the uppermost erect.
9 Mid-culm blades 6-11 (-14) mm wide, the uppermost 3-9 cm long ..... ***D. sphaerocarpon** var. **sphaerocarpon***
9 Mid-culm blades, at least some, 15-30 mm wide, the uppermost 10-15 cm or more long ..... ***D. polyanthes***
3 Basal leaves similar to or larger than the mid and upper culm leaves, often matted or cushion-forming; culms branching at the base (also at mid and upper nodes in *D. chamaelonche* vars. and *D. dichotomum* var. *glabrifolium*).
10 Longer blades > 6 cm; if only 6 cm, then sheaths retrorsely long-pilose (*D. laxiflorum*).
11 Spikelets 1.2-1.5 mm long, glabrous ..... ***[D. dichotomum** var. **glabrifolium]***
11 Spikelets 1.7-2.3 (-2.8) mm long, pubescent.
12 Longer blades 6-18 cm long by 7-12 mm wide; sheaths conspicuously retrorsely long-pilose; nodes bearded with retrorse or spreading hairs; spikelets 1.9-2.3 mm long ..... ***D. laxiflorum***
12 Longer blades 10-35 cm long by 2-4 mm wide; sheaths glabrous to variously pilose, but not conspicuously retrorsely long-pilose; nodes variously pubescent to glabrate; spikelets 1.7-2.3 (-2.8) mm long ..... ***D. linearifolium***
10 Longer blades 1.5-6 cm; sheaths glabrous or pubescent, but not retrorsely long-pilose.
13 Blades 1-3 mm wide, glabrous, eciliate or basally ciliate; spikelets 0.9-1.4 mm long.
14 Spikelets pubescent, 1.2-1.4 mm long; blades involute, often falcate, 2.5-6 cm long ..... ***[D. chamaelonche** ssp. **breve]***
14 Spikelets glabrous, 0.9-1.2 mm long; blades flat, not falcate, 1.5-4 (-5) cm long ..... ***D. chamaelonche** ssp. **chamaelonche***
13 Blades 3-8 mm wide; spikelets 1.1-2.1 mm long (if < 1.5 mm, then blades either pubescent on one or both surfaces or ciliate to the apex).
15 Spikelets pubescent, 1.5-2.1 mm long; blade surfaces glabrous ..... ***D. strigosum** var. **leucoblepharis***
15 Spikelets glabrous, 1.1-1.8 mm long; blade surfaces pubescent or glabrous.
16 Blades pilose; spikelets 1.1-1.6 mm long ..... ***D. strigosum** var. **strigosum***
16 Blades glabrous, or sparsely pilose only near the adaxial base; spikelets 1.4-1.8 mm long ..... ***D. strigosum** var. **glabrescens***

Key to the *Dichanthelium acuminatum* group

1 Internodes glabrous.
2 Ligule 1-2 mm long; sheaths sparsely to moderately spreading short-pilose; nodes retrorsely bearded; leaves 1-4 cm long, 2-5 mm wide; spikelets 1.2-1.4 mm long ..... ***D. species 10 (=curtifolium)***
2 Ligule (1.5-) 2-5 mm long; sheaths glabrous to variously pubescent, but not spreading short-pilose; nodes glabrous or pubescent, but not bearded; leaves 4-11 cm long, 4-8 mm wide.
3 Panicles 8-12 cm long, ¼-⅓ as wide, bearing 250 or more spikelets; spikelets 1.4-1.6 mm long; ligule (1.5-) 2-3 mm long; larger blades 7-11 cm long, often tinged with purple ..... ***D. spretum***

3 Panicles 3-8 cm long, > ½ as wide, bearing < 200 spikelets; spikelets 1.1-1.6 mm long; ligule 2-5 mm long; larger blades 4-10 cm long.
4 Longer hairs of ligule 2-3 mm long; spikelets 1.1-1.5 mm long; blades often tinged with purple, the larger 4-8 cm long ..... ***D. longiligulatum***
4 Longer hairs of ligule 3-5 mm long; spikelets 1.4-1.6 mm long; blades often yellowish-green, the larger 5-10 cm long..... ***D. acuminatum** var. **lindheimeri***

1 Internodes variously pubescent.
5 Peduncle, panicle axis, and/or sheaths of vernal culms puberulent with hairs 0.1 mm long, sometimes also pubescent with longer hairs, but never grayish-villous; larger blades 2-7 cm long, 2-7 mm wide.
6 Spikelets 0.8-1.1 mm long; blades 2-4.5 cm long, 2-5 mm wide; sheaths sparsely puberulent, lacking papillose-based longer hairs..... ***D. wrightianum***
6 Spikelets 1.1-1.7 mm long; mid-culm blades generally 3-7 cm long and 3-7 mm wide; sheaths with some papillose-based hairs 2 mm or more long.
7 Larger mid-culm blades 4-7 cm long, 4-7 mm wide, glabrous to sparsely pubescent adaxially; ligule 1-5 mm long; spikelets 1.1-1.5 mm long ..... ***D. leucothrix***
7 Larger mid-culm blades 3-6 cm long, 3-5 mm wide, long-pilose adaxially; ligule often with a ring of hairs < 1 mm and scattered longer hairs to 4 mm; spikelets 1.3-1.7 mm long..... ***D. meridionale***
5 Peduncle, panicle axis, and sheaths of vernal culms glabrous, or pilose, or grayish-villous with some shorter hairs 0.2-0.5 mm long, but not puberulent with hairs 0.1 mm long; larger blades 4-12 cm long, 4-12 mm wide.
8 Sheaths and internodes of vernal culms gray-villous with a dense, tangled, or matted mixture of slender hairs 2-4 mm long, variously ascending, spreading, and retrorse, papillose or non-papillose, often with shorter hairs beneath; blades velvety-pubescent on abaxial surface.
9 Culms 15-60 cm tall and < 1.5 mm thick; panicle broadly ovoid, 5-8 cm long and > 1/2 as wide.....***D. acuminatum** var. **acuminatum***
9 Culms 40-70 (-80) cm tall, the larger usually > 60 cm long and > 2 mm thick; panicle contracted, 8-11 cm long and < ½ as wide..... ***D. acuminatum** var. **thurowii***
8 Sheaths and internodes of vernal culms nearly glabrous, pubescent, or papillose-pilose to hispid with ascending straight hairs 1-3 mm long; blades appressed-pilose to puberulent abaxially, but not velvety.
10 Peduncle, panicle axis, and often middle and upper internodes glabrous; sheaths, at least near mid-length, lacking hairs or papillae; larger blades 4-8 mm wide, glabrous abaxially; spikelets 1.3-1.6 mm long ..... ***D. acuminatum** var. **lindheimeri***
10 Peduncle, panicle axis, and internodes pubescent to pilose; sheaths papillose-pilose to hispid, the hairs tending to break off but leaving evident papillae; larger blades 6-10 mm wide, short-pilose to glabrate abaxially; spikelets 1.5-2.0 mm long ..... ***D. acuminatum** var. **fasciculatum***

Key to the *Dichanthelium dichotomum* Group

1 Lower cauline nodes glabrous or puberulent, but not bearded.
2 Spikelets glabrous.
3 Cauline leaves mostly basally disposed, strongly ascending, much larger than the 2-3 remote middle and upper cauline leaves of fertile culms; spikelets 2.4-2.9 mm long; culms branch from basal and lower nodes, but are not known to produce autumnal inflorescences ..... ***[D. nudicaule]***
3 Cauline leaves well-distributed along the culm, > 3, gradually reduced upwards and often spreading; spikelets 0.9-2.6 mm long; culms produce autumnal inflorescences from lower, middle, and/or upper nodes, if from lower only, then spikelets only 0.9-1.2 mm long.
4 Fertile lemma and palea densely papillose; culms weak, soon sprawling over other vegetation.....***D. lucidum***
4 Fertile lemma and palea smooth, with few or no papillae; culms stiffer, erect to ascending.
5 Spikelets 0.9-1.5 mm long; vernal blades 1-4 mm wide.
6 Spikelets 0.9-1.2 mm long; blades 1.5-4 (-5) cm long, 1-2.5 (-3) mm wide, mostly 15-20 times as long as wide; autumnal plants cushion-forming.....***D. chamaelonche ssp. chamaelonche***
6 Spikelets 1.2-1.5 mm long; blades 1-12 (-20) cm long; autumnal plants not cushion-forming.
7 Blades 1-3 (-5) cm long, 1.5-3 (-4) mm wide, about 10 times as long as wide; autumnal plants sparsely tufted..... ***D. ensifolium***
7 Blades 4-12 (-20) cm long (the longer at least 7 cm), 2-4 mm wide, 20-30 (-50) times as long as wide ..... ***[D. dichotomum** var. **glabrifolium]***
5 Spikelets 1.4-2.6 mm long; vernal blades 3-15 mm wide (if spikelets < 1.6 mm long and vernal blades < 5 mm wide, then larger blades > 5 cm long in *D. caerulescens*).
8 Widest vernal cauline blades 7-15 mm wide; upper sheaths often glutinous-warty; spikelets 2.1-2.6 mm long, some or most acute to beaked, second glume and sterile lemma extending 0.3-0.5 mm beyond fertile lemma in at least some spikelets..... ***D. yadkinense***
8 Widest vernal cauline blades 3-10 mm wide; upper sheaths not glutinous-warty; spikelets 1.4–2.3 mm long, blunt to subacute, second glume and sterile lemma often equal to or shorter than fertile lemma, or extending < 0.3 mm beyond it.
9 Spikelets 1.4-1.8 mm long; first glume 0.3–0.8 mm long; fertile lemma 1.3-1.5 mm long; mature vernal panicles usually short-exerted with ascending branches; fresh foliage bluish-glaucous.....***D. caerulescens***
9 Spikelets 1.7-2.3 mm long; first glume 0.6-1.1 mm long; fertile lemma 1.6-1.9 mm long; mature vernal panicles exerted with spreading branches; fresh foliage not bluish-glaucous.
10 Vernal cauline blades spreading to deflexed, flexuous; [of wet-mesic to dry woods and thickets] ..... ***D. dichotomum** var. **dichotomum***
10 Vernal cauline blades stiffly erect; [of wet pine savannas and open swamps].....***D. dichotomum** var. **roanokense***
2 Spikelets pubescent.
11 Spikelets 1.2-1.7 mm long; fertile lemma and palea smooth; culms erect.
12 Blades involute and often falcate, 3-6 cm long, about 1.5 mm wide when flattened, 20-50× as long as wide; lower internodes often strigose; spikelets 1.2-1.4 mm long; culms 5-20 cm long..... ***[D. chamaelonche ssp. breve]***
12 Blades neither involute (except apically) nor falcate, 1-7 cm long, 1.5-7 mm wide, about 10× as long as wide; lower internodes glabrous or sparsely pilose, but not strigose; spikelets 1.1-1.7 mm long; culms 15-60 cm long.

13 Blades 1-3 (-5) cm long, 1.5-3 (-4) mm wide, the cartilaginous margins typically gray-green to white-beige and about 0.1 mm wide; spikelets 1.2-1.5 mm long; culms to 40 cm long ..... ***D. ensifolium***

13 Blades 2-7 mm long, 3-6 mm wide, the cartilaginous margins typically white-beige and about 0.2 mm wide; spikelets (1.2-) 1.4-1.7 mm long; culms to 60 cm long ..... ***D. tenue***

11 Spikelets (1.5-) 1.7-2.7 mm long, if shorter than 1.8 mm then fertile lemma and palea densely papillose; culms soon sprawling.

14 Spikelets (1.5-) 1.7-2.3 mm long, glabrous (rarely pubescent); first glume 0.7-1.1 mm long; fertile lemma and palea densely papillose at 20× ..... ***D. lucidum***

14 Spikelets 2.2-2.7 mm long, pubescent; first glume 1.0–1.4 mm long; fertile lemma and palea smooth or with a few weak papillae at 20× ..... ***D. sphagnicola***

1 Lower cauline nodes bearded, the hairs usually retrorse.

13 Spikelets glabrous.

14 Spikelets 0.9-1.4 mm long; vernal cauline blades 1.5-4 (-5) cm long and 1-5 mm wide; internodes or sheaths glabrous or pubescent.

15 Spikelets 1.2-1.4 mm long; sheaths spreading-pilose; vernal cauline blades 2-5 mm wide; ligule 1-2 mm long; node beard hairs usually spreading or reflexed; internodes glabrous ..... ***D. sp. 10 (=curtifolium)***

15 Spikelets 0.9-1.2 mm long; sheaths glabrous; vernal cauline blades 1-2 (-3) mm wide; ligule < 1 mm long; node beard hairs erect and often only partially encircling the node; internodes glabrous or puberulent ..... ***D. chamaelonche***

14 Spikelets 1.4-2.3 mm long; vernal cauline blades 5-12 cm long and 3-15 mm wide; internodes and sheaths glabrous.

16 Spikelets 1.8-2.3 mm long; first glume 0.6-1.1 mm long; fertile lemma 0.8–1.0 mm wide; widest vernal blades 3-8 (-10) mm wide .... ***D. dichotomum*** *var.* ***dichotomum***

16 Spikelets 1.4-1.9 mm long; first glume 0.3-0.6 (-0.7) mm long; fertile lemma 0.6-0.8 mm wide; widest vernal blades 7-15 mm wide .. .. ***D. dichotomum*** *var.* ***ramulosum***

13 Spikelets pubescent.

17 Spikelets 1.2-1.4 mm long; sheaths spreading-pilose; vernal cauline blades 1-4 cm long and 2-5 mm wide; ligule 1-2 mm long .... ***D. sp. 10 (=curtifolium)***

17 Spikelets 1.4-2.8 mm long; sheaths glabrous to appressed-pilose; vernal cauline blades 5-12 cm long and 5-15 mm wide; ligule < 1 mm long.

18 Usually all culm nodes bearded; internodes glabrous, or middle and upper internodes and peduncle sparsely to moderately spreading short-hairy, sometimes also glandular; upper as well as lower vernal sheaths and both surfaces of cauline blades pubescent, often densely so; spikelets (1.5-) 1.8-2.1 mm long; [of dry rocky or sandy basic soil and barrens] ..... ***D. annulum***

18 Often only lower culm nodes bearded; internodes glabrous; at least middle and upper cauline blades glabrous; spikelets 1.4-2.8 mm long; [mostly of wet acid soils and mesic to dry woodlands].

19 Spikelets (2.0-) 2.2-2.8 mm long; first glume 0.5-1.3 mm long; fertile lemma 1.8-2.3 mm long; lowest vernal cauline blades pubescent at least abaxially ..... ***D. mattamuskeetense***

19 Spikelets 1.4-2.2 mm long; first glume 0.3-0.9 mm long; fertile lemma 1.4-1.7 mm long; lowest vernal cauline blades glabrous.

20 Spikelets 1.7-2.2 mm long; first glume 0.6-0.9 mm long; fertile lemma 0.7-1.0 mm wide .... ***D. dichotomum*** *var.* ***nitidum***

20 Spikelets 1.4-1.9 mm long; first glume 0.3-0.6 (-0.8) mm long; fertile lemma 0.6-0.8 mm wide .... ***D. dichotomum*** *var.* ***ramulosum***

Dichanthelium aciculare (Desvaux ex Poiret) Gould & Clark, Needle Witch Grass. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA): sandy woods and fields; common in Coastal Plain (uncommon in Piedmont, rare in VA Piedmont). May-October. NJ south to n. Fl, west to TX and OK, also in West Indies and n. South America. Blades typically are strongly involute. Can be confused with autumnal forms of *D. ovale* var. *addisonii*, which has vernal blades 5-10 mm wide. See note at end of descriptions regarding *Panicum chrysopsidifolium*. [= *Panicum aciculare* Desvaux ex Poiret – RAB, F, G; < *P. aciculare* – C; = *D. aciculare ssp. aciculare* – FNA; > *P. aciculare* – HC, S; > *P. bennettense* M.V. Brown – HC, S; < *D. aciculare* – K, Z]

Dichanthelium acuminatum (Swartz) Gould & Clark. *var.* ***acuminatum***, Woolly Witch Grass. Cp, Pd (GA, NC, SC, VA): on dryish sandy or clayey soils of open woods and disturbed areas; common. May-October. MA south to FL, west to TX, also in West Indies, Mexico, Central America, and n. South America. Internodes and sheaths gray-villous with usually non-papillate hairs. Plants tend to be low and "bushy" with several spreading-ascending culms and dense autumnal branching. See note at end of descriptions regarding *Panicum chrysopsidifolium*. [= Y; < *Panicum lanuginosum* Elliott – RAB; > *P. lanuginosum* var. *lanuginosum* – C, F, G; < *P. leucothrix* Nash – C; > *P. auburne* Ashe – F, G, HC, S, WV; < *D. acuminatum* ssp. *acuminatum* – FNA; > *P. lanuginosum* – HC, S, WV; >< *D. acuminatum* var. *acuminatum* – K, Z; >< *D. acuminatum* var. *implicatum* (Scribner) Gould & Clark – K, Z; < *P. acuminatum* Swartz var. *acuminatum* – X]

Dichanthelium acuminatum (Swartz) Gould & Clark *var.* ***fasciculatum*** (Torrey) Freckmann, Slender-stemmed Witch Grass. Mt, Pd, Cp (GA, NC, SC, VA): open or cut-over woods, thickets, fields, meadows, and shores, frequently on disturbed soils; common (uncommon in Coastal Plain). May-August. Newfoundland south to FL, west to CA, north to s. British Columbia. Typically much less pilose than var. *acuminatum*, the hairs usually papillate. See note at end of descriptions regarding *Panicum glutinoscabrum*. [= Y; < *Panicum lanuginosum* Elliott – RAB; > *P. lanuginosum* var. *fasciculatum* (Torrey) Fernald – C, F, G; > *P. lanuginosum* var. *tennesseense* (Ashe) Gleason – C, G; > *P. lanuginosum* var. *implicatum* (Scribner) Fernald – C, F, G; = *D. acuminatum* ssp. *fasciculatum* (Torrey) Freckmann & Lelong – FNA; > *P. implicatum* Scribner – HC, WV; > *P. huachucae* Ashe var. *huachucae* – HC, S; > *P. huachucae* var. *fasciculatum* (Torrey) Hubb. – HC; > *P. tennesseense* Ashe – HC, S; > *P. huachucae* var. *silvicola* Hitchcock & Chase – S; >< *D. acuminatum* var. *acuminatum* – K, Z; >< *D. acuminatum* var. *implicatum* (Scribner) Gould & Clark – K, Z; > *P. huachucae* Ashe – WV; > *P. acuminatum* Swartz var. *fasciculatum* (Torrey) Lelong – X; > *P. acuminatum* var. *unciphyllum* (Trinius) Lelong – X]

Dichanthelium acuminatum (Swartz) Gould & Clark *var.* ***lindheimeri*** (Nash) Gould & Clark, Lindheimer's Witch Grass. Pd, Cp, Mt (GA, NC, SC, VA): open or cut-over woods, thickets, fields, meadows, and shores, often on wet soils; uncommon (rare in Coastal Plain and Mountains). May-September. Nova Scotia west to Manitoba, south to FL and MO, west to s. CA. Internodes as well as sheaths often nearly glabrous. Panicle axis sometimes sparsely pilose at branch nodes, but otherwise glabrous. [= Y; < *Panicum lanuginosum* Elliott – RAB; >< *P. lanuginosum* var. *lindheimeri* (Nash) Fernald – C, G; > *P. lanuginosum* var. *septentrionale* Fernald – C, F, G; > *P. lanuginosum* var. *lindheimeri* – F; = *D. acuminatum ssp. lindheimeri*

(Nash) Freckmann & Lelong – FNA; < *P. spretum* Schultes – GW; > *P. lindheimeri* Nash – HC, S, WV; < *D. acuminatum* var. *acuminatum* – K, Z; > *D. acuminatum* var. *lindheimeri* – K, Z; > *P. acuminatum* Swartz var. *lindheimeri* (Nash) Lelong – X; ? *D. lanuginosum* (Elliott) Gould var. *lindheimeri* (Nash) Harvill]

Dichanthelium acuminatum (Swartz) Gould & Clark var. ***thurowii*** (Scribner & J.G. Smith) Gould & Clark, Thurow's Witch Grass. Cp (GA): in dry open woods, woodland edges, dry prairies, brushy pastures; rare. May?-October? Occasional from GA to AR and e. TX. [= K, Y, Z; < *D. acuminatum* (Swartz) Gould & Clark. ssp. *acuminatum* – FNA; = *Panicum thurowii* Scribner & J.G. Smith – HC, S]

Dichanthelium angustifolium (Elliott) Gould, Narrow-leaved Witch Grass. Cp, Pd, Mt (GA, NC, SC, VA): sandy pinelands and fields; common (rare in Mountains, rare in VA). May-October. NJ south to FL, west to AR and e. TX. Vernal blades typically are flat (often involute distally). Can be confused with *D. consanguineum*, which has spreading-pilose nodes and blades 10-15× as long as wide; *D. angustifolium* blades typically are 20× or more as long as wide. Plants with involute blades to 8 cm long, spikelets 2.1-2.5 mm long, and first glumes 0.7-1.1 mm long are referable to *Panicum arenicoloides*, here included in *D. angustifolium*. They are transitional to *D. aciculare*. [= *Panicum angustifolium* Elliott – RAB, F, G; < *P. aciculare* Desvaux ex Poiret – C; = *D. aciculare* ssp. *angustifolium* (Elliott) Freckmann & Lelong – FNA; > *P. angustifolium* – HC, S; > *P. arenicoloides* Ashe – HC, S; < *D. aciculare* – K, Z]

Dichanthelium annulum (Ashe) LeBlond, Ringed Witch Grass. Pd (GA, NC, VA), Mt (VA): dry sandy or rocky soil of open woods, dry grasslands, and barrens, and glades over serpentine, limestone, calcareous shales, and other high pH dry soils; rare. May-October. NJ, IN, and MO south to AL and MS, primarily in the Appalachian Province with very few occurrences in the Coastal Plain. One of the more distinctive taxa within the *D. dichotomum* group by morphology, habitat, and range. Plants from se. MA with all leaves pubescent, glabrous internodes, and spikelets 2.2-2.5 mm long were described as *Panicum annulum* var. *glabrescens*, but belong to *D. mattamuskeetense*. [= Q; < *P. dichotomum* Linnaeus – RAB, C, GW; = *Panicum annulum* Ashe – F, HC, S; = *P. annulum* var. *annulum* – G; < *D. dichotomum* ssp. *mattamuskeetense* (Ashe) Freckmann & Lelong – FNA; < *D. dichotomum* (Linnaeus) Gould – K, Z; < *P. dichotomum* var. *mattamuskeetense* (Ashe) Lelong - X]

Dichanthelium boreale (Nash) Freckmann, Northern Witch Grass. Pd, Mt (GA, NC, VA): open woods and grassy slopes, usually in moist soil; rare. April-September. Newfoundland and Ontario south to NC, GA, and AR. Our plants are =*Panicum bicknellii*, regarded as a "putative hybrid" (along with =*P. calliphyllum*) by FNA, which cites WV as the southern limit of *D. boreale*. [= K, Z; > *Panicum bicknellii* Nash – RAB, F, HC, S; > *P. boreale* Nash – C, F, G, HC; > *P. calliphyllum* Ashe – F, HC; > *D. boreale* – FNA; > *P. bicknellii* var. *bicknellii* – G; > *P. bicknellii* var. *calliphyllum* (Ashe) Gleason – G]

Dichanthelium boscii (Poiret) Gould & Clark, Bosc's Witch Grass. Pd, Mt, Cp (GA, NC, SC, VA): shaded mesic to dry woodlands; common. April-September. MA and IL south to n. FL and e. TX. [= FNA, K, Z; = *Panicum boscii* Poiret – RAB, C, G; > *P. boscii* var. *boscii* – F, HC, S, WV; > *P. boscii* var. *molle* (Vasey) Hitchcock & Chase – F, HC, S, WV]

Dichanthelium caerulescens (Hackel ex Hitchcock) Correll, Blue Witch Grass. Cp (NC, VA): marshes, swamps, wet pinelands, maritime grasslands, damp sandy soil; rare. June-October. NJ to NC, and from FL to LA, also in the Bahamas and West Indies. Not treated by FNA, where it presumably would have been placed in synonymy with *D. dichotomum* ssp. *roanokense*. [= Q; < *Panicum dichotomum* Linnaeus – RAB, GW; = *P. caerulescens* Hackel ex Hitchcock – F, HC, S; < *D. dichotomum* ssp. *roanokense* – FNA; < *P. roanokense* Ashe – G; < *D. dichotomum* var. *dichotomum* – K, Z; < *P. dichotomum* var. *roanokense* (Ashe) Lelong – X]

Dichanthelium chamaelonche (Trinius) Freckmann & Lelong *ssp.* ***chamaelonche***, Carpet Witch Grass. Cp (GA, NC, SC, VA): moist pine savannas and flatwoods, pineland pondshores; uncommon (rare in VA). April-September. Se. VA south to FL, west to LA, also in Cuba and Belize. Internodes can be glabrous or puberulent, and nodes glabrous, pubescent, or bearded, but the glabrous spikelets 0.9-1.2 mm long are diagnostic. The concept of this taxon in FNA (as ssp. *chamaelonche*) appears to include *D. dichotomum* var. *glabrifolium* (see descriptions of Floridian *D. chamaelonche* ssp. *breve* and *D. dichotomum* var. *glabrifolium* at end of this treatment). [= *Panicum chamaelonche* Trinius – RAB, G, GW, HC, S; < *P. ensifolium* Baldwin – C; < *D. chamaelonche* ssp. *chamaelonche* – FNA; < *D. dichotomum* (Linnaeus) Gould var. *ensifolium* (Baldwin) Gould & Clark – K, Z; = *P. chamaelonche* var. *chamaelonche* – X]

Dichanthelium clandestinum (Linnaeus) Gould, Deer-tongue Witch Grass. Mt, Pd, Cp (GA, NC, SC, VA): shaded to filtered woodlands, ditches and low areas, and often in moist sandy soil; common (uncommon in Coastal Plain south of VA). May-October. Nova Scotia and Québec south to n. FL, west to IA, KA, and TX. [= FNA, K, Z; = *Panicum clandestinum* Linnaeus – RAB, C, F, G, HC, S, WV, X]

Dichanthelium columbianum (Scribner) Freckmann, American Witch Grass. Pd, Cp (GA, NC, SC, VA), Mt (NC, VA): dry to moist thin woods and open ground, usually in sandy soil; uncommon (rare in VA). June-October. S. ME, s. Ontario, and WI south to GA, TN, and IL. [= *Panicum columbianum* Scribner – RAB, C, G, WV; > *P. columbianum* var. *columbianum* – F, HC; > *P. columbianum* var. *oricola* (Hitchcock & Chase) Fernald – F; = *D. acuminatum* ssp. *columbianum* (Scribner) Freckmann & Lelong – FNA; > *P. columbianum* var. *thinium* Hitchcock & Chase – HC; > *P. oricola* Hitchcock & Chase – HC; > *P. tsugetorum* Nash – HC, S; < *D. sabulorum* (Lamarck) Gould & Clark var. *thinium* (Hitchcock & Chase) Gould & Clark – K, Z; > *P. columbianum* – S; < *P. acuminatum* Swartz var. *unciphyllum* (Trinius) Lelong – X]

Dichanthelium commutatum (Schultes) Gould *var.* ***ashei*** (Pearson ex Ashe) Mohlenbrock, Ashe's Witch Grass. Cp, Pd, Mt (GA, NC, SC, VA): dry rocky or sandy woods and openings; common. May-October. MA south to FL and MS, west to MI, MO, and OK. [< *Panicum commutatum* – RAB, C; = *P. commutatum* Schultes var. *ashei* (Pearson ex Ashe) Fernald – F, G; = *D. commutatum ssp. ashei* (Pearson ex Ashe) Freckman & Lelong – FNA; = *P. ashei* Pearson ex Ashe – HC, S, WV; < *D. commutatum* – K]

Dichanthelium commutatum (Schultes) Gould *var.* ***commutatum***, Variable Witch Grass. Cp, Mt, Pd (GA, NC, SC, VA): low, shaded, moist woodlands and woodland edges, and dry, thin, often rocky woods and thickets; common. May-October. ME south to FL, west to MI, MO, OK, and TX, also in Mexico. Plants with spikelets 3.0-3.7 mm long, first glumes half or more as long, and with broadly linear leaves about 10 × as long as wide have been recognized as ssp. *equilaterale* by FNA, and *Panicum equilaterale* by HC and S, but intermediates occur throughout the NC to FL portion of the range of specimens bearing the

equilaterale name. [< *Panicum commutatum* Schultes – RAB, C; > *P. commutatum* var. *commutatum* – F, G; > *P. commutatum* – HC, S, WV; > *P. mutabile* Scribner & Smith ex Nash – F, G, HC, S; > *D. commutatum* ssp. *commutatum* Freckmann & Lelong – FNA; > *D. commutatum ssp. equilaterale* (Scribner) Freckmann & Lelong – FNA; > *D. commutatum ssp. joori* (Vasey) Freckmann & Lelong – FNA; < *D. commutatum* – K; > *P. joorii* Vasey – HC, S; > *P. equilaterale* Scribner – HC, S]

Dichanthelium consanguineum (Kunth) Gould & Clark, Kunth's Witch Grass. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): moist or dry sandy soils of pinelands; common in the Coastal Plain, uncommon in the Piedmont (rare in VA). April-September. Occasional from se. VA south to FL, west to TX and IN. Often not easily separated from *D. angustifolium* and *D. ovale*. It is distinguished from *D. angustifolium* by spreading-hirsute nodes and leaves 10-15× as long as wide (*D. angustifolium* has beardless nodes, or nodes bearded with erect-ascending soft hairs, and longer leaves 20× or more as long as wide). *D. consanguineum* is distinguished from *D. ovale* by having strongly pilose upper blade surfaces (*D. ovale* upper blade surfaces are glabrous or with a few long hairs basally). The hairs of *D. consanguineum* frequently are strongly papillate. [= FNA, K, Z; = *Panicum consanguineum* Kunth – RAB, C, F, G, HC, S]

Dichanthelium depauperatum (Muhlenberg) Gould, Starved Witch Grass. Pd, Mt, Cp (GA, NC, SC, VA): dry soils of grasslands and open woods, often on disturbed soils of roadsides and ditches; common (rare in Coastal Plain south of VA). May-September. Newfoundland and MN south to GA and TX. [= FNA, K, Z; = *Panicum depauperatum* Muhlenberg – RAB, C, HC, S, WV; > *P. depauperatum* var. *depauperatum* – F, G; > *P. depauperatum* var. *psilophyllum* Fernald – F, G]

Dichanthelium dichotomum (Linnaeus) Gould *var.* ***dichotomum***, Forked Witch Grass. Cp, Pd, Mt (GA, NC, SC, VA): wet-mesic to dry woods, thickets, and woodland openings; common (rare in VA Coastal Plain). May-October. S. Canada and MI south to FL and TX. Plants with bearded nodes and larger leaves are referable to *Panicum dichotomum* var. *barbulatum* (here included) but intermediates abound. [= Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; > *P. dichotomum* var. *dichotomum* – F, WV; > *P. dichotomum* var. *barbulatum* (Michaux) Wood – F, WV; = *D. dichotomum* ssp. *dichotomum* – FNA; = *P. dichotomum* – G; > *P. dichotomum* – HC, S; > P. *barbulatum* Michaux – HC, S; < *D. dichotomum* var. *dichotomum* – K, Z; = *P. dichotomum* var. *dichotomum* – X]

Dichanthelium dichotomum (Linnaeus) Gould *var.* ***nitidum*** (Lamarck) LeBlond, Shining Witch Grass. Cp (GA, NC, SC, VA), Pd (NC), Mt (SC, VA): moist sandy or peaty soil of wet pine savannas and pocosin ecotones, wet meadows near the coast, swamps, and marshes; uncommon (rare in Piedmont and Mountains, rare in VA). PA and NJ south to FL, west to MO and TX; also the Bahamas (Sorrie & LeBlond 1997) and West Indies, and Mexico to Venezuela. [= Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; = *P. nitidum* Lamarck – F, HC, S; = *D. dichotomum* ssp. *nitidum* (Lamarck) Freckmann & Lelong – FNA; = *P. nitidum* var. *nitidum* – G; < *D. dichotomum* var. *dichotomum* – K, Z; = *P. dichotomum* var. *nitidum* (Lamarck) Wood – X]

Dichanthelium dichotomum (Linnaeus) Gould *var.* ***ramulosum*** (Torrey) LeBlond, Branched Witch Grass. Cp, Pd, Mt (GA, NC, SC, VA): floodplain forests, swamps, openings, and borders of streams and ponds, and occasionally in dry upland woods; common. May-October. MA and MI south to FL and TX. [= Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; = *P. microcarpon* Muhlenberg ex Elliott – F, HC, S, WV; = *D. dichotomum* ssp. *microcarpon* (Muhlenberg ex Elliott) Freckmann & Lelong – FNA; = *P. nitidum* Lamarck var. *ramulosum* Torrey – G; < *D. dichotomum* var. *dichotomum* – K, Z; = *P. dichotomum* var. *ramulosum* (Torrey) Lelong – X]

Dichanthelium dichotomum (Linnaeus) Gould *var.* ***roanokense*** (Ashe) LeBlond, Roanoke Witch Grass. Cp (GA, NC, SC, VA): wet pine savannas, swamp openings, and wet peaty meadows; uncommon (rare in VA). May-September. DE south to FL, west to e. TX; also in Jamaica. See note under *D. caerulescens* regarding FNA treatment. [= Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; = *P. roanokense* Ashe – F, HC, S; < *D. dichotomum* ssp. *roanokense* (Ashe) Freckmann & Lelong – FNA; < *P. roanokense* – G; < *D. dichotomum* var. *dichotomum* – K, Z; < *P. dichotomum* var. *roanokense* (Ashe) Lelong – X]

Dichanthelium ensifolium (Baldwin ex Elliott) Gould, Small-leaved Witch Grass. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA): wet to mesic peaty, sandy, or mucky soils, often in open pinelands or with sphagnum; common (rare in Piedmont). May-October. NJ south to FL, west to e. TX and AR. Plants with pubescent spikelets are frequent. [= *D. ensifolium* ssp. *ensifolium* – FNA; < *Panicum ensifolium* Baldwin ex Elliott – RAB, C, G, GW; = *P. ensifolium* – F; > *P. ensifolium* – HC, S; > *P. flavovirens* Nash – HC, S; > *P. vernale* Hitchcock & Chase – HC, S; < *D. dichotomum* (Linnaeus) Gould var. *ensifolium* (Baldwin ex Elliott) Gould & Clark – K, Z; < *P. ensifolium* var. *ensifolium* – X]

Dichanthelium erectifolium (Nash) Gould & Clark, Erect-leaved Witch Grass. Cp (GA, NC, SC): limesink ponds, depression meadows, cypress savannas, pine savannas; rare. May-August. Se. NC to FL, west to LA; Cuba. [= FNA, K, Z; = *Panicum erectifolium* Nash – RAB, GW, HC, S]

Dichanthelium fusiforme (Hitchcock) Harvill, Spindle-fruited Witch Grass. Cp (GA, NC, SC, VA): dry to moist sand of open pine and pine/oak woods and clearings; rare. May-November. Se. VA south to FL, west to MS, also in West Indies, Mexico, Central America, and Venezuela; perhaps most abundant in FL. Autumnal blades often flat. The autumnal form of *D. oligosanthes* var. *oligosanthes* can be very similar to *D. fusiforme* if the vernal blades of the former are missing. They are best separated by ligule length (0.5-1 mm in *fusiforme*, 1.5-3 mm in *oligosanthes*) and the more attenuated ends of the *fusiforme* spikelet. [= *Panicum fusiforme* Hitchcock – RAB, F, G, HC, S; < *P. aciculare* Desvaux ex Poiret – C; = *D. aciculare* ssp. *fusiforme* (Hitchcock) Freckmann & Lelong – FNA; < *D. aciculare* – K, Z]

Dichanthelium hirstii (Swallen) Kartesz, Hirsts' Witch Grass. Cp (GA, NC): pond-cypress savannas and limesink depressions; rare. June-September. This distinctive species is known from only seven sites: two in NC, one in DE, two in NJ (one not seen since 1992), and two historical populations in GA. Described in 1961 (Swallen 1961), it is treated by some taxonomists as part of the *D. aciculare* group and by others as part of the *D. dichotomum* group; its affinities appear to lie with the former. See Schuyler (1996) for a discussion of the taxonomic distinctiveness of this species. The occurrence of this species in NC is documented in LeBlond & Sorrie (2001). [= K; < *Panicum aciculare* Desvaux ex Poiret – C; < *D. dichotomum* ssp. *roanokense* (Ashe) Freckmann & Lelong – FNA]

Dichanthelium latifolium (Linnaeus) Harvill, Broad-leaved Witch Grass. Mt (GA, NC, SC, VA), Pd (VA, Cp (VA): open or shady well-drained forests; common (rare south of VA). Late May-September. ME south to n. GA, west to WI and MS. [=

FNA; = *Panicum latifolium* Linnaeus – RAB, C, F, G, HC, S, WV; = *D. latifolium* (Linnaeus) Gould & Clark – K, Z, a later combination]

Dichanthelium laxiflorum (Lamarck) Gould, Open-flower Witch Grass. Cp, Pd, Mt (GA, NC, SC, VA): open or shaded woodlands, often in moist soil; common. April-September. MD south to FL, west to TX, north to IN, also in Mexico, Central America, and West Indies. [= FNA, K, Z; = *Panicum laxiflorum* Lamarck – RAB, C, F, G; > *P. laxiflorum* – HC, S; > *P. xalapense* Humboldt, Bonpland, & Kunth var. *xalapense* – HC, S; > *P. xalapense* var. *strictirameum* Hitchcock & Chase – HC, S; > *P. xalapense* – WV]

Dichanthelium leucothrix (Nash) Freckmann, Roughish Witch Grass. Cp (GA, NC, SC), Pd (GA, NC, SC, VA): wet sandy, peaty, or mucky soil of pinelands; uncommon (rare in Piedmont). May-October. S. NJ south to FL, west to TX, also in TN, West Indies and n. South America. A micrometer is needed to measure the very short puberulence (0.1 mm) that distinguishes this taxon, *D. meridionale*, and *D. wrightianum* from other members of the *D. acuminatum* group. [= K, Y; = *Panicum leucothrix* Nash – RAB, F, G, HC, S; < *P. leucothrix* – C; = *D. acuminatum ssp. leucothrix* (Nash) Freckmann & Lelong – FNA; < *P. spretum* Schultes – GW; = *P. acuminatum* Swartz var. *leucothrix* (Nash) Lelong – X; < *D. acuminatum* (Swartz) Gould & Clark var. *implicatum* (Scribner) Gould & Clark – Z]

Dichanthelium linearifolium (Scribner) Gould, Low White-haired Witch Grass. Pd, Mt (GA, NC, SC?, VA), Cp (VA): dry open woods; common (rare south of VA). May-October. Se. Canada and MN south to GA and TX. [= FNA, K, Z; = *Panicum linearifolium* Scribner – RAB, C, S; > *P. linearifolium* var. *linearifolium* – F, G, WV; > *P. linearifolium* var. *werneri* (Scribner) Fernald – F, G, WV; > *P. linearifolium* – HC; > *P. werneri* Scribner – HC]

Dichanthelium longiligulatum (Nash) Freckmann, Long-ligule Witch Grass. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA): limesink ponds, depression meadows, cypress savannas, pine savannas, bogs, swamps; common (rare in Piedmont, rare in VA). May-September. NJ and PA south to FL, also in TN, e. TX, and Central America. Intermediate forms between this taxon and *D. spretum* occur. [= K, Y; = *Panicum longiligulatum* Nash – RAB, HC, S; < *P. lanuginosum* Elliott var. *lindheimeri* (Nash) Fernald – C, G; = *D. acuminatum* ssp. *longiligulatum* (Nash) Freckmann & Lelong – FNA; < *P. spretum* Schultes – GW; = *P. acuminatum* Swartz var. *longiligulatum* (Nash) Lelong – X; = *D. acuminatum* (Swartz) Gould & Clark var. *longiligulatum* (Nash) Gould & Clark – Z]

Dichanthelium lucidum (Ashe) LeBlond, Bog Witch Grass. Cp, Pd, Mt (GA, NC, SC, VA): wet meadows, sphagnous swamps, bogs, wet woods, sphagnous streamhead pocosins, baygalls; common (uncommon in Mountains). May-October. MA and MI south to FL and TX. Vernal culms soon recline, producing a tangled mass. The papillose fertile lemma is diagnostic. [= Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; = *P. lucidum* Ashe – G, S; > *P. lucidum* var. *lucidum* – F, HC; > *P. lucidum* var. *opacum* Fernald – F, HC; < *D. dichotomum* ssp. *lucidum* (Ashe) Freckmann & Lelong – FNA; < *D. dichotomum* var. *dichotomum* – K, Z; < *P. dichotomum* var. *lucidum* (Ashe) Lelong – X]

Dichanthelium mattamuskeetense (Ashe) Mohlenbrock, Mattamuskeet Witch Grass. Cp (NC, SC, VA): wet savannas, meadows, borders of pocosin shrub swamps, thickets; uncommon (rare in VA). May-October. Se. MA south to ne. SC. Typically a robust plant, often richly tinged with dark purple-maroon. [= Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; > *P. mattamuskeetense* var. *mattamuskeetense* – F; > *P. mattamuskeetense* var. *clutei* (Nash) Fernald – F; < *D. dichotomum* (Linnaeus) Gould ssp. *mattamuskeetense* (Ashe) Freckmann & Lelong – FNA; > *P. mattamuskeetense* Ashe – G, HC, S; > *P. annulum* Ashe var. *glabrescens* Gleason – G; > *P. clutei* Nash – HC, S, WV; < *D. dichotomum* var. *dichotomum* – K, Z; < *P. dichotomum* var. *mattamuskeetense* (Ashe) Lelong – X]

Dichanthelium meridionale (Ashe) Freckmann, Matting Witch Grass. Pd, Cp, Mt (GA, NC, SC, VA): dry to damp sand of shores and woods; uncommon. May-October. Sw. Nova Scotia and MA to MN, south to e. NC, n. GA, and n. AL. A micrometer is needed to measure the very short puberulence (0.1 mm) that distinguishes this taxon, *D. leucothrix*, and *D. wrightianum* from other members of the *D. acuminatum* group. [= K, Y; < *Panicum lanuginosum* Elliott – RAB; < *P. leucothrix* Nash – C; > *P. meridionale* var. *meridionale* – F; > *P. meridionale* var. *albemarlense* (Ashe) Fernald – F; = *D. acuminatum* (Swartz) Gould & Clark ssp. *implicatum* (Scribner ex Nash) Freckmann & Lelong – FNA; = *P. meridionale* Ashe – G; > *P. meridionale* – HC, S, WV; > *P. albemarlense* Ashe – HC, S, WV; < *P. acuminatum* Swartz var. *unciphyllum* (Trinius) Lelong – X; < *D. acuminatum* var. *implicatum* (Scribner) Gould & Clark – Z]

Dichanthelium oligosanthes (Schultes) Gould *var.* ***oligosanthes***, Few-flowered Witch Grass. Cp, Pd (GA, NC, SC, VA): sandy fields and open woods; uncommon (rare in Piedmont, rare in VA Coastal Plain). April-October. MA and MN south to FL and TX. See note under *D. fusiforme*. [= K, Z; = *Panicum oligosanthes* Schultes – RAB, HC, S; < *P. oligosanthes* – C, G; = *P oligosanthes* var. *oligosanthes* – F; = *D. oligosanthes* ssp. *oligosanthes* – FNA]

Dichanthelium oligosanthes (Schultes) Gould *var.* ***scribnerianum*** (Nash) Gould, Scribner's Witch Grass. Mt, Pd (GA, VA), Cp (NC, VA): calcareous maritime forests, dry thin woods and openings, dry prairies, usually in basic soil; uncommon in Mountains (rare in Piedmont and Coastal Plain). April-November. Sw. ME to s. British Columbia, south to se. NC, n. GA, and CA, also in n. Mexico. Throughout the U.S., but infrequent in the southeastern and western states. [= K, Z; < *Panicum oligosanthes* Schultes – RAB, C, G; = *P. oligosanthes* var. *scribnerianum* (Nash) Fernald – F; = *D. oligosanthes* ssp. *scribnerianum* (Nash) Freckmann & Lelong – FNA; = *P. scribnerianum* Nash – HC, S]

Dichanthelium ovale (Elliott) Gould & Clark *var.* ***addisonii*** (Nash) Gould & Clark, Low Stiff Witch Grass. Cp (GA, NC, SC, VA), Mt (VA): dry to damp sandy woods and fields; uncommon (rare in VA). May-October. MA and MN south to FL and TX, also in n. Mexico. See note under *D. ovale* var. *ovale*. [= K, Z; = *Panicum commonsianum* Ashe – RAB, C; > *P. commonsianum* var. *commonsianum* – F, G; > *P. commonsianum* var. *addisonii* (Nash) Fernald – F, G; > *P. mundum* Fernald – F, G, HC; > *P. villosissimum* var. *pseudopubescens* (Nash) Fernald – F, G; = *D. ovale* ssp. *pseudopubescens* (Nash) Freckmann & Lelong – FNA; > *P. commonsianum* – HC, S; *P. pseudopubescens* Nash – HC, S; *P. addisonii* Nash – HC, S; *P. wilmingtonense* Ashe – HC, S; = *P. ovale* Elliott var. *pseudopubescens* (Nash) Lelong – X]

Dichanthelium ovale (Elliott) Gould & Clark *var.* ***ovale***, Oval-flowered Witch Grass. Cp (GA, NC, SC, VA): dry to damp sandy pinelands; rare. May-October. NY to WI, south to FL and e. TX. Infrequent over most of its range except FL. In our region, the *D. ovale* double ligule character is more evident in var. *ovale*, with var. *addisonii* often having only a single ligule

about 1 mm long. Also see note under *D. consanguineum*, and note at end of descriptions regarding *Panicum malacon* (placed in synonymy here). [= K, Z; = *Panicum ovale* Elliott – RAB, X; = *D. ovale* ssp. *ovale* – FNA; > *P. ovale* – HC, S; > *P. malacon* Nash – HC, S; = *P. ovale* var. *ovale* – X]

Dichanthelium polyanthes (Schultes) Mohlenbrock, Small-fruited Witch Grass. Pd, Mt, Cp (GA, NC, SC, VA): damp to dry soil of open woods and ditches; common (absent from the outer Coastal Plain south of the Neuse River, NC). June-October. VA to s. IL, south to GA and e. TX. [= FNA; = *Panicum polyanthes* Schultes – RAB, C, F, G, GW, HC, S, WV; = ***D. sphaerocarpon*** (Elliott) Gould var. ***isophyllum*** (Scribner) Gould & Clark – K, Z]

Dichanthelium portoricense (Desvaux ex Hamilton) B.F. Hansen & Wunderlin, Puerto Rican Witch Grass. Cp (GA, NC, SC): moist pine savannas and flatwoods; common (uncommon in SC). May-September. NC south to FL, west to TX, also in West Indies. [= *Panicum portoricense* Desvaux ex Hamilton – RAB, HC, S; = *D. portoricense* ssp. *portoricense* – FNA; < *D. sabulorum* (Lamarck) Gould & Clark var. *thinium* (Hitchcock & Chase) Gould & Clark – K, Z; = *P. portoricense* var. *portoricense* – X]

Dichanthelium ravenelii (Scribner & Merrill) Gould, Ravenel's Witch Grass. Cp, Pd (GA, NC, SC, VA): dry sandy or rocky thin woods and openings, sometimes in moist soils; common (rare in VA). May-October. NJ south to FL, west to e. TX, north to IA. [= FNA, K, Z; = *Panicum ravenelii* Scribner & Merrill – RAB, C, F, G, HC, S]

Dichanthelium scabriusculum (Elliott) Gould & Clark, Tall Swamp Witch Grass. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): moist, low, open or shaded woodlands, often along streams or ditches; common in Coastal Plain, uncommon in Piedmont (rare in VA). May-October. Se. MA south to FL, west to e. TX and AR. [< *Panicum scabriusculum* – RAB, C, GW; > *P. scabriusculum* – F, HC, S; > *P. aculeatum* Hitchcock & Chase – F, G, HC, S; < *D. scabriusculum* – FNA, K, Z; > *P. scabriusculum* var. *scabriusculum* – G]

Dichanthelium scoparium (Lamarck) Gould, Velvet Witch Grass. Cp, Pd, Mt (GA, NC, SC, VA): moist sandy soil of woodland openings and ditches; common (uncommon in Mountains). May-October. MA and MI south to FL and TX, also in Mexico and West Indies. The dense, velvety pubescence of the internodes, sheaths, and blades of this taxon, combined with the viscid band below the nodes, are diagnostic. [= FNA, K, Z; = *Panicum scoparium* Lamarck – RAB, C, F, G, GW, HC, S]

Dichanthelium species 2 (=webberianum), Webber's Witch Grass. Cp (GA, NC, SC): moist pine savannas and flatwoods; uncommon. May-August. Disjunct in se. NC and SC from GA and FL. [= *Panicum webberianum* Nash – RAB, HC, S; < *D. portoricense* (Desvaux ex Hamilton) B.F. Hansen & Wunderlin ssp. *patulum* (Scribner & Merrill) Freckmann & Lelong – FNA; < *D. sabulorum* (Lamarck) Gould & Clark var. *patulum* (Scribner & Merrill) Gould & Clark – K, Z; < *P. portoricense* Desvaux ex Hamilton var. *nashianum* (Scribner) Lelong – X]

Dichanthelium species 3 (=lancearium), Nash's Witch Grass. Cp, Pd (GA, NC, SC, VA): moist pine savannas and flatwoods, moist to dry openings in maritime forests, dry pine and oak sandhills; common (uncommon in Piedmont, rare in VA Piedmont and Coastal Plain). May-September. Se. VA to FL, west to e. TX, also in West Indies and Central America. This and *D. portoricense* appear to intergrade in our region, and =*lancearium* is treated as part of *D. portoricense* ssp. *patulum* in FNA, whose concept of ssp. *patulum* includes *Panicum webberianum* (*D. species 2* here) and *P. patentifolium*, both of which appear to merit recognition (=*webberianum* as a species and =*patentifolium* as at least a variety). [= *Panicum lancearium* Trinius – RAB, C, G; > *P. lancearium* var. *lancearium* – F; > *P. lancearium* var. *patulum* (Scribner & Merrill) Fernald – F; < *D. portoricense* (Desvaux ex Hamilton) B.F. Hansen & Wunderlin ssp. *patulum* (Scribner & Merrill) Freckmann & Lelong – FNA; > *P. lancearium* – HC, S; > *P. patulum* (Scribner & Merrill) Hitchcock – HC, S; < *D. sabulorum* (Lamarck) Gould & Clark var. *patulum* (Scribner & Merrill) Gould & Clark – K, Z; < *P. portoricense* Desvaux ex Hamilton var. *nashianum* (Scribner) Lelong – X]

Dichanthelium species 5 (=neuranthum), Nerved Witch Grass. Cp (GA, NC): maritime wet grasslands and wet savannas near the coast; rare. May-September. Disjunctly in se. NC, se. SC, GA, FL, s. MS, TX, Bahamas, Cuba, and Belize. Treated as *D. aciculare* ssp. *neuranthum* in FNA, but distinctive morphology and habitat argue for recognition as a species. Can occur with the similar-appearing *D. caerulescens*; from which it differs by having spikelets that are longer (1.8-2.0 mm vs. 1.4-1.8), rounded vs. obtuse to sub-acute, and pubescent vs. glabrous; longer first glumes (0.8-1.0 mm vs. 0.3-0.8); leaves 15× or more as long as wide vs. 10-15×; and a nearly strict panicle. FNA gives a spikelet length of 2-2.8 mm, well beyond the length of spikelets on specimens we have seen throughout the range. As FNA provides no synonymy, it is possible that its concept of *"neuranthum"* includes entities treated separately here, or entities outside the range of this flora. [= *Panicum neuranthum* Grisebach – RAB, HC, S; = *D. aciculare* (Desvaux ex Poiret) Gould & Clark ssp. *neuranthum* (Grisebach) Freckmann & Lelong – FNA; < *D. aciculare* – K, Z]

Dichanthelium species 9 (=cryptanthum), Hidden-flowered Witch Grass. Cp (NC, SC): wet meadows and ditches, streamside openings; rare. May-September. NC (or NJ?) to MS (or TX?) (previous concepts of this taxon and its range are unclear). In the field, this taxon can be mistaken for *D. yadkinense*; it is readily distinguished by its scabrous peduncle and membranous ligules. [= *Panicum cryptanthum* Ashe – F, HC, S; < *P. scabriusculum* Elliott – RAB, C, GW; < *D. scabriusculum* (Elliott) Gould & Clark – FNA, K, Z; = *P. scabriusculum* var. *cryptanthum* (Ashe) Gleason – G]

Dichanthelium species 10 (=curtifolium), Short-leaved Witch Grass. Cp (SC), Mt (NC): bogs, sphagnous streamhead swamps, mountain streams; uncommon (rare in Piedmont and Mountains). April-September. Ranging disjunctly in w. NC and e. TN, e. SC, FL, and MS. The combination of characters is quite distinctive for the genus in our region. [= *Panicum curtifolium* Nash – RAB, HC, S; = *D. ensifolium* (Baldwin ex Elliott) Gould ssp. *curtifolium* (Nash) Freckmann & Lelong – FNA; < *D. acuminatum* (Swartz) Gould & C.A. Clark var. *implicatum* (Scribn.) Gould & C.A. Clark – K, Z; = *Panicum ensifolium* Baldwin ex Elliott var. *curtifolium* (Nash) Lelong – X]

Dichanthelium sphaerocarpon (Elliott) Gould, Round-fruited Witch Grass. Cp, Pd, Mt (GA, NC, SC, VA): moist or dry thin woods, meadows, and ditches, often in dry sandy soil; common. May-October. MA, VT, OH, and KA south to FL and TX, also in Mexico. [= FNA, K, Z; = *Panicum sphaerocarpon* Elliott – RAB, C, WV; > *P. sphaerocarpon* var. *sphaerocarpon* – F, G, HC, S; > *P. sphaerocarpon* var. *inflatum* (Scribner & J.G. Smith) Hitchcock & Chase – F, G, HC, S]

Dichanthelium sphagnicola (Nash) LeBlond, Peaty Witchgrass. Cp (FL, GA): edges of cypress swamps, in sphagnous bogs, moist shady places; rare (but poorly known). May-October. GA (Chatham County) to FL; should be sought in se. SC. Treated in synonymy with *Panicum dichotomum* by RAB, but no specimen is known from the Carolinas. This species is similar to *D. lucidum* in appearance, and differs most readily by its larger pubescent spikelets with smooth fertile lemma and palea. [= Q; < *Panicum dichotomum* Linnaeus – RAB; < *D. dichotomum* (Linnaeus) Gould ssp. *lucidum* (Ashe) Freckmann & Lelong – FNA; = *P. sphagnicola* Nash – HC, S; < *D. dichotomum* var. *dichotomum* – K, Z; < *P. dichotomum* var. *lucidum* (Ashe) Lelong – X]

Dichanthelium spretum (Schultes) Freckmann, Eaton's Witch Grass. Pd, Cp, Mt (GA, NC, SC, VA): wet sands and peats of bogs, savannas, meadows, and shores; rare (rare in NC and VA). May-September. ME south to n. FL, LA and e. TX. Intermediate forms between this taxon and *D. longiligulatum* occur. [= K, Y; = *Panicum spretum* Schultes – RAB, C, F, G, HC, S; = *D. acuminatum* (Swartz) Gould & Clark ssp. *spretum* (Schultes) Freckmann & Lelong – FNA; < *P. spretum* – GW; = *P. acuminatum* Swartz var. *densiflorum* (Rand & Redfield) Lelong – X; = *D. acuminatum* var. *densiflorum* (Rand & Redfield) Gould & Clark – Z]

Dichanthelium strigosum (Muhlenberg) Freckmann *var.* ***glabrescens*** (Grisebach) Freckmann, Hairless Witch Grass. Cp (GA): low, open sandy pinelands and hammocks; rare (?). May-October. S. GA and FL west to LA; also in West Indies, Belize. Included in synonymy with *Panicum strigosum* by RAB, but no specimen from the Carolinas has been found. [= K; = *D. strigosum* ssp. *glabrescens* (Grisebach) Freckmann & Lelong – FNA; < *Panicum strigosum* Muhlenberg – GW; = *P. polycaulon* Nash – HC, S; = *D. leucoblepharis* (Trinius) Gould & Clark var. *glabrescens* (Grisebach) Gould & Clark – Z]

Dichanthelium strigosum (Muhlenberg) Freckmann *var.* ***leucoblepharis*** (Trinius) Freckmann, Dwarf Witch Grass. Cp, Mt (GA, NC, SC): sandy, acidic soils of pinelands; uncommon (rare in Mountains). May-October. NC south to FL, west to TX, also in Mexico. [= K; = *Panicum ciliatum* Elliott – RAB, HC, S; = *D. strigosum* ssp. *leucoblepharis* (Trinius) Freckmann & Lelong – FNA; = *P. strigosum* Muhlenberg var. *leucoblepharis* (Trinius) Lelong – X; = *D. leucoblepharis* (Trinius) Gould & Clark var. *leucoblepharis* – Z]

Dichanthelium strigosum (Muhlenberg) Freckmann *var.* ***strigosum***, Rough-hairy Witch Grass. Cp (GA, NC, SC, VA): moist soils of pine flatwoods, savannas, and pocosins, also in boggy situations; uncommon (rare in VA). May-September. Se. VA south to FL, west to TX, also in TN, e. Mexico, Mesoamerica, n. South America, and West Indies. [= K; = *Panicum strigosum* Muhlenberg – RAB, C, F, G, GW, HC, S; = *D. strigosum* ssp. *strigosum* – FNA; = *P. strigosum* var. *strigosum* – X; = *D. leucoblepharis* (Trinius) Gould & Clark var. *pubescens* (Vasey) Gould & Clark – Z]

Dichanthelium tenue (Muhlenberg) Freckmann & Lelong, White-edged Witch Grass. Cp (GA, NC, SC, VA), Pd, Mt (GA, NC, SC): wet peaty or sandy soil pineland savannas, flatwoods, bogs, and meadows; common (uncommon in Piedmont, rare in Mountains). May-October. NJ south to FL, west to TX, also in Mesoamerica and Cuba. This treatment of *D. tenue* includes plants from northern Alabama formerly recognized as *Panicum concinnius*, with spikelets 1.2-1.4 mm long but otherwise possessing the characters of *D. tenue*. [= FNA; = *Panicum tenue* Muhlenberg – RAB, C; > *P. tenue* – F, HC, S; > *P. albomarginatum* Nash – F, HC, S; > *P. trifolium* Nash – F, G, HC, S; < *P. ensifolium* Baldwin – G; > *P. concinnius* Hitchcock & Chase – HC, S; < *D. dichotomum* (Linnaeus) Gould var. *tenue* (Muhlenberg) Gould & Clark – K, Z]

Dichanthelium villosissimum (Nash) Freckmann *var.* ***villosissimum***, White-haired Witch Grass. Cp, Pd, Mt (GA, NC, SC, VA): dry sandy soil of open woods and prairies; common (uncommon in VA). April-September. MA south to FL, west to TX, also in Mexico and Mesoamerica. Appearing to be related to *D. ovale* based on such characters as the double ligule. [= K, Y; = *Panicum villosissimum* Nash – RAB, C, HC, S, WV; = *P. villosissimum* var. *villosissimum* – F, G; = *D. ovale* (Elliott) Gould & Clark ssp. *villosissimum* (Nash) Freckmann & Lelong – FNA; = *P. ovale* Elliott var. *villosum* (A. Gray) Lelong – X; < *D. acuminatum* (Swartz) Gould & Clark var. *villosum* (A. Gray) Gould & Clark – Z]

Dichanthelium wrightianum (Scribner) Freckmann, Wright's Witch Grass. Cp (GA, NC, SC, VA): limesink ponds and meadows, cypress savannas, pine savannas, bogs; uncommon (rare in VA). May-September. MA south to FL, west to TX, also in Cuba and Mesoamerica. A micrometer is needed to measure the very short puberulence (0.1 mm) that distinguishes this taxon, D. *meridionale*, and *D. leucothrix* from other members of the *D. acuminatum* group. [= FNA, K, Y; = *Panicum wrightianum* Scribner – RAB, C, F, G, HC, S; < *P. spretum* Schultes – GW; = *D. acuminatum* (Swartz) Gould & Clark var. *wrightianum* (Scribner) Gould & Clark – Z]

Dichanthelium yadkinense (Ashe) Mohlenbrock, Spotted-sheath Witch Grass. Pd, Cp, Mt (GA, NC, SC, VA): floodplain forests, thickets, bottomlands, and swamps, often on alluvial deposits; common (uncommon in Coastal Plain, uncommon in Mountains, uncommon in VA). May-October. NJ and MI south to GA and TX, also in Mexico. Sheaths often with wart-like glands. This taxon resembles *D. species 9 (=cryptanthum)*, from which it differs most readily by its hairy ligule (vs. membranous) and smooth peduncle (vs. antrorsely scabrous). [= Q; < *Panicum dichotomum* Linnaeus – RAB, GW; = *P. yadkinense* Ashe – C, F, G, HC, S, WV; = *D. dichotomum* ssp. *yadkinense* (Ashe) Freckmann & Lelong – FNA; < *D. dichotomum* var. *dichotomum* – K, Z; = *P. dichotomum* var. *yadkinense* (Ashe) Lelong – X]

Dichanthelium chamaelonche (Trinius) Freckmann & Lelong *ssp. breve* (Hitchcock & Chase) Freckmann & Lelong, Short Witch Grass, endemic to c. and s. FL, primarily near the east coast. [= FNA; = *Panicum breve* Hitchcock & Chase – HC, S; = *D. dichotomum* (Linnaeus) Gould var. *breve* (Hitchcock & Chase) Gould & Clark – K, Z; = *P. chamaelonche* Trinius var. *breve* (Hitchcock & Chase) Lelong – X]

Dichanthelium dichotomum (Linnaeus) Gould *var. glabrifolium* (Nash) Gould & Clark, Smooth-leaved Witch Grass, endemic to peninsular FL, mostly near the west coast. Like *D. chamaelonche* ssp. *breve*, this taxon appears to be more closely related to *D. chamaelonche* than to *D. dichotomum* or *D. ensifolium*. [= K, Z; = *Panicum glabrifolium* Nash – HC, S; < *P. chamaelonche* Trinius var. *chamaelonche* – X]

Dichanthelium leibergii (Vasey) Freckmann, Leiberg's Witch Grass, NY and PA west to Alberta, ND, and KS. [= FNA, K, Z; = *Panicum leibergii* (Vasey) Scribner – C, F, G, HC]

Dichanthelium malacophyllum (Nash) Gould, Soft-leaf Witch Grass, KY and TN west to KS and TX. Primarily a plant of cedar glades and dry calcareous soils. Reported from SC by FNA, but source of record has not been identified. [= FNA, K, Z; = *Panicum malacophyllum* – F, G, HC, S]

Dichanthelium nudicaule (Vasey) B.F. Hansen & Wunderlin. Cp (AL, FL, MS): bogs, wet pine savannas; rare. W. FL Panhandle and s. AL west to MS. [= Q; = *Panicum nudicaule* Vasey] {add synonymy}

Dichanthelium wilcoxianum (Vasey) Freckmann is shown as occurring in SC and MS on the range map in FNA, but the source of these records is not known for this plant primarily of dry prairies in the Upper Midwest. It is not treated here.

Dichanthelium xanthophysum (A. Gray) Freckmann, Slender Witch Grass, ME south to PA, WV, west to SD; Nova Scotia to Saskatchewan. [= FNA, K, Z; = *Panicum xanthophysum* A. Gray – C, F, G, HC, WV]

Panicum chrysopsidifolium Nash is treated variously by the cited sources. According to Z, who examined an isotype collection and found the ligule to be 2.5 mm long, it belongs to *D. acuminatum* var. *acuminatum*. Plants referred to by HC all have ligules < 1 mm long, and apparently belong to the *D. aciculare* complex. These plants are described as having densely villous nodes, internodes, sheaths, and blades; the blades 5-10 cm long and 3-5 mm wide; and spikelets 1.9-2.2 mm long, obovate, and villous. HC gives a range of se. VA to FL, west to TX, along the Coastal Plain in sandy oak or pine woods. This entity needs further scrutiny.

Panicum glutinoscabrum Fernald is an entity known only locally from "boggy spots" in southeastern Virginia. It is treated as a full species by F, but is placed in synonymy with *Dichanthelium scoparium* (Lamarck) Gould by FNA; with *D. acuminatum* (Swartz) Gould & Clark var. *acuminatum* by Z; with *P. lanuginosum* Elliott var. *fasciculatum* (Torrey) Fernald by C; and with *P. huachucae* Ashe var. *fasciculatum* (Torrey) Hubb. by HC. *Panicum glutinoscabrum* is described as having culms 7-9 dm high; elongate internodes with cinereous puberulence and black, warty, viscid glands; villous nodes; glutinous-warty and scabrous sheaths and blades; ligule 4-5 mm long; minutely puberulent panicle axis; spikelets ellipsoid, subacute, 1.7-1.8 mm long, pubescent; first glume subacute, 0.6-0.7 mm long. Y concedes that "I am not able to render a decision on the poorly known *P. glutinoscabrum* Fernald, but I suggest that it is a hybrid between a member of the *D. acuminatum* complex and *D. scoparium* (Lam.) Gould - the latter contributing the genes for height and viscid sheaths."

Panicum malacon Nash, here placed in synonymy with *Dichanthelium ovale* var. *ovale*, needs additional study. It is distinguished by HC and S as having spikelets 3-3.2 mm long with a first glume situated conspicuously below the second glume and sterile lemma, half or more as long as the spikelet; and leaves 3-5 mm wide, puberulent beneath, and puberulent to glabrous above. The leaf width and puberulence characters are not consistent with descriptions of *D. ovale*, and the placement of *P. malacon* within *D. ovale* by current treatments (including this one) may be in error. The description of *P. malacon* in RAB differs greatly from that of HC and S, and falls well outside the range of *D. ovale* characters. In RAB, *P. malacon* is described as having spikelets 3.5-4 mm long, and leaves 5-14 mm wide. This description may be based on specimens from the Sandhills of SC at NCU identified as *P. malacon* and matching the RAB description. These specimens appear to be misidentified collections of *D. oligosanthes* var. *oligosanthes*.

Digitaria Haller 1768 (Crab Grass)

A genus of about 200 species, primarily in the tropics and subtropics. Most of our species occur primarily in disturbed situations; their original distributions and habitats are now obscure. References: Wipff in FNA (2003a); Webster (1987)=Z; Wipff & Hatch (1994)=Y; Wipff (1996b)=X; Webster (1980).

1 Inflorescence an open panicle; spikelets long-pedicellate, borne singly at the ends of long panicle branches; [section *Pennatae*] ..... ***D. cognata*** *var.* ***cognata***

1 Inflorescence of 2-several spikelike racemes borne digitately or in close proximity near the summit of the culm; spikelets sessile or short-pedicellate, borne more-or-less closely spaced along the racemes.

2 Rachis of each raceme narrow, trigonous, only slightly (if at all) winged.

3 Spikelets 4.2-5.9 mm long ..... ***D. insularis***

3 Spikelets 1.3-3.6 mm long.

4 Spikelets in 2s on the middle portions of the primary branches, the pedicels not adnate; upper lemmas gray, yellow, and/or purple-tinged when immature, purple at maturity ..... ***D. texana***

4 Spikelets in groups of 2-5 on the middle portions of the primary branches, the longer pedicels often adnate to the primary branch for a portion of their lengths; upper lemmas brown when immature, dark brown at maturity.

5 Spikelets 1.7-2.2 mm long; plants 3-10 dm tall; racemes to 10 cm long; upper sheaths glabrous, lower sheaths glabrous to sparsely pilose ..... ***D. filiformis*** *var.* ***filiformis***

5 Spikelets 2.0-2.8 mm long; plants 8-15 dm tall; racemes to 25 cm long; upper sheaths glabrous or pilose, lower sheaths densely pilose ..... ***D. villosa***

2 Rachis of each raceme broad (0.5-1 mm wide), winged, the wings as wide as or wider than the rachis proper.

6 Lower sheaths glabrous; second glume 0.75-1× as long as the first glume (which may be ; fertile lemma dark brown or black at maturity (or pale brown or gray in *D. longiflora*).

7 Hairs of the spikelet minutely capitate; second glume ca. 1× as long as the first glume; spikelets 1.7-2.3 mm long ..... ***D. ischaemum***

7 Hairs of the spikelet not minutely capitate; second glume ca. 0.75× as long as the first glume; spikelets 1.2-1.7 mm long ..... ***D. violascens***

6 Lower sheaths pilose; second glume 0.3-0.6× as long (to 0.8× as long in *D. ciliaris*) as the first glume; fertile lemma white, tan, or grayish-brown at maturity.

8 Spikelets 1.5-1.8 mm long, villous with crinkled hairs; pedicels glabrous, terete in cross-section ..... ***D. serotina***

8 Spikelets (1.7-) 2.4-4.1 mm long, glabrous, scabrous, or pubescent with straight hairs; pedicels scabrous, 3-angled in cross-section; [section *Digitaria*].

9 Spikelets (1.7-) 2.5-3.4 mm long, averaging 3.0 mm long or shorter; leaf blades pilose over the upper surface ..... ***D. sanguinalis***

9 Spikelets 2.6-4.1 mm long, averaging 3.1 mm long or longer; leaf blades glabrous except for a few hairs on the upper surface at the base.

10 Lower lemma of the sessile spikelet with 5 equidistant nerves; lowermost inflorescence node glabrous or pubescent with hairs < 0.4 mm long; apex of the first glume rounded to truncate ..... ***D. bicornis***

10 Lower lemma of sessile spikelet with the lateral nerves crowded to the margins; lowermost inflorescence node pubescent with hairs > 0.4 mm long; apex of the first glume acute ..... ***D. ciliaris***

Digitaria bicornis (Lamarck) Roemer & J.A. Schultes. Cp (FL, GA, NC, SC): sandy fields, lawns, roadsides, disturbed places; common. Webster (1980) believed that this species is likely to occur in VA and MD, as well. Whether or not it is introduced is unclear; it is now widely distributed in the tropics and subtropics worldwide. [= FNA, K, Z]

Digitaria ciliaris (Retzius) Köler, Southern Crab Grass. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC): sandy fields, roadsides, and disturbed areas; common? August-October. [= C, FNA, K, Z; = *D. sanguinalis* var. *ciliaris* (Retzius) Parlatore – F, HC]

Digitaria cognata (J.A. Schultes) Pilger, Fall Witch Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): sandy fields and roadsides; common (rare in VA). July-October. Wipff & Hatch (1994) discuss the reasons for including *Leptoloma* in *Digitaria*. [= FNA; = *Digitaria cognata* var. *cognata* – K; = *Leptoloma cognatum* (J.A. Schultes) Chase – RAB, C, F, G, HC, S; = *D. cognatum* ssp. *cognatum* – Y]

Digitaria filiformis (Linnaeus) Köler *var. **filiformis***. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common (uncommon in Mountains). September-October. Var. *filiformis*, with pubescent spikelets, is widespread in e. North America. Var. *laeviglumis* (Fernald) J. Wipff, with glabrous spikelets, occurs in New England. Var. *dolichophylla* (Henrard) J. Wipff occurs in s. FL, Cuba, and PR. See Wipff (1996) for additional discusion. [= RAB, C, F, FNA, G, X; = *D. filiformis* – HC, K; = *Syntherisma filiformis* (Linnaeus) Nash – S; < *D. filiformis* – W, WV]

Digitaria insularis (Linnaeus) Mez ex Ekman, Sourgrass. Cp (AL, FL, MS): moist areas; rare. FL, AL, and MS west to TX; West Indies; Mexico, Central America, South America. [= FNA, K; = *Trichachne insularis* (Linnaeus) Nees – HC; = *Valota insularis* (Linnaeus) Chase – S]

* ***Digitaria ischaemum*** (Schreber) Muhlenberg, Smooth Crab Grass. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, lawns, disturbed areas; common, native of Eurasia. July-October. Two varieties have sometimes been recognized. Var. *ischaemum* has racemes (1-) 2-6, 1-9 (-10) cm long, mostly curved and plants mostly to 4 dm tall. Var. *mississippiensis* (Gattinger) Fernald has racemes 5-7, 6-15 cm long, mostly stiff and straight and plants to 10 dm tall. [= C, FNA, K, W, WV; > *D. ischaemum* var. *ischaemum* – F, G, HC; > *D. ischaemum* (Schreber) Muhlenberg var. *mississippiensis* (Gattinger) Fernald – F, G, HC; = *D. ischaemum* var. *ischaemum* – RAB; = *Syntherisma ischaemum* (Schreber) Nash – S]

* ***Digitaria sanguinalis*** (Linnaeus) Scopoli, Northern Crab Grass. Cp, Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common. July-October. [= RAB, FNA, C, G, K, W, WV, Z; = *D. sanguinalis* var. *sanguinalis* – F, HC; *Syntherisma sanguinalis* (Linnaeus) Dulac – S]

Digitaria serotina (Walter) Michaux, Dwarf Crab Grass. Cp (FL, GA, SC, VA): sandy woodlands; rare (rare in VA). October. [= RAB, C, F, FNA, G, GW, HC, K; = *Syntherisma serotina* Walter – S]

* ***Digitaria texana*** A.S. Hitchcock, Texas Crabgrass. Cp (VA): disturbed areas; rare, native of coastal Texas. Established in City of Virginia Beach, VA (VBA 2007). Also reported for St. Johns County, FL, adjacent to our area. [= FNA, HC, K] {add to synonymy}

Digitaria villosa (Walter) Persoon. Cp (GA, NC, SC, VA), Pd, Mt (GA, NC, SC): sandy fields, roadsides; common (rare in VA). September-October. [= HC, K; = *D. filiformis* var. *villosa* (Walter) Fernald – RAB, C, F, FNA, G, X; = *Syntherisma villosa* Walter – S]

* ***Digitaria violascens*** Link. Cp (FL, GA, NC, SC), Pd (GA, SC), Mt (GA): sandy fields, roadsides, and woodland borders; common. September-October. [= C, FNA, G, HC, K; = *D. ischaemum* var. *violascens* (Link) Radford – RAB; ? *Syntherisma floridana* (A.S. Hitchcock) A.S. Hitchcock – S]

* ***Digitaria eriantha*** Steudel *ssp. **pentzii*** (Stent) Kok, Pangola Grass. Cp (FL): pastures; rare, native of Africa. Introduced in n. FL (Wunderlin & Hansen 2003, 2006). [= FNA; < *D. eriantha* – K; = *D. pentzii* Stent] {not yet keyed; add to synonymy}

* *Digitaria horizontalis* Willdenow, Jamaican Crabgrass. Reported for SC on the basis of a specimen at NCU (Kartesz 1999). {check specimen} [= FNA, K] {not yet keyed; add to synonymy

* ***Digitaria longiflora*** (Retzius) Persoon, Indian Crabgrass. Cp (FL): lawns, roadsides, pastures; uncommon, native of Asia and Africa. Alachua, Dixie Duval, and Holmes counties southward to s. FL. [= FNA, K] {not yet keyed}

* ***Digitaria nuda*** Schumacher. Cp (FL) disturbed areas; rare, native of Africa. In our area, known only from Columbia County, FL. [= FNA, K; *Syntherisma nuda* (Schumacher) A.S. Hitchcock] {not yet keyed; add to synonymy}

Dinebra Jacquin 1809 (Viper Grass)

References: Barkworth in FNA (2003a).

* *Dinebra retroflexa* (Vahl) Panzer, Viper Grass, native of Africa and s. Asia, has been collected as a waif in Mecklenburg County, NC (Mellichamp, Matthews, & Smithka 1987). [= FNA, K] {not keyed}

Distichlis Rafinesque 1819 (Saltgrass)

A genus of about 5 species, of North, Central, and South America, and Australia. References: Barkworth in FNA (2003a).

Identification notes: When sterile, *Distichlis spicata* is easily confused with *Sporobolus virginicus*, with which it sometimes occurs. *Distichlis spicata* is generally a coarser plant, and lacks long hairs around the collar of the sheath; *Sporobolus virginicus* is more delicate, and typically has long hairs on either side of the collar.

Distichlis spicata (Linnaeus) Greene, Saltgrass, Spike Grass. Cp (FL, GA, NC, SC, VA): coastal marshes and shores, especially common in hypersaline flats (where infrequent tidal inundation is followed by evaporation); common. June-October. Two varieties (or subspecies or species) have often been recognized: var. *spicata* ranging along the Atlantic coast from Nova Scotia and Prince Edward Island south to tropical America, and on the Pacific coast of North America, and var. *stricta* (Torrey) Scribner widespread in saline situations in western North America. These do not appear to warrant taxonomic recognition

(Barkworth in FNA 2003a). [= RAB, FNA, GW, K, S; > *D. spicata* var. *spicata* – C; > *D. spicata* – F, G, HC; > *D. spicata* ssp. *spicata*]

Echinochloa Palisot de Beauvois 1812 (Barnyard-grass, Jungle-rice)

A genus of 4-5- species of the tropics and warm temperate regions. References: Michael in FNA (2003a). Key based in part on C.

1 Panicle elongate, the branches few, distant, unbranched, and short, to 2 (-3) cm long; spikelets awnless; leaves 3-6 (-9) mm wide ..... ***E. colonum***
1 Panicle broader, the branches numerous, approximate, often further branched, short to long, some (at least) exceeding 2 cm long; spikelets awnless or awned; leaves 5-30 mm wide.
  2 Lower sheaths usually papillate-pubescent; fertile lemma 2.5-4× as long as wide ..... ***E. walteri***
  2 Lower sheaths glabrous; fertile lemma 1.5-2.5× as long as wide.
    3 Inflorescence nodding; awns 4-29 mm long ..... ***E. cruspavonis*** *var.* ***cruspavonis***
    3 Inflorescence erect, stiff; awns 0-25 mm long.
      4 Second glume and sterile lemma hairy or scabrous to nearly glabrous, the hairs usually not papillose-based; fertile lemma obtuse or broadly acute, with a thin, membranous (later withering) tip set off from the body by a line of minute hairs.
        5 Panicle fairly open, the branches erect, appressed, or spreading; spikelets green or purple-tinged, awnless or with a well-developed awn (to 25 mm long); leaves 5-15 mm wide; plants mostly 3-7 dm tall ..... ***E. crusgalli*** *var.* ***crusgalli***
        5 Panicle very crowded, the branches appressed to slightly spreading, the tips often incurved; spikelets purplish-brown, awnless (or with awn to 2 mm long); leaves mostly 15-30 mm wide; plants mostly 7-15 dm tall ..... ***E. frumentacea***
      4 Second glume and sterile lemma usually with stout, papillose-based hairs on the veins; fertile lemma acuminate, abruptly narrowed to a firm, persistent tip.
        6 Spikelets < 3.5 mm long, not including the awn (if present); sterile lemma awnless or with an awn to 6 (-10) mm long ..... ***E. muricata*** *var.* ***microstachya***
        6 Spikelets > 3.5 mm long, not including the awn (if present); sterile lemma usually awned (rarely awnless), the awn 6-25 mm long. ..... ***E. muricata*** *var.* ***muricata***

* ***Echinochloa colonum*** (Linnaeus) Link, Jungle-rice. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, SC, NC): fields, ditches, disturbed wet areas; uncommon (rare in VA), native of the Old World tropics. July-October. The debate over the appropriate grammatical treatment and therefore spelling of the epithet is discussed in detail in Ward (2005b). [= *E. colonum* – RAB, C, F, G, GW, HC; = *E. colona* – FNA, K, S, orthographic variant]

* ***Echinochloa crusgalli*** (Linnaeus) Palisot de Beauvois *var.* ***crusgalli***, Barnyard-grass. Cp (FL, VA), Pd (VA), Mt (VA), {GA, NC, SC, VA}: {habitats}; common. July-October. [= C, G; < *E. crusgalli* – RAB, GW, WV (also see *E. muricatum*); = *E. crus-galli* – K, orthographic variant; < *E. crusgalli* – F, FNA; < *E. crus-galli* ssp. *crus-galli* – S (also see *E. muricata*)]

Echinochloa cruspavonis (Kunth) J.A. Schultes *var.* ***cruspavonis***. Cp (FL), {AL, MS} July-October. [< *E. crus-pavonis* – HC; = *E. crus-pavonis* var. *crus-pavonis* – FNA, K, orthographic variant]

* ***Echinochloa frumentacea*** Link, Japanese Millet, Billion-dollar Grass, White Panic. Cp (NC), Pd (VA): disturbed areas; rare, native of Asia. July-October. [= F, FNA, K, WV; < *E. crusgalli* – RAB, GW; = *E. crusgalli* (Linnaeus) Palisot de Beauvois var. *frumentacea* (Link) W. Wight – C, G; = *E. crus-galli* ssp. *edulis* A.S. Hitchcock – S]

Echinochloa muricata (Palisot de Beauvois) Fernald *var.* ***microstachya*** Wiegand, Barnyard-grass. Mt (VA), {GA, NC, SC, VA}: {habitat}; {rarity}. July-October. [= C, FNA, K; < *E. crusgalli* – RAB, GW, WV; = *E. pungens* (Poiret) Rydberg var. *microstachya* (Wiegand) Fernald & Griscom – F; = *E. microstachya* (Wiegand) Rydberg – G; < *E. crus-galli* ssp. *crus-galli* – S]

Echinochloa muricata (Palisot de Beauvois) Fernald *var.* ***muricata***, Barnyard-grass. Cp (FL, NC, VA), Pd (VA), Mt (VA): interdune wetlands, {other habitats}. July-October. [= C, FNA, K; < *E. crusgalli* – RAB, GW, WV; > *E. pungens* (Poiret) Rydberg var. *pungens* – F; > *E. pungens* var. *ludoviciana* (Wiegand) Fernald & Griscom – F; = *E. muricata* – G; < *E. crus-galli* ssp. *crus-galli* – S]

Echinochloa walteri (Pursh) Heller. Cp (FL, GA, NC, SC, VA), Pd (GA): marshes; common. July-October. MA south to FL, west to TX on the outer Coastal Plain; also inland from OH west to WI, south to MO and AR. [= RAB, C, F, FNA, GW, HC, K, S, W]

Eleusine Gaertner 1788 (Yard Grass)

A genus of about 9 species, native to Africa and South America. References: Hilu in FNA (2003a). Key based on FNA.

1 Panicles with 1-3 branches, attached in a single digitate cluster ..... ***E. tristachya***
1 Panicles with 4-20 branches, 1-2 of these attached below the terminal digitate cluster.
  2 Lower glumes 2-3-veined; panicle branches 5-7 mm wide; ligule 1-2 mm long, ciliate with hairs 1-2 mm long .... ***E. coracana*** *ssp.* ***africana***
  2 Lower glumes 1-veined; panicle branches 3-5.5 mm wide; ligule 0.2-1 mm long, erose ..... ***E. indica***

* ***Eleusine coracana*** (Linnaeus) Gaertner *ssp.* ***africana*** (Kennedy & O'Byrne) Hilu & de Wet, Finger Millet. Cp (SC): disturbed areas; rare, native of Africa. There remains some doubt about the identity of the population discovered. Reported by Werth, Zeng, & Baird (1997). [= FNA, K; = *E. africana* Kennedy & O'Byrne]

* ***Eleusine indica*** (Linnaeus) Gaertner, Yard Grass, Goose Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): lawns, roadsides, gardens, disturbed areas; common, native of Old World. [= RAB, C, F, FNA, G, HC, K, S, W, WV]

* ***Eleusine tristachya*** (Lamarck) Lamarck. Cp (SC): in waste areas of wool-combing wills; rare, native of South America, perhaps only a waif in our area. Reported as introduced in additional, scattered states in e. United States, including VA (Kartesz 1999, but apparently in error), NJ (Hilu 1980) and AL (Small 1933). [= FNA, K, S]

Elionurus Humboldt & Bonpland ex Willdenow 1805 (Balsamscale)

A genus of about 15 species, native to tropical and subtropical parts of Africa and the Americas. References: Barkworth in FNA (2003a).

Elionurus tripsacoides Humboldt & Bonpland ex Willdenow, Pan-American Balsamscale. Cp (FL, GA, MS): wet savannas; rare. S. GA south to s. FL, west to s. and w. TX, and south through Central America to s. South America. Reported for sw. GA by Jones & Coile (1988), for s. MS and FL (Sorrie & Leonard 1999). [= FNA, K; = *Elyonurus tripsacoides* – GW, HC, S, orthographic variant]

Elymus Linnaeus 1753 (Wild-rye, Rye Grass)
(also see *Thinopyrum*)

A genus of about 150 species, semicosmopolitan in temperate regions. The genus, as now circumscribed, includes all allopolyploid taxa with at least one chromosome complement contributed from *Pseudoroegneria*. North American *Elymus* are allopolyploids of *Pseudoroegneria* and *Hordeum* (Helfgott & Mason-Gamer 2004). Reference: Barkworth, Campbell, & Salomon in FNA (2007a); Campbell (2000); Church (1967); Tucker (1996)=Z; Barkworth (1997)=X. This treatment largely follows Barkworth, Campbell, & Salomon in FNA (2007a).

Identification notes: Measurements of the spike include the awns, but measurements of spikelets and its components do not. Rachis internodes should be measured near the middle of the spike. Glume widths are measured at the widest point, or if the widest point is not apparent, at about 5 mm above the glume base.

1 Spikelets solitary at each node (occasionally paired at the lowest nodes); glumes and lemmas awned or unawned; plants cespitose to strongly rhizomatous.
  2 Plants strongly rhizomatous; [common and weedy introduced species]; [section *Elytrigia*] ..... ***E. repens***
  2 Plants cespitose; [rare natives and introductions]; [section *Goulardia*].
    3 Spikelets 20-30 mm long; anthers 3-6 mm long; rachis internodes hirtellous below the spikelets; [very rare introduction, reported for c. GA] ..... ***[E. semicostatus]***
    3 Spikelets 8-25 mm long; anthers 0.8-3 mm long; rachis internodes glabrous below the spikelets; [rare natives of glades and barrens].
      4 Lemma awns 15-40 mm long, longer than the body of the lemma ..... ***[E. trachycaulus** ssp. **subsecundus]***
      4 Lemma awns 1-13 mm long, shorter than the body of the lemma ..... ***E. trachycaulus** ssp. **trachycaulus***
1 Spikelets 2-3 (-5) at each node; glumes and lemmas usually awned; plants usually cespitose, occasionally short-rhizomatous.
  5 Both glumes (including their awn) either 0-3 mm long and subulate or 1-20 mm long and differing in length by > 5 mm, 0.1-0.6 mm wide, tapering from the base, with 0-1 distinct veins, persistent; rachis internodes 4-12 mm long, ca. 0.5 mm thick at the narrowest section.
    6 Spikelets appressed; lemma awns straight or curving; glumes sometimes absent, but usually 1-20 mm long, 0.1-0.6 mm wide, with a distinct vein; spikes erect or nodding ..... ***E. svensonii***
    6 Spikelets widely spreading to horizontal; lemma awns straight (rarely slightly curving); glumes 0-3 mm long, with no distinct veins (rarely 1 glume to 20 mm long, 0.2 mm wide); spikes usually erect.
      7 Lemmas pubescent ..... ***E. hystrix** var. **bigelovianus***
      7 Lemmas glabrous to scabrous ..... ***E. hystrix** var. **hystrix***
  5 Both glumes (including the awns) 10-40 mm long, usually differing in length by < 5 mm, 0.2-2.3 mm wide, lanceolate to setaceous, usually widest above the base, with 2-8 veins, persistent or disarticulating; rachis internodes slender (as above) or stout (2-5 mm long and ca. 1 mm thick at the narrowest section).
    8 Glume bases flat, thin, and evidently veined, or indurate for < 1 mm, the bodies not exceeding the adjacent (usually 8-15 mm long) lemmas; lemma awns usually curving outward; spikes usually nodding to pendent; internodes (2-) 4-12 mm long.
      9 Glumes 0.5-1.6 mm wide; lemma awns 15-40 (-50) mm long; paleas acute; rachis internodes 2-5 (-7) mm long; blades (3-) 4-15 (-20) mm wide, pale green, usually glabrous or scabridulous above ..... ***E. canadensis** var. **canadensis***
      9 Glumes 0.3-0.8 mm wide; lemma awns 15-25 (-35) mm long; paleas narrowly truncate; rachis internodes 5-8 (-12) mm long; blades 8-24 mm wide, dark green, usually thinly pilose above ..... ***[E. wiegandii]***
    8 Glume bases terete, indurate, and lacking evident veins for 0.5-4 mm, the bodies (unless indistinct from the awns) exceeding the adjacent (usually 6-12 mm long) lemmas; lemma awns straight; spikes erect or nodding; internodes 2-5 mm long (to 7 mm in *E. sp. 1*).
      10 Glumes persistent, 0.2-1 mm wide, with 2-4 veins, the basal 0.5-2 mm essentially straight; lemmas rarely glabrous; spikelets with 1-3 (-4) florets; spikes nodding, exserted.
        11 Blades glabrous to scabrous, pale dull green; spikes 7-25 cm long; internodes usually 3-5 mm long; spikelets with 2-3 (-4) florets; lemmas usually scabrous, 7-14 mm long, 1-5 mm longer than the acute paleas; flowering usually late June to late July ..... ***E. riparius***
        11 Blades villous to pilose, dark glossy green; spikes 4-12 cm long; internodes usually 2-3 mm long; spikelets with 1-2 (-3) florets; lemmas usually villous, 5.5-9 mm long, 0-1.5 mm longer than the obtuse paleas; flowering usually early June to early July ..... ***E. villosus***

10 Glumes disarticulating with the lowest floret, 0.7-2.3 mm wide, with (2-) 3-5 (-8) veins, the basal 1-4 mm clearly bowed-out; lemmas often glabrous; spikelets with (2-) 3-5 (-6) florets; [*Elymus virginicus* complex].
12 Spikes 2.5-6 cm wide, exserted; lemma awns 15-40 mm long; blades glabrous or villous.
13 Spikes with 9-18 nodes; internodes 4-7 mm long; blades usually lax, dark glossy green under the glaucous bloom; auricles 2-3 mm long, blackish at maturity; flowering usually in mid-May to mid-June ..... ***E. macgregorii***
13 Spikes with 15-30 nodes; internodes 3-5 mm long; blades lax, or often ascending and involute, pale dull green; auricles 0-2 mm long, brownish at maturity; flowering usually in mid-June to late July.
14 Spikelets (and usually also the foliage) pubescent; spikes usually 6-12 cm long; lemmas 6-10 mm long ..... ***E. glabriflorus var. australis***
14 Spikelets (and usually also the foliage) glabrous to scabrous); spikes usually 9-16 cm long; lemmas 7-13 mm long ..... ***E. glabriflorus var. glabriflorus***
12 Spikes 0.7-2 cm wide (including the awns), exserted or sheathed; lemma awns 1-15(20) mm long; spikelets appressed to slightly spreading; blades usually glabrous to scabridulous.
15 Lemma awns 1-3(5) mm long; blades often ascending, somewhat involute, those higher on the stiffly erect culms broader and more persistent; flowering usually in early July to mid-August ..... ***E. curvatus***
15 Lemma awns 5-15(20) mm long; blades usually spreading or lax, not markedly broader or more persistent towards the culm summit; flowering usually in mid-June to late July.
16 Spikes glaucous, hispidulous to villous-hirsute, often intermediate in exsertion; glumes indurate in the lowest 1-2 mm; ligules and auricles usually absent; flowering usually early July to mid-August ..... ***E. virginicus var. intermedius***
16 Spikes green to glaucous, usually glabrous to scabrous, partly included in the sheath to fully exserted; ligules and auricles often present; flowering usually mid-June to mid-July.
17 Spikes partly sheathed; glumes 1-2.3 mm wide, strongly indurate and bowed-out in the lowest 2-4 mm; plants usually green to yellowish-brown; nodes mostly covered ..... ***E. virginicus var. virginicus***
17 Spikes usually exserted; glumes (0.5-) 0.7-1.5 (-1.8) mm wide, moderately indurate and bowed out in the lowest 1-2 mm; plants usually glaucous, sometimes reddish-brown at maturity; nodes often exposed.
18 Culms usually 3-8 dm tall, with 4-6 nodes; blades 2-9 mm wide, becoming involute; spikes 3.5-11 cm long, strongly glaucous; glumes usually indurate in the lowest 1-2 mm ..... ***E. virginicus var. halophilus***
18 Culms usually 7-10 dm tall, with 6-8 nodes; blades 3-15 mm wide, flat; spikes 4-20 cm long, pale green or glaucous; glumes indurate only in the lowest 1 mm ..... ***E. virginicus var. jejunus***

Elymus canadensis Linnaeus *var.* ***canadensis***, Great Plains Wild-rye, Nodding Wild-rye. Mt (NC, VA), Pd (NC, VA), Cp? (SC?): moist forests; rare. Nova Scotia, Québec, and Yukon south to NC, SC (?), OK, NM, and AZ. [= FNA; < *E. canadensis* – RAB, C, F, G, GW, K, W, WV]

Elymus curvatus Piper, Awnless Wild-rye. Ip (KY, TN): moist bottomlands and slopes; rare. NY and Québec west to British Columbia and WA, south to s. OH, KY, c. TN, OK, and n. TX. [= FNA; < *E. virginicus* Linnaeus – C; = *E. submuticus* (Hooker) Smyth & Smyth – K; = *E. virginicus* Linnaeus var. *submuticus* Hooker – F, G; < *E. virginicus* var. *virginicus* – S]

Elymus glabriflorus (Vasey) Scribner & Ball *var.* ***australis*** (Scribner & C.R. Ball) J.J.N. Campbell, Southeastern Wild-rye. {Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): } {*glabriflorus* as a whole: ME, WV, IN, IL, and IA, south to n. FL, and c. TX} [< *E. glabriflorus* – FNA; < *E. virginicus* – RAB, C, GW, W, WV; < *E. virginicus* var. *glabriflorus* (Vasey) Bush – F, "forma *australis*"; < *E. virginicus* var. *virginicus* – G, K; = *E. virginicus* var. *australis* – S]

Elymus glabriflorus (Vasey) Scribner & Ball *var.* ***glabriflorus***, Southeastern Wild-rye. {Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): } {*glabriflorus* as a whole: ME, WV, IN, IL, and IA, south to n. FL, and c. TX} [< *E. glabriflorus* – FNA; < *E. virginicus* – RAB, C, GW, W, WV; < *E. virginicus* var. *glabriflorus* (Vasey) Bush – F, "forma *glabriflorus*"; < *E. virginicus* var. *virginicus* – G, K; = *E. virginicus* var. *glabriflorus* – S]

Elymus hystrix Linnaeus *var.* ***bigelovianus*** (Fernald) Bowden, Northern Bottlebrush Grass. Mt (NC): high elevation forests; rare. [< *Hystrix patula* Moench – RAB, G, WV; < *Elymus hystrix* – C, FNA; = *Hystrix patula* var. *bigeloviana* (Fernald) Deam – F; = *E. hystrix* var. *bigeloviana* – K, orthographic variant; < *Hystrix hystrix* (Linnaeus) Millspaugh – S]

Elymus hystrix Linnaeus *var.* ***hystrix***, Common Bottlebrush Grass. Mt, Pd (GA, NC, SC, VA), Cp (VA): moist forests, dry forests especially over more fertile soils; common. [= K; < *Hystrix patula* Moench – RAB, G, WV; < *Elymus hystrix* – C, FNA; = *Hystrix patula* var. *patula* – F; < *Hystrix hystrix* (Linnaeus) Millspaugh – S]

Elymus macgregorii R. Brooks & J.J.N. Campbell, Early Wild-rye. Pd (GA, NC, VA), Mt (FL, NC, VA), Cp (FL, NC, VA): rich mesic forests, especially bottomlands; uncommon. ME west to SD, south to Panhandle FL and s. TX. See Campbell (2000). [= FNA; < *E. virginicus* – RAB, C, GW, W, WV; < *E. virginicus* var. *virginicus* – F, G, K, S]

* ***Elymus repens*** (Linnaeus) Gould, Quackgrass, Dog-grass, Witchgrass. Mt, Pd, Cp (NC, VA): roadsides, disturbed areas, pastures; uncommon, probably introduced from Europe (sometimes considered to be partially native along the coast). June-August. [= FNA, K, X; = *Elytrigia repens* (Linnaeus) Nevski – C, Z; = *Agropyron repens* (Linnaeus) Palisot de Beauvois – RAB, G, HC, S, W, WV; > *Agropyron repens* var. *repens* – F; > *Agropyron repens* var. *subulatum* (Schreber) Roemer & J.A. Schultes – F]

Elymus riparius Wiegand, Eastern Riverbank Wild-rye. Mt (GA, NC,SC, VA), Pd (GA, NC, SC, VA), Cp (SC?, VA): moist forests; uncommon (rare in NC). ME, Québec, Ontario, and MN south to GA and AR. [= RAB, C, F, FNA, G, GW, K, S, W, WV]

Elymus svensonii G.L. Church, Svenson's Wild-rye. Ip (KY, TN): limestone river bluffs; rare. Nc. KY south to c. TN. [= FNA, K]

Elymus trachycaulus (Link) Gould ex Shinners *ssp.* ***trachycaulus***, Slender Wheatgrass. Mt (NC, VA): glades and barrens, over serpentine, etc.; rare. August. Greenland, Labrador, Keewatin, Nunavut, Yukon, and AK, south to w. NC, OH, IN, IL, MO, TX, Mexico and CA. [= FNA, K; < *Agropyron trachycaulum* (Link) Malte ex H.F. Lewis – RAB, W, WV; < *Elymus trachycaulus* – C; > *Agropyron trachycaulum* var. *novae-angliae* (Scribner) Fernald – F; > *Agropyron trachycaulum* var. *ciliatum* (Scribner & J.G. Smith) Gleason – G; = *Agropyron trachycaulum* – HC]

Elymus villosus Muhlenberg ex Willdenow, Downy Wild-rye. Mt, Pd, Cp (NC, SC, VA), {GA}: moist forests; uncommon. Québec, Ontario, MN, ND, and WY south to GA, AL, MS, and TX. [= RAB, C, F, FNA, G, GW, K, W, WV; = *E. striatus* Willdenow – S]

Elymus virginicus Linnaeus *var.* ***halophilus*** (Bicknell) Wiegand, Salt-marsh Wild-rye. Cp (NC, VA): brackish marshes, maritime forests and hammocks; uncommon (VA Watch List). Along the Atlantic Coast, from Nova Scotia to NC. [= F, FNA, G, K; < *E. virginicus* – RAB, C, GW; < *E. virginicus* var. *virginicus* – S]

Elymus virginicus Linnaeus *var.* ***intermedius*** (Vasey) Bush. [= FNA, G; < *E. virginicus* – RAB, C, GW, W, WV; < *E. virginicus* var. *virginicus* – F, K; < *E. virginicus* var. *hirsutiglumis* (Scribner) A.S. Hitchcock – S]

Elymus virginicus Linnaeus *var.* ***jejunus*** (Ramaley) Bush. [= F, FNA, G; < *E. virginicus* – RAB, C, GW, W, WV; < *E. virginicus* var. *virginicus* – K; < *E. virginicus* var. *virginicus* – S]

Elymus virginicus Linnaeus *var.* ***virginicus***, Common Eastern Wild-rye, Terrell Grass. Cp (FL, GA, NC, SC, VA), Mt, Pd, Cp (NC, SC, VA): moist forests; common. [= FNA; < *E. virginicus* – RAB, C, GW, W, WV; < *E. virginicus* var. *virginicus* – F, G, K; < *E. virginicus* var. *virginicus* – S; ? *E. striatus* Willdenow – S]

Elymus elymoides (Rafinesque) Swezey ssp. *brevifolius* (J.G. Smith) Barkworth. Mt (KY): {habitat}; rare. [= FNA] {synonymy incomplete}

* *Elymus semicostatus* (Nees ex Steudel) Melderis. Reported for c. GA by Jones & Coile (1988), as *Agropyron semicostatum* Nees ex Steudel, but FNA states that known reports from North America are based on misidentifications. [= FNA, K; = *Agropyrum semicostatum* Nees ex Steudel] {not keyed}

Elymus trachycaulus (Link) Gould ex Shinners ssp. *subsecundus* (Link) A. & D. Löve, Bearded Wheatgrass, in MD, WV, and KY (Kartesz 1999). [= FNA, K; ? *Agropyron trachycaulum* (Link) Malte ex H.F. Lewis var. *glaucum* (Pease & Moore) Malte – F, G; = *Agropyron subsecundum* (Link) A.S. Hitchcock var. *subsecundum* – HC; < *Agropyrum subsecundum* (Link) A.S. Hitchcock – WV]

Elymus wiegandii Fernald, Northern Riverbank Wild-rye. South to sc. PA and NJ. [= C, F, FNA, K; < *E. canadensis* – G]

Enteropogon Nees 1836

* ***Enteropogon prieurii*** (Kunth) W.D. Clayton. Cp (NC): on ballast at Wilmington, New Hanover County, NC; rare, native of Africa, probably only a waif. Also reported from Mobile, Baldwin County, AL (Hitchock & Chase 1950). [= K; = *Chloris prieurii* Kunth – S]

Eragrostis Wolf 1776 (Lovegrass)

A genus of about 350 species of temperate and tropical areas. References: Peterson in FNA (2003a); Koch (1978); Peterson & Harvey (in prep.)=Z. Key adapted from Peterson & Harvey (in prep.).

1 Plants cespitose or rhizomatous perennials, with innovations near the base, and with or without buds in the basal sheaths.
  2 Plants with short, knotty, thick rhizomes; florets articulating whole..... ***E. spectabilis***
  2 Plants without short or thick rhizomes; florets usually disarticulating.
    3 Caryopsis with a deep to shallow groove along the adaxial surface.
      4 Caryopsis dorso-ventrally compressed, flattened parallel to the side of the embryo, translucent, light brownish..... ***E. curvula***
      4 Caryopsis laterally compressed, flattened on the side perpendicular to the embryo, or cylindric, opaque (rarely translucent), usually reddish brown.
        5 Lateral veins of the lemmas conspicuous, often greenish, the lemmas strongly keeled..... ***E. trichodes***
        5 Lateral veins of the lemmas inconspicuous and hardly evident, the lemmas sometimes weakly keeled.
          6 Lemmas 1.2-1.8 mm long; culms 30-70 cm tall..... ***E. lugens***
          6 Lemmas 1.6-3.0 mm long; culms (30-) 40-110 (-120) cm tall.
            7 Spikelets 2-6-flowered, greenish with purple tinges; leaf blades 3-8 (-11) mm wide, 25-60 cm long; sheaths often densely papillose-hirsute..... ***E. hirsuta***
            7 Spikelets (3-) 5-12-flowered, olive green to lead gray; leaf blades 1-3.8 mm wide, (4-) 10-35 cm long; sheaths never papillose-hirsute..... ***E. intermedia***
    3 Caryopsis not grooved on the adaxial surface.
      8 Stamens 3.
        9 Spikelets 4-8.2 (-10) mm long..... ***E. curvula***
        9 Spikelets 2-4.5 (-5) mm long.
          10 Leaf blades 25-60 cm long, 3-8 (-11) mm wide; lemmas 1.6-2.4 mm long; spikelets 1.0-1.7 mm wide..... ***E. hirsuta***
          10 Leaf blades (4-) 8-22 cm long, 1-3.5 mm wide; lemmas 1.2-1.8 mm long; spikelets 0.5-1.0 (-1.3) mm wide..... ***E. lugens***
      8 Stamens 2.
        11 Panicle 15-45 cm wide, open, diffuse, broadly ovate to obovate in outline, the panicle branches capillary; pedicels 0.5-35 (-50) mm long, longer than or shorter than the spikelets.
          12 Spikelets with widely spreading pedicels, the lower pedicels all generally longer than the spikelets; disarticulation of the lemmas only, the paleas persistent..... ***E. elliottii***
          12 Spikelets with appressed pedicels, lower pedicels of each branch shorter than the spikelets; disarticulation usually of the whole floret..... ***E. refracta***
        11 Panicle (1-) 2-17 (-20) cm wide, contracted to open, narrowly ovate to oblong in outline;, the panicle branches stiffly spreading; pedicels (0-) 0.3-6 mm long, always shorter than the spikelets.
          13 Spikelets 0.7-2.4 mm wide; glumes 0.3-2.2 mm long; lemma 1.5-2.5 mm long, the apex acute (sometimes acuminate)..... ***E. bahiensis***
          13 Spikelets 2.4-5 mm wide; glumes 1.4-4 mm long; lemma 2-6 mm long, the apex acuminate to attenuate.....

.....*E. secundiflora var. oxylepis*

1 Plants cespitose, geniculate or mat-forming annuals, lacking innovations or buds in the lower sheaths.
14 Paleas prominently ciliate-pectinate on the keels, the hairs 0.1-0.8 mm long.
15 Panicles contracted, narrow, spike-like, usually <1.5 cm wide..... ***E. ciliaris var. ciliaris***
15 Panicles open, cylindrical to narrowly ovate, usually 1-8 cm wide.
16 Spikelets (1.0-) 1.5-3.5 mm long, 0.9-1.4 mm wide, 4-12-flowered; lemmas 0.7-1.1 mm long, membranous, the apex truncate to obtuse..... ***E. amabilis***
16 Spikelets 5-12 (-18) mm long, 1.4-2.4 mm wide, 12-42-flowered; lemmas (1.3-) 1.5-2.0 mm long, chartaceous, the apex acute..... .....***E. cumingii***
14 Paleas smooth to scaberulous on the keels, the hairs (if present) <0.1 mm long.
17 Plants extensively stoloniferous, creeping and forming flat mats; inflorescences 1-3.5 cm long; culms (2-) 5-12 (-20) cm tall on the erect portions.....***E. hypnoides***
17 Plants not stoloniferous (sometimes creeping and forming flat mats); inflorescences 3-55 cm long; culms (2-) 6-130 cm tall.
18 Ligules membranous, glabrous..... ***E. japonica***
18 Ligules ciliate, with a row of tiny white hairs.
19 Caryopsis with a deep to shallow groove along the adaxial surface.
20 Spikelets (4-) 5-10 (-11) mm long, 5-11 (-15)-flowered; pedicels ascending, somewhat appressed along the branches.
21 Spikelets ovate to oblong in outline, >1.4 mm wide; lower glume 1.2-2.3 mm long.....***E. mexicana ssp. mexicana***
21 Spikelets linear to linear-lanceolate, <1.5 mm wide; lower glume 0.7-1.7 mm long.....***E. mexicana ssp. virescens***
20 Spikelets (1.4-) 2-5 mm long, 2-6 (-7)-flowered; pedicels erect, spreading along the branches.
22 Panicle 10-45 (-55) cm long, 2/3 or more the height of the plant; pedicels (4-) 5-25 mm long; glandular pits absent below the nodes, branches, and rachis..... ***E. capillaris***
22 Panicle 4-20 cm long, < ½ the height of the plant; pedicels 1.5-5 mm long; glandular pits often present below the nodes, branches, and rachis..... ***E. frankii***
19 Caryopsis not grooved on the adaxial surface.
23 Plants with glandular pits or bands on the culm below the nodes, on the veins of the sheath, on the margins and veins of the blade, on the rachis, on the inflorescence branches and pedicels, and/or on the midveins of the lemma and palea.
24 Spikelets (1.7-) 2-4 mm long, 3-6-flowered..... ***E. frankii***
24 Spikelets (2-) 3.5-20 mm long, (3-) 5-40-flowered.
25 Spikelets 0.6-1.3 mm wide; pedicels 1-10 mm long, flexuous and delicate, appressed or spreading .....***E. pilosa***
25 Spikelets 1.1-4 mm wide; pedicels 0.2-4 mm long, straight and rigid, mostly spreading.
26 Spikelets 6-20 mm long, 2-4 mm wide, 10-40-flowered; lemmas 2-2.8 mm long, with 1-3 crateriform glands along the keel; disarticulation of the entire florets from the persistent rachilla; anthers yellow.....***E. cilianensis***
26 Spikelets 4-7 (-11) mm long, 1.1-2.2 mm wide, 7-12 (-20)-flowered; lemmas 1.4-1.8 mm long, rarely with 1-2 crateriform glands along the keel; disarticulation of the lemmas only, the palea and rachilla usually persistent; anthers reddish-brown.
27 Inflorescence with glandular areas of spots or rings on the rachis below the panicle branch bases, the glands often shiny or yellowish; stamens 3; blade margins lacking crateriform glands.....***E. barrelieri***
27 Inflorescence sometimes with glandular areas of spots or crateriform pits on the rachis below the panicle branch bases, the glands usually dull and greenish-gray to straw-colored; stamens 2; blade margins sometimes with crateriform glands..... ***E. minor***
23 Plants lacking glandular pits or bands on the culm below the nodes, on the veins of the sheath, on the margins and veins of the blade, on the rachis, on the inflorescence branches and pedicels, and/or on the midveins of the lemma and palea.
28 Spikelets (1.6-) 2-4 mm wide, 12-42-flowered; disarticulation of entire florets from a persistent rachilla.....*[E. unioloides]*
28 Spikelets 0.6-2.5 mm wide, 3-22-flowered; disarticulation of the lemmas only, the paleas usually persistent (or deciduous), the rachilla persistent.
29 Spikelets 3-6-flowered..... ***E. frankii***
29 Spikelets (3-) 5-22-flowered.
30 First glume 0.3-0.6 (-0.8) mm long, <0.5× as long as the lowest lemma; spikelets 0.6-1.3 mm wide; panicle branches usually whorled at the lowest 2 nodes.....***E. pilosa***
30 First glume 0.5-1.5 mm long, >0.5× as long as the lowest lemma; spikelets 1.2-2.5 mm wide; panicle branches solitary or paired at the 2 lowest nodes.
31 Pedicels widely spreading ..... ***E. pectinacea var. miserrima***
31 Pedicels appressed or rarely diverging up to 20 degrees from the branches.....***E. pectinacea var. pectinacea***

* ***Eragrostis amabilis*** (Linnaeus) Wright & Arnott ex Nees, Japanese Lovegrass, Feather Lovegrass. Cp (FL, GA, SC), Pd? (GA?): disturbed areas; rare, native of Old World. June. [= RAB, FNA, HC, S, Z; *? E. tenella* (Linnaeus) Palisot de Beauvois ex Roemer & J.A. Schultes – K]

* ***Eragrostis bahiensis*** (Schrader ex J.A. Schultes) J.A. Schultes, Bahia Lovegrass. Cp (FL, GA, SC): disturbed areas; rare, native of {}. Reported for SC (Kartesz 1999) and sw. GA (Jones & Coile 1988, GW, Kartesz 1999). [= FNA, GW, HC, K, S, Z]

* ***Eragrostis barrelieri*** Daveau, Mediterranean Lovegrass. Cp (FL, SC): waste areas near wool-combing mills, other disturbed areas; rare, native of Mediterranean Europe. Also reported for e. TN (Chester et al. 1993). [= FNA, HC, K, Z]

Eragrostis capillaris (Linnaeus) Nees, Lacegrass. Mt, Pd, Cp (GA, NC, SC, VA): fields, roadsides, disturbed areas; common (uncommon in Piedmont and Coastal Plain). July-October. ME and WI south to GA and TX. [= RAB, C, F, FNA, G, HC, K, S, W, WV, Z]

* ***Eragrostis cilianensis*** (Allioni) Vignolo ex Janchen, Stinkgrass. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): fields, disturbed areas; common, native of Europe. July-October. [= RAB, C, FNA, G, HC, K, S, W, Z; *? E. megastachya* (Koel.) Link – F, WV]

Eragrostis ciliaris (Linnaeus) R. Brown *var. ciliaris*. Cp (FL, GA, SC): sandy shores; rare. S. SC south to TX, Central America, West Indies, South America, Africa, and Asia. [= FNA, HC; < *E. ciliaris* – RAB, G, K, S, Z]

* ***Eragrostis cumingii*** Steudel, Fortyflower Lovegrass, Cuming's Lovegrass. Cp (FL, GA), {NC}. Reported for NC (Kartesz 1999) and sw. GA (Jones & Coile 1988, HC). [= FNA, K, Z; *? E. simplex* Scribner – HC]

* ***Eragrostis curvula*** (Schrader) Nees, Weeping Lovegrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): roadsides; common, native of s. Africa. May-June. Very commonly planted as a roadbank stabilizer, *E. curvula* is fire resistant and shows some capability to spread into adjacent natural habitats. [= RAB, C, FNA, HC, K, WV, Z; > *E. curvula* var. *conferta* Stapf]

Eragrostis elliottii S. Watson, Elliott's Lovegrass. Cp (FL, GA, NC, SC): ultisol wet pine savannas, maritime wet grasslands, inland edges of brackish marshes, inland edges of freshwater tidal marshes, calcareously-influenced wet pine savannas; rare. September-October. NC south to FL, west to TX. [= RAB, FNA, GW, HC, K, S, Z]

Eragrostis frankii C.A. Meyer ex Steudel, Lacegrass. Mt (VA), Pd (NC, VA), Cp (VA), {FL?, GA}: disturbed areas; uncommon (NC Watch List). September. MA and MN south to FL and AR. [= RAB, C, FNA, G, GW, K, S, W, WV, Z; > *E. frankii* var. *frankii* – F, HC]

Eragrostis hirsuta (Michaux) Nees, Bigtop Lovegrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common (uncommon in Mountains, rare in VA Mountains). July-October. MD south to FL, west to TX, north in the interior to TN, AR, and MO; Central America. [= RAB, C, FNA, K, S, W, WV, Z; > *E. hirsuta* var. *hirsuta* – F, G, HC; > *E. hirsuta* var. *laevivaginata* Fernald – F, G, HC]

Eragrostis hypnoides (Lamarck) Britton, Sterns, & Poggenburg, Creeping Lovegrass, Teal Lovegrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, VA): marshes, shores; uncommon. September. Throughout most of North America, south to South America. [= RAB, C, F, FNA, G, GW, HC, K, S, W, WV, Z]

Eragrostis intermedia A.S. Hitchcock, Plains Lovegrass. Cp (GA), Pd (GA, VA), {NC, SC}: {habitat); rare. Reported for scattered locations as far east as NC and SC (Kartesz 1999), e. GA (Jones & Coile 1988), e. TN (Chester et al. 1993). [= C, F, FNA, G, HC, K, Z]

*? ***Eragrostis japonica*** (Thunberg) Trinius, Pond Lovegrass. Cp (FL, GA, SC): moist or wet sandy areas; rare. SC and TN south to Central America, South America, and West Indies; Old World tropics. Perhaps introduced from the Old World. Reported for SC by HC, G, and Small (1933), sw. GA by Jones & Coile (1988), and for w. TN by Chester et al. (1993). [= FNA, K, Z; ? *E. glomerata* (Walter) L.H. Dewey – G, GW, HC, S]

*? ***Eragrostis lugens*** Nees, Mourning Lovegrass. Cp (FL, NC, SC), Pd (GA, NC, SC): marshes, roadsides, low fields; rare, introduced (NC Watch List). June-October. Perhaps only introduced from further south and west. [= RAB, FNA, HC, K, S, W, Z]

* ***Eragrostis mexicana*** (Hornemann) Link *ssp.* ***mexicana***, Mexican Lovegrass. Cp (SC): waste areas near wool-combing mills; rare, native of w. North America and Mexico. Reported to be naturalized as far east and north as SC, DE, and MD (Kartesz 1999). [= FNA, K; > *E. neomexicana* Vasey – C, F, G, HC; > *E. mexicana* – C, F, G, HC]

* ***Eragrostis mexicana*** (Hornemann) Link *ssp.* ***virescens*** (J. Presl) S.D. Koch & Sánchez. Cp (FL): disturbed areas; rare, native of South America and w. North America. Reported as an introduction on ballast in MD and FL. [= FNA, K; = *E. virescens* J. Presl – HC]

* ***Eragrostis minor*** Host, Little Lovegrass. Pd (GA, NC, SC, VA), Mt (NC, SC, VA), Cp (FL, VA): disturbed areas; uncommon, native of Europe. July-September. [= C, FNA, K, Z; ? *E. poaeoides* Palisot de Beauvois ex Roemer & J.A. Schultes – RAB, F, G, HC, W, WV; ? *E. eragrostis* (Linnaeus) Palisot de Beauvois – S]

Eragrostis pectinacea (Michaux) Nees ex Steudel *var.* ***pectinacea***, Carolina Lovegrass. Cp (FL, GA, NC, SC, VA?), Pd (GA, NC, SC, VA?}, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common (rare in VA). ME and WA south to Central America and West Indies. [= FNA, K, Z; < *E. pectinacea* – C, GW, W; = *E. pectinacea* – F, HC, S, WV; > *E. pectinacea* – G; > *E. diffusa* Buckley – G]

Eragrostis pectinacea (Michaux) Nees ex Steudel *var.* ***miserrima*** (Fournier) J. Reeder. Cp (FL): disturbed habitats; rare. From FL and westwards and southwards. [= FNA, K, Z; = *E. tephrosanthos* J.A. Schultes – HC, S; < *E. pectinacea* – GW]

* ***Eragrostis pilosa*** (Linnaeus) Palisot de Beauvois *var.* ***pilosa***. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common, native of tropical regions of the Old and New World. July-October. Var. *perplexa* (L.H. Harvey) S.D. Koch is also introduced but is not known from our area. [= FNA; = *E. pilosa* – RAB, S, W; > *E. multicaulis* Steudel – F, G, HC; > *E. pilosa* – F, G, HC; < *E. pilosa* – K, WV, Z]

Eragrostis refracta (Muhlenberg) Scribner, Coastal Lovegrass. Cp (GA, NC, SC, VA), Pd (NC, SC, VA): pinelands, savannas, woodlands, marshes; common (uncommon in Piedmont). July-October. DE south to FL, west to TX. [= RAB, C, F, FNA, G, GW, HC, K, S, Z; ? *E. virginica* (Zuccarini ex Roemer) Steudel]

* ***Eragrostis secundiflora*** J. Presl *var.* ***oxylepis*** (Torrey) S.D. Koch, Red Lovegrass. Cp (FL, GA, NC, SC, VA): sandy roadsides, coastal dunes, and disturbed areas; rare, native of sw. United States. First reported for SC by Nelson & Kelly (1997). [= *E. oxylepis* (Torrey) Torrey – GW, HC; = *E. secundiflora* ssp. *oxylepis* S.D. Koch – FNA, K, Z; < *E. secundiflora* – S]

Eragrostis spectabilis (Pursh) Steudel, Purple Lovegrass, Tumblegrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): sandy fields, roadsides, woodlands; common. August-October. ME west to ND, south to FL and TX. [= RAB, C, FNA, G, GW, HC, K, S, W, WV, Z; > *E. spectabilis* var. *spectabilis* – F; > *E. spectabilis* var. *sparsihirsuta* Farwell – F; *E. pectinacea*, misapplied]

* ***Eragrostis trichodes*** (Nuttall) Wood. Pd (VA): disturbed areas; rare, native of w. North America. [= C, FNA, K, Z; > *E. trichodes* var. *trichodes* – F, HC]

* ***Eragrostis unioloides*** (Retzius) Nees ex Steudel, Chinese Lovegrass. Cp (FL, GA): disturbed areas; rare, native of Asia. Reported for s. GA (Jones & Coile 1988, FNA, GW, HC). [= FNA, GW, HC, K, S, Z]

* ***Eragrostis atrovirens*** (Desvaux) Trinius ex Steudel, Thalia Lovegrass. Cp (AL, FL, LA, MS): disturbed areas; rare, native of Africa. [= FNA, K] {add to key; add to synonymy}

* ***Eragrostis elongata*** (Willdenow) Jacquin f., Long Lovegrass. Cp (SC): waste areas near wool-combing mills; rare, native of se. Asia and Australia. [= FNA, K] {not yet keyed}

* ***Eragrostis leptostachya*** (R. Brown) Steudel, Australian Lovegrass, is reported for NC (Kartesz 1999). {investigate} [= FNA, K] {not yet keyed}
* ***Eragrostis plana*** Nees, South African Lovegrass. Cp (SC): waste areas near wool-combing mills; rare, native of South Africa. [= FNA, K] {not yet keyed}
* ***Eragrostis setifolia*** Nees, Neverfail. Cp (SC): waste areas near wool-combing mills; rare, native of Australia. [= FNA, K] {not yet keyed}
* ***Eragrostis tef*** (Zuccagni) Trotter, Teff. Cp (SC): waste areas near wool-combing mills; rare, native of Africa. This is the grain used in making Ethiopian bread. [= FNA, HC, K] {not yet keyed}

Eremochloa Büse 1852 (Centipede Grass)

A genus of about 11 species, native of Asia and Australia. References: Thieret in FNA (2003a).

Identification notes: In the autumn, the inflorescences make this grass readily recognizable at a distance: a short, tight lawn grass with a reddish aspect.

* ***Eremochloa ophiuroides*** (Munro) Hackel, Centipede Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): lawns, roadsides, sometimes weedy in more natural sites; common (rare in VA), native of se. Asia. Now very commonly planted as a lawn and roadside grass in the Coastal Plain from se. NC southward. Stalter & Lamont (1996) report the VA occurrence of this species. [= RAB, FNA, HC, K]

Eriochloa Kunth 1816 (Cup Grass)

A genus of 320-30 species, of the tropical, subtropical, and warm temperate Old World and New World. References: Crins (1991)=Z; Shaw, Webster, & Bern in FNA (2003a); Shaw & Webster (1987)=Y.

1 Lemma of fertile floret with an awn >0.2 mm long; second glume awned; panicle compact, the raceme-like lateral branches close together and ascending-appressed, of irregular lengths; spikelets 8-16 on a typical, primary branch ..... ***E. contracta***
1 Lemma of fertile floret lacking an awn; second glume not awned; panicle open, the raceme-like lateral branches remote and divergent, the lowermost longest, the upper gradually reduced in length to the apex (*E. acuminata* var. *acuminata*, *E. michauxii* var. *michauxii*) **or** the panicle compact (*E. villosa*); spikelets 12-40 on a typical, primary branch.
  2 Spikelets 2.0-2.5 mm wide ..... ***E. villosa***
  2 Spikelets 1.1-1.8 mm wide.
    3 Annual, 3-12 dm tall; spikelets 1.1-1.4 mm wide ..... ***E. acuminata*** *var.* ***acuminata***
    3 Perennial, 5-25 dm tall; spikelets 1.3-1.8 mm wide ..... ***E. michauxii*** *var.* ***michauxii***

* ***Eriochloa acuminata*** (J. Presl) Kunth *var.* ***acuminata***. Cp (GA, SC), Pd (GA): disturbed areas, waste areas near wool-combing mills; rare, presumably native of further south. Reported for scattered locations in GA (Jones & Coile 1988, as *E. gracilis*). Reported for NC (Kartesz 1999), but the specimen basis is of cultivated material. [= FNA, K, Y, Z; < *E. acuminata* – C; = *E. gracilis* (Fournier) A.S. Hitchcock var. *gracilis* – HC]
* ***Eriochloa contracta*** A.S. Hitchcock, Prairie Cupgrass. Pd, Mt (VA), Cp (SC): disturbed areas, waste areas around wool-combing mills; rare, native of midwestern United States. [= C, F, FNA, G, GW, HC, K, Y, Z]
Eriochloa michauxii (Poiret) A.S. Hitchcock *var.* ***michauxii***, Longleaf Cupgrass. Cp (FL, GA, SC): coastal freshwater and slightly brackish marshes, flatwoods, disturbed areas; rare (GA Special Concern). Se. SC south to FL, west to AL, or possibly LA. Var. *simpsonii* A.S. Hitchcock is endemic to sw. FL. [= FNA, HC, K, Y, Z; < *E. michauxii* – GW, S]
* ***Eriochloa villosa*** (Thunberg) Kunth, Chinese Cupgrass. Mt (VA): disturbed area (open edge of railroad bed); rare, native of e. Asia. See Belden et al. (2004) for additional information about the first occurrence in Virginia. [= C, FNA, HC, K, Y]

Eriochloa punctata (Linnaeus) Desvaux ex Hamilton, Louisiana Cupgrass. Cp (GA): marshes, creek banks; rare. MS west to TX, and south into the New World Tropics; reported for e. GA (FNA). [= FNA, HC, K] {not yet keyed; synonymy incomplete}

Eustachys Desvaux 1810 (Finger-grass)

A genus of ca. 12 species, of tropical and warm temperate regions. References: Aulbach in FNA (2003a). McKenzie, Urbatsch, & Aulbach-Smith (1987)=Z. Key based on Z.

1 Lateral nerves of the fertile lemma glabrous; culms stout, 7-15 dm tall; spikes 8-16 (-20), 7-12 cm long ..... ***E. glauca***
1 Lateral nerves of the fertile lemma pubescent; culms slender, 3-10 dm tall; spikes 1-20, 2.5-9 cm long.
  2 Keel of the fertile lemma appressed brownish-ciliate; spikes 1-6; [native].
    3 Spikes 5-10 cm long; spikelets >3 mm long ..... ***E. floridana***
    3 Spikes 2.5-6 cm long; spikelets <2.5 mm long ..... ***E. petraea***
  2 Keel of the fertile lemma glabrous; spikes 7-20; [aliens, in disturbed situations].
    4 Spikelets >2.4 mm long; sterile floret oblanceolate, acute ..... ***E. distichophylla***
    4 Spikelets <2.1 mm long; sterile floret widely cuneate, truncate ..... ***E. retusa***

* ***Eustachys distichophylla*** (Lagasca y Segura) Nees, Weeping Finger-grass. Cp (GA): disturbed areas; rare, native of South America. In GA and FL (Kartesz 1999). [= FNA, K, Z; = *Chloris distichophylla* Lagasca y Segura – HC]

Eustachys floridana Chapman, Florida Finger-grass. Cp (FL, GA): sandhills, pine flatwoods; rare (GA Special Concern). E. GA south to c. peninsular FL, west to w. Panhandle FL and s. AL. [= FNA, K, Z; = *Chloris floridana* (Chapman) Wood – HC, S] {synonymy}

Eustachys glauca Chapman, Saltmarsh Finger-grass. Cp (FL, GA, NC, SC): marshes and marsh edges; rare. June-October. Se. NC south to FL and west to s. AL. [= FNA, K, Z; = *Chloris glauca* (Chapman) Wood – RAB, GW, HC, S]

Eustachys petraea (Swartz) Desvaux, Dune Finger-grass. Cp (FL, GA, NC, SC): dune slacks and sand flats, sometimes in disturbed areas; common (uncommon north of GA). (May-) June-October. NC (Dare County) south to FL and west to TX. [= FNA, K, Z; = *Chloris petraea* Swartz – RAB, GW, HC, S]

* ***Eustachys retusa*** (Lagasca y Segura) Kunth, Argentine Finger-grass. Cp (FL, GA, SC): sandy fields; rare, native of Argentina. June. [= FNA, K, Z; ? *Chloris argentina* (Hackel) Lillo & Parodi – RAB, G, HC]

* ***Eustachys caribaea*** (Sprengel) Herter, Chickenfoot Grass. Cp (GA): disturbed areas; rare, native of South America. [= FNA, K; = *Chloris capensis* – HC, misapplied] {add to synonymy; not yet keyed}

Eustachys neglecta (Nash) Nash. Native. Cp (FL): pinelands, sandy fields; uncommon. N. and peninsular FL, se. AL, and e. TX. [= FNA, K; = *Chloris neglecta* Nash – HC, S] {synonymy incomplete; not yet keyed}

Festuca Linnaeus 1753 (Fescue)

A genus of about 500 species, nearly cosmopolitan in temperate regions. References: Darbyshire & Pavlick in FNA (2007a); Darbyshire (1993)=X; Aiken & Darbyshire (1990)=Y; Tucker (1996)=Z; Soreng & Terrell (1998). Key based in part on C and Y. [also see *Vulpia*]

1 Leaves 0.2-3 mm wide, often involute.
  2 Plant loosely tufted, often rhizomatous; basal sheaths disintegrating into fibers; spikelets 6-13 mm long ..... ***F. rubra***
  2 Plant tufted, lacking rhizomes; basal sheaths persistent, remaining firm and entire; spikelets 3-9 mm long.
    3 Lemmas 2.3-4.0 (-4.4) mm long, awnless, or with a minute projection to 0.4 mm long; anther 1.5-2.2 (-2.5) mm long; spikelets 3.0-6.0 (-6.5) mm long ..... ***F. filiformis***
    3 Lemmas 3.8-5.5 mm long, with an awn 0.5-2.5 mm long; anther (2.3-) 2.5-3.0 mm long; spikelets 5.5-9.0 mm long ..... ***F. trachyphylla***
1 Leaves 3-12 mm wide, flat.
  4 Larger lemmas 5.5-10 mm long; leaf blades auriculate at the base; anthers 2-4 mm long ..... ***[see Schedonorus]***
  4 Larger lemmas 3.3-5.2 mm long; leaf blades not auriculate at the base; anthers 0.8-1.5 mm long; [subgenus *Subulatae*, section *Obtusae*].
    5 Ligules 2-9 mm long; [rare introduction] ..... ***F. thurberi***
    5 Ligules 0.1-1.5 (-2) mm long; [common natives].
      6 Principal lowermost panicle branches with 8-20 spikelets clustered at the end; spikelets broadly ovate, 4-6 mm wide ..... ***F. paradoxa***
      6 Principal lowermost panicle branches with 2-7 spikelets scattered along the outer half; spikelets narrowly ovate, 2-4 mm wide ..... ***F. subverticillata***

* ***Festuca filiformis*** Pourret, Hair Fescue, Fineleaf Sheep Fescue. Mt, Pd (NC, VA): lawns, disturbed areas; rare, native of Eurasia. May-June. [= C, FNA, K, Y, Z; ? *F. capillata* Lamarck – RAB, F, HC; ? *F. ovina* Linnaeus var. *capillata* (Lamarck) Alefeld – G; ? *F. tenuifolia* Sibthorp – W]

Festuca paradoxa Desvaux, Cluster Fescue. Cp, Pd, Mt (GA, NC, SC, VA): bottomlands, uplands over mafic rock; common (rare in VA Mountains and Piedmont). May-July. PA west to WI and IA, south to SC, c. GA, and e. TX. [= RAB, C, F, FNA, G, GW, HC, K, W, Z; ? *F. shortii* Kunth ex Wood – S, misapplied]

Festuca rubra Linnaeus *ssp.* ***rubra***, Linnaeus, Red Fescue. Mt (NC, SC, VA), Pd, Cp (GA, NC, VA): roadsides, fields, disturbed areas, pastures, grassy balds; common. May-July. In our area, this species is considered to be partly native and partly introduced. This species is circumboreal, extending south in North America to GA and MO. Many varieties or subspecies have been described in the *F. rubra* complex. [= FNA, K; < RAB, C, G, HC, S, WV, Y, Z; > *F. rubra* var. *rubra* – F; > *F. rubra* var. *commutata* Gaudin – F]

Festuca subverticillata (Persoon) Alexeev, Nodding Fescue. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist to wet forests, woodlands, and disturbed areas; common. May-June. ME, Québec, and Manitoba south to FL and e. TX. [= C, FNA, K, Y, Z; ? *F. obtusa* Biehler – RAB, F, G, GW, HC, S, W, WV]

* ***Festuca trachyphylla*** (Hackel) Krajina, Hard Fescue. Pd (GA, NC, VA), Mt (NC, VA), Cp (NC, SC, VA): meadows, pastures, disturbed areas; uncommon, native of Eurasia. May-June. The nomenclatural debate about the application of the name *F. trachyphylla* is summarized in Darbyshire & Pavlick (1997). [= C, K, Y, Z; < *F. ovina* – RAB, S, W, WV, in the broad sense (misapplied as to our material); < *F. ovina* var. *ovina* – F, G, HC; < *F. ovina* var. *duriuscula* (Linnaeus) W.D.J. Kock – F, G, HC, misapplied as to our material]

* ***Festuca thurberi*** Vasey. Cp (SC): disturbed areas; rare, introduced, native of sw. United States (NM, CO, WY, and UT). [= FNA, K] {not keyed; investigate}

Festuca versuta Beal, Texas Fescue. Native, east to TN according to K, but not considered to be distributed east of the Mississippi River by FNA. [= K] {not keyed; investigate}

Gastridium Palisot de Beauvois 1812 (Nitgrass)

A genus of 2 species, annuals, of s. Europe, n. Africa, and w. Asia. References: Wipff in FNA (2007a).

* ***Gastridium phleoides*** (Nees & Meyen) C.E. Hubbard, Nitgrass. Cp (SC): disturbed areas; rare, native of sw. Asia. [= FNA, K] {synonymy incomplete}

Gaudinia Palisot de Beauvois 1812

A genus of about 4 species, annuals or perennials, native of the Mediterranean region. References: Daniel in FNA (2007a).

* *Gaudinia fragilis* (Linnaeus) Palisot de Beauvois, Oatgrass. Ballast, reported from Mobile, AL. [= FNA, K; = *Avena fragilis* Linnaeus]

Glyceria R. Brown 1810 (Mannagrass)

A genus of about 40 species, nearly cosmopolitan. References: Barkworth & Anderton in FNA (2007a); Tucker (1996)=Z. [also see *Torreyochloa*]

1 Spikelets 10-40 mm long, linear, subterete, 5-15× as long as wide, terete or nearly so in cross-section; [section *Glyceria*].
  2 Lemma (6-) 7-8.5 (-10) mm long, acute to acuminate; palea longer than the lemma, extending 1.5-3 mm beyond the lemma apex ..... ***G. acutiflora***
  2 Lemma 2.4-6.0 mm long, obtuse to notched; palea about as long as the lemma (ranging from shorter than the lemma and included, to projecting up to 1.5 mm beyond the lemma apex).
    3 Lemma (3.5-) 4.0-6.0 mm long, the apex with 1-2 strongly developed lobes, and also often toothed between the lobes; leaf blades 2-12 cm long; primary panicle branches 1.5-9.5 cm long ..... ***G. declinata***
    3 Lemma 2.4-4.8 mm long, the apex rounded or with a few poorly developed rounded teeth; leaf blades 18-32 cm long; primary panicle branches 3-17 cm long.
      4 Culms 2.5-8 dm tall; pedicels 1-6 mm long ..... ***[G. notata]***
      4 Culms 7-18 dm tall; pedicels 0.7-1.7 mm long.
        5 Lemmas hispidulous on the veins, the hairs ca. 0.1 mm long ..... ***G. arkansana***
        5 Lemmas scabrous on the veins, the prickles ca. 0.05 mm long ..... ***G. septentrionalis***
1 Spikelets 2.5-8 mm long, ovate to oblong, 1.5-3× as long as wide, laterally compressed in cross-section.
  5 Upper glumes 2.5-5 mm long, longer than wide; [of w. VA and possibly NC northward]; [section *Hydropoa*] ..... ***G. grandis var. grandis***
  5 Upper glumes 0.6-3.7 mm long, if > 3 mm long, then shorter than wide; [collectively widespread]; [section *Striatae*].
    6 Inflorescence compact (at maturity), the branches stiffly ascending to appressed, the tips never nodding; ligule < 1 mm long.
      7 Inflorescence branches elongate, appressed; lower internodes of the inflorescence 2-8 cm long; spikelets with 3-4 flowers, 3.5-4 mm long; lemma 1.9-2.8 mm long; leaves 2-5 mm wide; [of the Mountains, rarely elsewhere] ..... ***G. melicaria***
      7 Inflorescence branches short, stiffly ascending; lower internodes of the inflorescence 0.8-2.0 (-2.5) cm long; spikelets with 4-7 flowers, 4-8 mm long; lemma 3.0-3.7 mm long; leaves 3-10 mm wide; [of the Coastal Plain, rarely disjunct inland to the Mountains of VA] ..... ***G. obtusa***
    6 Inflorescence lax and diffuse (at maturity), the branches spreading to somewhat ascending, the tips often nodding or drooping; ligule 1-6 mm long.
      8 Glumes tapering from below midlength to the narrowly acute (< 45 degree) tips; lemmas > 2× as long as wide; [endemic to seepage at high elevations in the Greeat Smoky Mountains, NC and TN and nearby] ..... ***G. nubigena***
      8 Glumes narrowing from midlength or above to the acute or rounded (> 45 degree) tips; lemmas < 2× as long as wide; [collectively widespread].
        9 Lemma 1.4-2.1 mm long, the veins prominently raised.
          10 Leaf blades 6-15 mm wide; anthers 0.5-0.8 mm long; culms 2.5-8 mm thick; [rare introduction] ..... ***G. elata***
          10 Leaf blades 2-6 mm wide; anthers 0.2-0.6 mm long; culms 1.5-3.5 mm thick; [common] ..... ***G. striata var. striata***
        9 Lemma 1.8-4.0 mm long, the veins visible, but not raised; ligule 2-6 mm long.
          11 Lemma 2.4-4.0 mm long, projecting conspicuously beyond the palea; spikelets 5-8 mm long, with (4-) 5-10 flowers ..... ***G. canadensis***
          11 Lemma 1.8-2.5 mm long, more-or-less equal to the palea; spikelets 3-5 mm long, with 2-5 (-6) flowers ..... ***G. laxa***

Glyceria acutiflora Torrey. Mt (GA, VA): shallow water and wet mucky soils in mountain ponds, wet pastures; uncommon (rare in GA). June-July. ME west to MI, south to DE, VA, nw. GA (Jones & Coile 1988), e. TN, and MO; also in e. Asia. [= C, F, FNA, G, GW, HC, K, W, WV, Z; = *Panicularia acutiflora* (Torrey) Kuntze – S]

Glyceria canadensis (Michaux) Trinius, Rattlesnake Mannagrass. Mt (NC, VA), Cp (VA): bogs, seepages, and wet meadows; rare. June-July. Newfoundland west to MN, south to NJ, VA, nw. NC, and IL. [= C, F, G, K, WV, Z; = *G. canadensis* var. *canadensis* – FNA, HC, W]

* ***Glyceria declinata*** de Brébisson. Cp, Pd (SC): disturbed moist areas; rare, native of Europe. [= FNA] {check for additional synonymy}

* ***Glyceria elata*** (Nash) M.E. Jones. Pd (GA): {habitat unknown}; rare, native of w. North America. Reported for GA by FNA; presumably a chance introduction. [= FNA] {add synonymy}

Glyceria grandis S. Watson *var.* ***grandis***, American Mannagrass. Mt (NC?, VA), Cp (VA): wet, mucky soils of open wetlands; rare. Nova Scotia west to AK, south to VA, IA, NM, and OR. Attributed to w. NC by Tucker (1996). [= FNA, K; < *G. grandis* – C, F, G, GW, HC, WV, Z; = *Panicularia grandis* (S. Watson) Nash – S; ? *G. maxima* (Hartman) Holmberg ssp. *grandis* (S. Watson) Hultén]

Glyceria laxa (Scribner) Scribner, Lax Mannagrass. Mt (NC, VA): bogs; rare. June-July. Prince Edward Island south to NC, mostly Appalachian. Though often described as a hybrid of *G. canadensis* and either *G. striata* var. *striata* and/or *G.*

grandis var. *grandis*, *G. laxa* ranges south of the distribution of both *G. canadensis* and *G. grandis* var. *grandis*. It is best considered as a species, perhaps of hybrid origin. [= F, G, K, WV; = *G. canadensis* (Michaux) Trinius var. *laxa* (Scribner) A.S. Hitchcock – RAB, FNA, HC; = *G.* ×*laxa* – C; < *G. canadensis* – GW]

Glyceria melicaria (Michaux) F.T. Hubbard, Northeastern Mannagrass. Mt (GA, NC, VA), Pd (NC): mountain swamp forests and seepages; common (uncommon in NC, rare in GA). June-August. Nova Scotia west to Québec, south to n. GA (Jones & Coile 1988) and KY. [= RAB, C, F, FNA, G, GW, HC, K, W, WV, Z; = *Panicularia melicaria* (Michaux) A.S. Hitchcock – S]

Glyceria nubigena W.A. Anderson, Smoky Mountain Mannagrass. Mt (NC, TN): moderate to high elevation seepages in the Great Smoky Mountains, sometimes in areas appearing dry (such as heath balds), nearly endemic to Great Smoky Mountains National Park; rare. June-July. Endemic to the Great Smoky Mountains of w. NC and e. TN. *G. nubigena* has nearly the same range as *Rugelia nudicaulis,* but is more restricted to seepage. The distinctions and relationship between this taxon and *G. grandis* need further investigation. [= RAB, FNA, HC, K, W, Z]

Glyceria obtusa (Muhlenberg) Trinius, Coastal Mannagrass. Cp (NC, SC, VA), Mt (VA): blackwater swamp forests, wet meadows, freshwater marshes; uncommon. June-September. Nova Scotia south to SC, on or near the Coastal Plain; disjunct to w. VA in Shenandoah Valley sinkhole ponds. [= RAB, C, F, FNA, G, GW, HC, K, W, Z; = *Panicularia obtusa* (Muhlenberg) Kuntze – S]

Glyceria septentrionalis A.S. Hitchcock, Floating Mannagrass, Eastern Mannagrass. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, VA): shallow water, wet mucky soils, floodplain sloughs, cypress ponds; uncommon (rare in GA). May-June. MA west to MN, south to SC, ne. GA, and TX. [= RAB, F, GW, HC, K, W, WV, Z; < *G. septentrionalis* – C, G (also see *G. arkansana*); = *G. septentrionalis* var. *septentrionalis* – FNA; = *Panicularia septentrionalis* (A.S. Hitchcock) Bicknell – S]

Glyceria striata (Lamarck) A.S. Hitchcock *var. striata*, Fowl Mannagrass. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): wet meadows, seepages, bogs, marshes, swamp forests; common. April-June. Newfoundland west to British Columbia, south to FL and CA. Var. *stricta* (Scribner) Fernald is more northern. [= C, F, G, HC, Z; < *G. striata* – RAB, FNA, GW, K, W, WV; = *Panicularia striata* (Lamarck) A.S. Hitchcock – S; = *G. striata* ssp. *striata*]

Glyceria arkansana Fernald, Arkansas Mannagrass. Swamps. IL south to LA and AR; disjunct in w. NY. The VA report is in error. The appropriate treatment of this taxon needs further investigation. [= F, HC, K, Z; < *G. septentrionalis* – C, G; = *G. septentrionalis* A.S. Hitchcock var. *arkansana* (Fernald) Steyermark & Kučera – FNA]

* *Glyceria notata* Chevallier, Marked Mannagrass. Reported for TN (FNA). [= FNA] {add synonymy}

Gymnopogon Palisot de Beauvois 1812 (Beard Grass, Skeleton Grass)

A genus of about 15 species, in temperate and tropical areas of the Americas. References: Smith in FNA (2007b); Smith (1971)=Z.

Identification notes: When sterile, *Gymnopogon* is sometimes confused with *Dichanthelium*. *Gymnopogon* differs in having the sheaths conspicuously overlapping (vs. not overlapping in *Dichanthelium*) and leaves that are definitely cordate-clasping and of stiff texture (only a few *Dichanthelium* have this combination).

1 Awn of the lemma 4.5-12 mm long; inflorescence branches with spikelets distributed from the tip nearly to the base; leaves 5-15 mm wide; [of the Coastal Plain, Piedmont, and Mountains] ..... ***G. ambiguus***
1 Awn of the lemma 0.8-1.6 (-3.5) mm long; inflorescence branches with spikelets distributed from the tip nearly to the base (*G. chapmanianus*) or to roughly the midpoint, the basal portion naked (or some branches rarely with a few spikelets) (*G. brevifolius*); leaves 2-8 mm wide; [of the Coastal Plain and lower Piedmont].
  2 Spikelets 1-flowered; first glume 2.3-3.7 mm long ..... ***G. brevifolius***
  2 Spikelets 2-4-flowered; first glume 3.8-5 mm long ..... ***G. chapmanianus***

Gymnopogon ambiguus (Michaux) Britton, Sterns, & Poggenburg, Eastern Beard Grass. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (KY, NC, SC, VA); Ip (KY): prairies, glades, barrens, dry pinelands and woodlands, dry fields; common (rare in Mountains, rare in KY). August-October. S. NJ west to KY, OH, and MO, south to FL and TX. [= RAB, C, F, FNA, G, HC, K, S, W, Z]

Gymnopogon brevifolius Trinius, Pineland Beard Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA), Ip (KY): pine savannas, sandhills, dry woodlands, prairies, calcareous glades; common (rare in KY Interior low Plateau, rare in VA Coastal Plain, rare in lower Piedmont of GA, NC, SC, VA). August-October. S. NJ south to FL, west to LA and AR; disjunct in the Highland Rim of KY and TN. [= RAB, C, F, FNA, G, HC, K, S, Z]

Gymnopogon chapmanianus A.S.Hitchcock, Chapman's Beard Grass. Cp (FL, GA): sandhills and other xeric, sandy habitats; rare (rare in GA). Se. GA south to FL. [= FNA, HC, K, S; > *G. chapmanianus* – Z; *G. floridanus* Swallen – Z]

Hackelochloa Kuntze 1891 (Pitscale Grass

* ***Hackelochloa granularis*** (Linnaeus) Kuntze, Pitscale Grass. Cp (GA): disturbed areas; rare, native of the Old World. Reported for sw. GA and other Gulf Coast states (Thieret in FNA 2003a, Jones & Coile 1988, Kartesz 1999). [= FNA, HC, K; = *Rytilix granularis* (Linnaeus) Skeels – S; = *Mnesithea granularis* (Linnaeus) Koning & Sosef]

Hainardia W. Greuter 1967 (Thintail)

A genus of 1 species, an annual, native of Europe. References: Smith in FNA (2007a); Tucker (1996)=Z.

* ***Hainardia cylindrica*** (Willdenow) W. Greuter, Thintail. Cp (SC): waste areas around wool-combing mills; rare, native of the Old World. April-June. [= FNA, K, Z; = *Lepturus cylindricus* (Willdenow) Trinius – RAB; = *Monerma cylindrica* (Willdenow) Cosson & Durieu – HC]

Heteropogon Persoon 1806 (Tanglehead)

A genus of about 10 species, pantropical and extending into subtropical and warm temperate areas. References: Barkworth in FNA (2003a).

* ***Heteropogon melanocarpus*** (Elliott) Elliott ex Bentham, Sweet Tanglehead. Cp (FL, GA, NC, SC): sandy roadsides, disturbed areas; rare, probably naturalized from further south (or even from the Old World). September-October. The species is widespread in the Old World and New World tropics, north in North America to se. NC. [= RAB, FNA, HC, K, S]

Holcus Linnaeus 1753 (Velvet Grass, Soft Grass)

A genus of 8 species, usually perennial, native of Europe, n. Africa, and w. Asia. References: Standley in FNA (2007a); Tucker (1996)=Z.

1 Plant not rhizomatous; upper culm internodes velvety-villous; lemma awn 1-2 mm long, recurved as a hook ..... ***H. lanatus***
1 Plant strongly rhizomatous; upper culm internodes glabrous; lemma awn 3-5 mm long, straight or geniculate ..... ***H. mollis ssp. mollis***

* ***Holcus lanatus*** Linnaeus, Velvet Grass, Soft Grass, Yorkshire-fog. Mt (Ga, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (NC, SC, VA): pastures, disturbed areas, roadsides, hedge-rows; common (rare in SC), native of Europe. May-October. [= RAB, C, F, FNA, G, HC, K, W, WV, Z; = *Notholcus lanatus* (Linnaeus) Nash – S]
* ***Holcus mollis*** Linnaeus *ssp.* ***mollis***, Creeping Soft Grass. Mt (NC): lawns; rare, native of Europe. September. This European species is known from scattered sites in e. North America. The species was documented for our area by Clay (1995). [= FNA; < *H. mollis* – C, F, G, HC, K, Z]

Hordeum Linnaeus 1753 (Barley)

A genus of about 40 species, north temperate and in South America. Many recent authors place most of our species (other than *H. vulgare)* in *Critesion* Rafinesque. References: von Bothmer, Baden, & Jacobsen in FNA (2007a); Tucker (1996)=Z; Petersen & Seberg (2003); Blattner (2004).

1 Rachis remaining intact at maturity; leaves 5-12 mm wide, with well-developed auricles; [section *Hordeum*] ..... ***H. vulgare***
1 Rachis disarticulating at maturity; leaves 1-5 mm wide, not auriculate (except in *H. murinum* ssp. *leporinum*).
  2 Perennial; glumes 25-150 mm long; [intersectional hybrid derivative of section *Sibirica* and section *Critesion*] .... ***H. jubatum ssp. jubatum***
  2 Annual; glumes 7-22 (-28) mm long.
    3 Leaves auriculate; glumes of the central spikelet (in the triad) with ciliate margins; [section *Hordeum*] ..... ***H. murinum ssp. leporinum***
    3 Leaves not auriculate; glumes of the central spikelet (in the triad) with scabrous margins; [section *Critesion*] ..... ***H. pusillum***

* ***Hordeum jubatum*** Linnaeus *ssp.* ***jubatum***, Foxtail Barley, Squirreltail Barley. Mt, Pd (VA), Cp (NC, SC, VA): disturbed areas; rare, apparently introduced in our area, native of w. United States. May-August. A tetraploid taxon. [= FNA, K; < *H. jubatum* – RAB, C, F, G, HC, W, WV, Z; = *Critesion jubatum* (Linnaeus) Nevski]
* ***Hordeum murinum*** Linnaeus *ssp.* ***leporinum*** (Link) Arcangeli. Pd (GA, NC, VA), Cp (SC, VA): disturbed areas; rare, native of Mediterranean Europe. May. A tetraploid taxon. [= FNA, K, Z; = *H. leporinum* Link – RAB, C, HC; < *Hordeum murinum* Linnaeus – G, S; = *Critesion murinum* (Linnaeus) Á. Löve ssp. *leporinum* (Link) Á. Löve]
Hordeum pusillum Nuttall, Little Barley. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): roadsides, ditches, disturbed areas; common (rare in VA Mountains). April-June. Se. NY west to MN, south to n. FL, s. TX, and s. AZ. A diploid taxon. [= RAB, C, F, FNA, G, HC, K, S, W, Z; = *Critesion pusillum* (Nuttall) Á. Löve]
* ***Hordeum vulgare*** Linnaeus, Barley. Cp (FL, NC, SC, VA), Pd (NC, SC, VA), Mt (VA): cultivated fields, occasionally persistent as a waif; commonly cultivated, rare as a waif, native of Eurasia. May-June. A diploid taxon. The original wild form is often treated as *H. vulgare* ssp. *spontaneum* and the cultivated, non-shattering derivative as ssp. *vulgare* (Hancock 2004). The wild form was used as a food source since at least 19,000 years ago, and ssp. *vulgare* developed by 8500 years ago. [= RAB, C, F, K, Z; > *H. aegiceras* Nees ex Royle – G; > *H. vulgare* var. *vulgare* – G, HC; > *H. vulgare* var. *trifurcatum* (Schlechtendahl) Alefeld – G, HC; > *H. vulgare* ssp. *vulgare* – FNA; > *H. vulgare* ssp. *spontaneum* (K. Koch) Thellung]

*? ***Hordeum brachyantherum*** Nevski *ssp.* ***brachyantherum*** is reported for se. PA (Rhoads & Klein 1993) and also is apparently known from specimens from GA (Sorrie, pers. comm.). A tetraploid taxon. [= FNA, K; ? *Critesion brachyantherum* (Nevski) Barkworth & D.R. Dewey] {not yet keyed}

* ***Hordeum depressum*** (Scribner & J.G. Smith) Rydberg, Low Barley. Cp (SC): waste areas around wool-combing mills; rare, native of w. North America. A tetraploid taxon. [= FNA, HC, K; = *Critesion depressum* (Scribner & J.G. Smith) Á. Löve] {not yet keyed}

Imperata Cirillo 1792 (Cogongrass, Satintail)

A genus of about 8-9 species, of tropical, subtropical, and warm temperate areas of both hemispheres. References: Gabel in FNA (2003a); Ward (2004c)=Z; Hall (1998)=Y.

* ***Imperata cylindrica*** (Linnaeus) Palisot de Beauvois, Cogongrass, Brazilian Satintail. Cp (FL, GA, SC): grassy roadside; common (rare north of FL), introduced fom the tropics. See Nelson (1993) for first report from SC. An extremely aggressive and dangerous weed, now well-established and rapidly invading fire-maintained Coastal Plain areas (such as longleaf pine and slash pine flatwoods and longleaf pine clayhills) on the Gulf Coastal Plain of FL, AL, and MS. Hall (1998) argues that *I. cylindrica* and *I. brasiliensis* are not distinct. The only character considered to separate them is that *I. brasiliensis* has 1 anther and *I. cylindrica* has 2. Ward (2004c) treats the 2 taxa at varietal level. Both putative taxa are present in the Gulf Coast area of FL, GA, AL, and LA. [= Y; > *I. cylindrica* – FNA, HC, K; > *I. brasiliensis* Trinius – FNA, HC, K, S; > *I. cylindrica* var. *cylindrica* – Z; > *I. cylindrica* var. *mexicana* (Ruprecht) D.B. Ward – Z]

Koeleria Persoon 1805 (Junegrass, Koeleria)
[also see *Rostraria*]

A genus of about 60 species, north and south temperate. References: Standley in FNA (2007a)

Koeleria macrantha (Ledebour) J.A. Schultes, Junegrass. South to DE, MD, PA, KY, AL, LA, TX, and Mexico. [= FNA, K; < *K. pyramidata* (Lamarck) Palisot de Beavois – C]

Lachnagrostis Trinius 1820

A genus of about 20 species, annuals and perennials, of the Southern Hemisphere. References: Harvey in FNA (2007a); Soreng et al. (2003).

* ***Lachnagrostis filiformis*** (G. Forst.) Trinius, Pacific Bentgrass. Cp (SC): waste areas around wool-combing mill; rare, perhaps only a waif, native of Australia. [= FNA; = *Agrostis avenacea* J.F. Gmelin – K]

Lagurus Linnaeus 1753 (Hare's-tail Grass)

A monotypic genus, an annual, of the Mediterranean region. References: Tucker in FNA (2007a); Tucker (1996)=Z.

* ***Lagurus ovatus*** Linnaeus, Hare's-tail Grass. Cp (FL, NC): on ballast, other disturbed areas; rare, native of Mediterranean Europe. April-June. [= RAB, FNA, HC, K, Z]

Leersia Swartz 1788 (Cutgrass)

A genus of about 17-18 species, tropical and warm temperate. References: Pyrah in FNA (2007a); Tucker (1988)=Z.

1 Lower panicle branches whorled or closely approximate; spikelets 4.0-5.5 mm long, 1.5-2.0 mm broad; stamens 3 ..... ***L. oryzoides***
1 Lower panicle branches alternate (rarely opposite); spikelets 2.2-5.0 mm long, 0.8-4.0 mm broad; stamens 2 or 6.
  2 Spikelets suborbicular-falcate, 3.0-4.0 mm broad, < 2× as long as broad; principal leaf-blades 10-15 mm wide; stamens 2 ..... ***L. lenticularis***
  2 Spikelets narrowly elliptic-falcate, 1.0-2.0 mm broad, > 2× as long as wide; principal leaf-blades usually < 7 mm wide; stamens 2 or 6.
    3 Spikelets 3.8-4.7 mm long, 1.5-2.0 mm broad; panicle branches short, bearing spikelets nearly to their bases; stamens 6 ..... ***L. hexandra***
    3 Spikelets 2.2-3.5 mm long, 0.8-1.2 mm broad; panicle branches long, filiform, the longer ones bearing spikelets only in their upper half; stamens 2 ..... ***L. virginica***

Leersia hexandra Swartz, Southern Cutgrass. Cp (FL, GA, NC, SC, VA): clay-based Carolina bays, limesink ponds, lakes, pools, usually in places where periodically or seasonally inundated; uncommon (rare in VA). June-August. Pantropical, ranging north in North America to MD, TN, and TX. This species is considered a serious weed in the Old World and New World tropics; in our area, however, it is uncommon and not weedy. [= RAB, C, F, FNA, G, GW, HC, K, Z; = *Homalocenchrus hexandrus* (Swartz) Kuntze – S]

Leersia lenticularis Michaux, Catchfly Cutgrass. Cp (FL, GA, NC, SC, VA): floodplain forests and swamps; uncommon. September-October. Se. VA south to n. FL, west to e. TX, north in the interior to IN and MN. [= RAB, C, F, FNA, G, GW, HC, K, Z; = *Homalocenchrus lenticularis* (Michaux) Kuntze – S]

Leersia oryzoides (Linnaeus) Swartz, Rice Cutgrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): marshes, riverbanks, pond-shores; common. August-October. Nova Scotia west to British Columbia, south to FL and CA; also in Europe and e. Asia. [= RAB, C, F, FNA, G, GW, HC, K, WV, Z; = *Homalocenchrus oryzoides* (Linnaeus) Pollich – S]

Leersia virginica Willdenow, White Grass, White Cutgrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): floodplain forests, swamps, streambanks; common. August-October. Québec west to MN and SD, south to FL and TX. [= RAB, C, FNA, G, GW, HC, K, WV, Z; > *L. virginica* var. *virginica* – F; > *L. virginica* var. *ovata* (Poiret) Fernald – F; = *Homalocenchrus virginicus* (Willdenow) Britton – S]

Leptochloa Palisot de Beauvois 1812 (Sprangletop, Feathergrass)

A genus of about 30 species, pantropical and extending into warm temperate areas. The circumscription of *Leptochloa* has been controversial; many earlier authors have preferred to separate *Diplachne* as a separate genus. References: Snow in FNA (2003a); Snow (1998); Cronquist (1991).

1 Spikelets 1-2.5 mm long, with 2-4 flowers; sheaths sparsely pilose with long, pustular-based hairs ..... ***L. panicea ssp. brachiata***
1 Spikelets 3.5-10 mm long, with 5-12 flowers; sheaths glabrous (rarely slightly scabrous).
  2 Lemmas 2-3 mm long, the apex obtuse to truncate, with the midrib often extended as a mucro ..... ***L. uninervia***
  2 Lemmas 3-5 mm long, the apex acuminate or awned.
    3 Lemmas acuminate; leaf blades 5-10 mm wide ..... ***L. panicoides***
    3 Lemmas awned; leaf blades 1-3 mm wide.
      4 Low sprawling grasses, < 5 dm tall; lemma awns (1-) 2.5-5 mm long; first glume 2.5-3.5 mm long; second glume 4-7 mm long ..... ***L. fascicularis*** *var.* ***maritima***
      4 Taller grasses, usually 5-10 dm tall; lemma awns 0.5-2.5 mm long; first glume 1.3-3.4 mm long; second glume 2.2-5 mm long.
        5 First glume 2.3-3.4 mm long; second glume 3.4-5.0; lemmas 4-5 mm long, with an awn 0.5-2.5 mm long ..... ***[L. fascicularis*** *var.* ***acuminata]***
        5 First glume 1.3-2 mm long; second glume 2.2-3.5; lemmas 3-4 mm long, with an awn 0.5-1 mm long ..... ***L. fascicularis*** *var.* ***fascicularis***

* ***Leptochloa fascicularis*** (Lamarck) A. Gray *var.* ***fascicularis***, Bearded Sprangletop. Pd (NC), Cp (SC): bed of artificial impoundment, brackish habitats; rare, adventive from further west. September. Widespread in e. North America, primarily west of the Appalachians (adventive further east), and extending into South America. Reported (as *L. fascicularis*) for SC by Nelson & Kelly (1997). [= C, G; < *L. fascicularis* – RAB, GW, HC, S; < *L. fusca* (Linnaeus) Kunth ssp. *fascicularis* (Lamarck) N. Snow – FNA, K; = *Diplachne fascicularis* (Lamarck) Palisot de Beauvois – F]

Leptochloa fascicularis (Lamarck) A. Gray *var.* ***maritima*** (Bicknell) Gleason, Salt-meadow Grass. Cp (NC, VA): fresh to brackish marshes, overwash flats, other disturbed brackish habitats; rare. August-October. Along the coast from s. NH south to se. NC. This taxon appears to warrant status as a species separate from *L. fascicularis*. [= C, G; < *L. fascicularis* – RAB, GW, HC, S; = *Diplachne maritima* E.P. Bicknell – F; < *L. fusca* (Linnaeus) Kunth ssp. *fascicularis* (Lamarck) N. Snow – FNA, K; = ***Leptochloa maritima*** (E.P. Bicknell) LeBlond & Sorrie ined.]

Leptochloa panicea (Retzius) Ohwi *ssp.* ***brachiata*** (Steudel) N. Snow, Red Sprangletop. Pd (GA, NC, SC, VA), Cp (NC, SC, VA): disturbed areas; uncommon. June-October. Widespread in the Western Hemisphere. The more familiar name, *L. filiformis*, must be replaced for reasons of nomenclatural priority. [= FNA, K; < *L. filiformis* (Lamarck) Palisot de Beauvois – RAB, C, F, G, GW, HC, K, S, W]

* ***Leptochloa panicoides*** (J. Presl) A. Hitchcock & Chase, Amazon Sprangletop. Pd (VA), Cp (GA): drawdown habitats on lake margins; rare, native of South America. Belden et al. (2004) discuss the Virginia occurrences along the banks of the Roanoke (Staunton) River at Kerr Reservoir. Also reported for e. GA in the Coastal Plain (Sorrie, pers. comm.). [= C, FNA, G, GW, HC, K; ? *Diplachne halei* Nash – F; ? *Leptochloa floribunda* Doell – S; = *Diplachne panicoides* (J. Presl) McNeill]

* ***Leptochloa uninervia*** (J. Presl) A. Hitchcock & Chase. Cp (FL, GA, SC, VA), Pd (NC): disturbed areas; rare, adventive from further west. July-August. Widespread in the Western Hemisphere, the native range obscure, but not likely native in our area. Reported for SC by Nelson & Kelly (1997). [= RAB, C, G, GW, HC, K, S; = *L. fusca* (Linnaeus) Kunth ssp. *uninervia* (J. Presl) N. Snow – FNA, K; = *Diplachne uninervia* (J. Presl) Parodi]

* ***Leptochloa decipiens*** (R. Brown) Stapf ex Maiden *ssp.* ***peacockii*** (Maiden & Betche) N. Snow. Cp (SC): waif at wool-combing mill; rare, introduced, probably not established. [= K] {not keyed}

* ***Leptochloa digitata*** (R. Brown) Domin. Cp (SC): waif at wool-combing mill; rare, introduced, probably not established. [= K] {not keyed}

* ***Leptochloa divaricatissima*** S.T. Blake. Cp (SC): waif at wool-combing mill; rare, introduced, probably not established. [= K] {not keyed}

* ***Leptochloa dubia*** (Kunth) Nees. Cp (SC): waif at wool-combing mill; rare, introduced, probably not established. Also reported for NC by Kartesz (1999), but the documentation indicates that it was cultivated at a Soil Conservation Service test nursery in Chapel Hill, Orange County. [= FNA, HC, K] {not keyed}

* *Leptochloa fascicularis* (Lamarck) A. Gray var. *acuminata* (Nash) Gleason has been reported as adventive in PA and along highways in WV from halophytic habitats of w. United States (Cusick 1994). [= C, G; *Diplachne acuminata* Nash – F; < *L. fascicularis* – HC; < *L. fusca* (Linnaeus) Kunth ssp. *fascicularis* (Lamarck) N. Snow – FNA, K; *L. acuminata* (Nash) Mohlenbrock] {not keyed}

* ***Leptochloa virgata*** (Linnaeus) Palisot de Beauvois, Tropical Sprangletop. Cp (SC): waif at wool-combing mill; rare, introduced, probably not established. [= FNA, HC, K] {not keyed}

Limnodea L.H. Dewey 1894

A monotypic genus, and annual, of sc. United States and adjacent Mexico. References: Snow in FNA (2007a); Brandenburg & Thieret (2000)=Z; Tucker (1996)=Y.

Limnodea arkansana (Nuttall) L.H. Dewey. Cp (AL, FL, LA, MS, SC*): hammocks, moist forests (Panhandle FL westward), waste at wool-combing mill, probably not established (SC); rare, introduced, native of sc. United States (w. FL, c. and s. AL, west through MS, LA, and AR to OK, TX, and adjacent Mexico). [= FNA, HC, K, S, Z; = *Cinna arkansana* (Nuttall) G. Tucker – Y]

Lolium Linnaeus 1753 (Rye-grass, Darnel, Fescue)

A genus of about 5 species, annuals and perennials, native to Europe, n. Africa, and temperate Asia. References: Terrell in FNA (2007a); Darbyshire (1993)=Y; Aiken & Darbyshire (1990)=X; Tucker (1996)=Z. Key based in part on C and X. [also see *Schedonorus*]

1 Inflorescence paniculate (spikelets borne on branches off the central axis) ..... ***[see Schedonorus]***
1 Inflorescence spikelike (spikelets sessile on the central axis).
  2 Glumes (12-) 15-25 mm long, subcoriaceous, equalling or surpassing the uppermost lemma (therefore the length of the spikelet); florets 4-9 per spikelet; annual ..... ***L. temulentum***
  2 Glumes 4-12 mm long, herbaceous, shorter than the lemmas (therefore shorter than the spikelet); florets (2-) 5-22 per spikelet; annual or perennial.
    3 Lemmas (at least the upper) awned, the awns to 15 mm long; florets 11-22 per spikelet; annual or perennial.... ***L. perenne*** *var.* ***aristatum***
    3 Lemmas awnless; florets (2-) 5-10 per spikelet; perennial ..... ***L. perenne*** *var.* ***perenne***

* ***Lolium perenne*** Linnaeus *var.* ***aristatum*** Willdenow, Italian Rye-grass, Annual Rye-grass. Cp (GA, NC, SC, VA), Pd (NC, SC), Mt (NC, SC, VA), {FL}: fields, roadsides, pastures, disturbed areas; common (rare in VA), native of Eurasia. April-July. [= C, Z; = *L. multiflorum* Lamarck – RAB, F, FNA, G, HC, S, WV; = *L. perenne* ssp. *multiflorum* (Lamarck) Husnot – K; < *L. perenne* – W]
* ***Lolium perenne*** Linnaeus *var.* ***perenne***, English Rye-grass, English Rye-grass, Perennial Rye-grass. Cp (GA, NC, SC, VA), Pd, Mt (GA, NC, VA), {FL}: fields, roadsides, pastures, disturbed areas; uncommon, native of Eurasia. April-July. [= C, Z; = *L. perenne* – RAB, F, FNA, G, HC, S, WV; = *L. perenne* ssp. *perenne* – K; < *L. perenne* – W]
* ***Lolium temulentum*** Linnaeus *ssp.* ***temulentum***, Darnel. Pd (GA, NC, VA), Cp (FL, NC, VA), {SC}: fields, roadsides, pastures, disturbed areas; common (rare in FL and VA), native of Eurasia. May-June. [= FNA; < RAB, C, F, HC, S, Z; > *L. temulentum* var. *leptochaetum* A. Braun – G; > *L. temulentum* var. *macrochaeton* A. Braun – G; > *L. temulentum* ssp. *temulentum* – K]

Luziola Antoine Laurent de Jussieu 1789 (Southern Water Grass)

A genus of about 12 species, from s. North America south to tropical South America. References: Terrell in FNA (2007a); Tucker (1988)=Z; Judziewicz et al. (2000)=Y. Key based on Terrell in FNA (2007a).

1 Culms prostrate; leaves conspicuously clustered towards the apex of the culms, floating, 1-5 (-8) cm long ..... ***L. fluitans*** *var.* ***fluitans***
1 Culms suberect to erect; leaves scattered along the culm, not floating, > 6 cm long.
  2 Pistillate florets 3-5 mm long; achenes striate ..... ***L. bahiensis***
  2 Pistillate florets 2-2.5 mm long; achenes smooth ..... ***L. peruviana***

*? ***Luziola bahiensis*** (Steudel) Hitchcock. Cp (AL, FL, MS): streams and riverbanks; rare. Apparently native (Anderson & Hall 1993), but considered native of South America by some authors. [= FNA, HC, K]
Luziola fluitans (Michaux) Terrell & H. Robinson *var.* ***fluitans***, Southern Water Grass. Cp (GA, NC, SC), Pd? (GA?): aquatic in water of natural lakes, slow-moving blackwater rivers, and other stagnant waters; rare (NC Watch List). August-October. Var. *fluitans* ranges from ne. NC to c. FL and west to e. TX; var. *oconnerii* (Guzman M.) G. Tucker occurs in the highlands of w. Mexico (Tucker 1988). A very unusual grass, truly aquatic, with flexuous stems and unwettable, floating leaves. In addition to floating leaves (helpful in the field but not in the herbarium!), other useful characters include two secondary blade nerves on either side of the midnerve and virtually as prominent as the midnerve, and which extend onto the sheath where they occur with another 5 or so strong nerves; often with cilia 0.5-1 mm long at the summit of the ventral face of the sheath (an unusual place); and a hyaline ligule about 1 mm long on the same plane as the sheath (i.e., free from the base of diverging blades). [= FNA, Y, Z; < *L. fluitans* – K; < *Hydrochloa carolinensis* Palisot de Beauvois – RAB, GW, HC, S]
* ***Luziola peruviana*** Gmelin, Peruvian Water Grass. Cp (FL): disturbed wet areas; rare. FL Panhandle. Apparently an introduction, occurring in disturbed situations. See Anderson & Hall (1993). [= FNA, HC, K]

Megathyrsus (Pilger) B.K. Simon & S.W.L. Jacobs 2003 (Guinea Grass)

A genus of 3 species. References: Wipff & Thompson in FNA (2003a), amended in FNA (2007a).

* ***Megathyrsus maximus*** (Jacquin) B.K. Simon & S.W.L. Jacobs, Guinea Grass. Cp (AL, FL, GA): disturbed areas; common, native of Africa. Introduced in the Gulf states (GA, AL, FL) (FNA). [= FNA (2007a); = *Urochloa maxima* – FNA (2003a), K; = *Panicum maximum* Jacquin – HC, S]

Melica Linnaeus 1753 (Melic)

A genus of about 80 species, north temperate, s. Africa and s. South America. References: Barkworth in FNA (2007a); Tucker (1996)=Z.

1 First glume oblong, 6.5-10 mm long, 2-4× as long as wide, acute to obtuse at the apex, about the same length and width as the second glume; inflorescence with (0-) 1-5 branches from the lower nodes only; fertile lemmas 2; leaves 1-6 mm wide; [common species, widespread in our area] ..... ***M. mutica***

1 First glume broadly ovate, 5-8 mm long, 1.5-2× as long as wide, obtuse to rounded at the apex, shorter and broader than the second glume; inflorescence with 2-10 (or more) branches from most nodes; fertile lemmas (2-) 3; leaves 3-12 mm wide; [rare species of the Mountains of NC and VA, northwards and westwards] ..... ***M. nitens***

Melica mutica Walter, Two-flower Melic. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): forests and woodlands, including coastal fringe and maritime forests; common. April-May. MD west to IN and IL, south to FL and TX. [= RAB, C, F, FNA, G, HC, K, S, W, WV, Z]

Melica nitens (Scribner) Nuttall ex Piper, Three-flower Melic. Mt (GA, NC, VA): rocky upland woodlands, barrens, and glades, over calcareous rocks (such as limestone, calcareous shale); rare. May. PA west to s. MN and NE, south to nw. GA and TX. [= RAB, C, F, FNA, G, HC, K, W, WV, Z]

Melinis Palisot de Beauvois 1812 (Natalgrass)

A genus of ca. 22 species, native to Africa and w. Asia. References: Wipff in FNA (2003a).

* ***Melinis repens*** (Willdenow) Zizka *ssp.* ***repens***, Rose Natalgrass. Cp (FL, GA), Pd, Mt (GA): disturbed areas, roadsides; common (rare north of FL), native of Africa. The report for NC by Kartesz (1999) is an error. [= FNA; < *M. repens* – K; ? *Rhynchelytrum roseum* (Nees) Stapf & C.E. Hubbard ex Bews – HC; < *Rhynchelytum repens* (Willdenow) C.E. Hubbard]

Microstegium Nees in Lindley 1836 (Sasa-grass, Japanese-grass)

A genus of about 15 species, of subtropical Asia and Africa. References: Barden (1987); Fairbrothers & Gray (1972); Winter, Schmitt, & Edwards (1982); Koyama (1987); Thieret in FNA (2003a).

* ***Microstegium vimineum*** (Trinius) A. Camus, Japanese Stilt-grass, Flexible Sasa-grass, Japanese-grass. Pd (Ga, NC, SC, NC, VA), Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): disturbed areas, colonizing moist, rich soil, especially in floodplains; common, native of tropical se. Asia. The following chronological synopsis of flora accounts of *Microstegium* is perhaps instructive: not treated by Small (1933), "local" (Fernald 1950), "rarely introduced and possibly not established" (Gleason & Cronquist 1952), "sporadically naturalized" (Godfrey & Wooten 1979), "a rapidly spreading pernicious invader on moist ground, too common" (Wofford 1989). RAB report it from fewer than 1/3 of the counties of the Carolinas (in 1968); it is now undoubtedly in every county, an abundant weed in most of them. This species has become a very serious pest, now ranking as one of the most destructive introduced plants in our area, forming extensive and dense patches, sprawling over and eliminating nearly all other herbaceous plants. Eradication is very difficult, and considering its obvious colonizing abilities, only temporary. Hunt & Zaremba (1992) document the continuing northern expansion of *Microstegium* into NY and CT. Redman (1995) discusses its habitat preferences in MD and DC. Koyama (1987) reports it as "common as undergrowth of forests" in Japan, part of its native distribution. [= RAB, C, FNA, GW, K, W; = *Eulalia viminea* (Trinius) Kuntze – G; > *Eulalia viminea* var. *viminea* – F; > *Eulalia viminea* var. *variabilis* Kuntze – F; > *M. vimineum* var. *vimineum* – HC; > *M. vimineum* var. *imberbe* (Nees) Honda – HC]

Milium Linnaeus 1753 (Wood-millet, Millet-grass)

A genus of 4 species, north temperate. References: Crins in FNA (2007a); Tucker (1996)=Z; Fernald (1950b)=Y.

Milium effusum Linnaeus *var.* ***cisatlanticum*** Fernald, American Wood-millet, Millet-grass. Mt (NC, VA): forests at high (or rarely moderate) elevations; rare. June. A circumboreal species, ranging in North America south to w. NC (Swain County), e. TN (Sevier County), w. VA, WV, OH, IN, IL, and MN. The American plants are sometimes segregated as var. *cisatlanticum* Fernald (Fernald 1950b). Though considered "probably accidentally introduced and established" in NC by Radford, Ahles, & Bell (1968), the native occurrence of this northern species is more plausible; the only known occurrence in NC (not recently seen) is in the Great Smoky Mountains National Park. [= K, Y; < *M. effusum* – RAB, C, F, G, HC, W, WV, Z]

Miscanthus Andersson 1855 (Eulalia)

References: Barkworth in FNA (2003a).

* ***Miscanthus sinensis*** Andersson, Eulalia, Chinese Silver Grass. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): roadsides; common (rare in FL), native of e. Asia. September-November. This species is becoming aggressively weedy. Forms with leaves cross-variegated or linear-variegated with yellow are cultivated and sometimes escape or persist (in addition to the much more common green-leaved form). [= RAB, C, FNA, G, K, S, W, WV; > *M. sinensis* var. *variegatus* Beal – F, HC; > *M. sinensis* var. *zebrinus* Beal – F, HC]

Monanthochloe Engelmann 1859 (Shoregrass)

A genus of 2 species, perennials, of tropical and subtropical America. References: Thieret in FNA (2003a).

Monanthochloe littoralis Engelmann, Shoregrass, Key Grass. Cp (FL): brackish shores; rare. From n. peninsular FL (Taylor and Dixie cos. on the west coast and Volusia County on the east coast) southward. Also known from sw. LA (Cameron Parish) and TX southward. [= FNA, K, WH]

Muhlenbergia Schreber 1789 (Muhly)

A genus of about 160 species, of North America south to Andean South America, and e. and se. Asia. *Muhlenbergia* is a large and diverse genus; the various groups seem very different. References: Pohl (1969); Gustafson & Peterson (2007)=Y; Morden & Hatch (1989)=Z; Peterson in FNA (2003a).

1 Panicle open and diffuse, > 4 cm broad, the spikelets borne on slender or capillary pedicels longer than the lemmas.
  2 Plant with rhizomes, the rhizomes prominent, creeping, and covered with imbricate scales; culms and sheaths strongly compressed at base, the leaves distichous; spikelets 1.5-2 mm long ..... ***M. torreyana***
  2 Plant without rhizomes, tufted with erect culms (a "bunchgrass"); culm and sheaths terete, the leaves not distichous; spikelets 1.5-5 mm long (excluding awns, if present); [subgenus *Podosemum*].
    3 Spikelets 1.5-2 mm long, awnless ..... ***[M. uniflora]***
    3 Spikelets 2.5-5 mm long (excluding awns), awned or awnless.
      4 Lemma awn 0-1.5 (-4) mm long; glume bodies (1.1-) 2.0-3.3 (-3.6) mm long, < ½ as long as the lemma bodies, acuminate, not awned (rarely the second with a short awn < 0.6 mm long); spikelets usually brown or bronze (when fresh); basal sheaths usually very fibrous ..... ***M. expansa***
      4 Lemma awn (2-) 3-35 mm long; glume bodies (0.3-) 0.7-1.7 (-2.4) mm long, > ½ as long as the lemma body, one or both glumes sometimes awned; spikelets usually purple (when fresh); basal sheaths rarely strongly fibrous.
        5 Lemma awn (2-) 3-13 (-18) mm long, first glume awnless (or rarely with an awn to 3.2 mm long), second glume awnless (or rarely with an awn up to 5.0 mm long), palea awnless; lemma lacking setaceous teeth flanking the awn; flowering late August-October; [widespread in our area, particularly in rocky, clayey, or sandy glades, barrens, and woodlands with prairie affinities] ..... ***M. capillaris***
        5 Lemma awn (8-) 12-26 (-35) mm long, first glume awn (0.5-) 1-7 (-10) mm long, second glume awn (1-) 5-19 (-25) mm long, palea awn-tipped; lemma with two setaceous teeth flanking the awn, the teeth 0.5-2.5 (-4.7) mm long; flowering October-November; [of sandy maritime situations on barrier islands of the outer Coastal Plain] ..... ***M. sericea***
1 Panicle slender, dense, < 2.5 cm broad, the spikelets sessile or on non-capillary pedicels shorter than the lemmas; [subgenus *Muhlenbergia*].
  5 Glumes minute, 0-0.5 mm long; plant lacking rhizomes; culms weak, decumbent and cespitosely branching in their lower portions, rooting at the nodes, the upper portions erect and sparsely branched ..... ***M. schreberi***
  5 Glumes well-developed, 1-7 mm long; plant with scaly rhizomes (except for *M. cuspidata*); culms firm (rarely sprawling), few or solitary (rarely forming dense colonies).
    6 Glumes 5-7 mm long (tapered to arched or straight awns), about double the length of the lemma (excluding its awn); panicle dense and spike-like, 2-6 cm long and 3-10 mm broad ..... ***M. glomerata***
    6 Glumes 1.2-3 mm long, shorter than to barely exceeding the lemma; panicle usually slender, arching, generally less dense and not spike-like, often with some elongated (though appressed) branches, 4-50 cm long, 2-15 mm broad.
      7 Callus glabrous; plant lacking scaly rhizomes (with slender stolons and a hard, knotty crown); leaves 0.5-2 mm wide; [of calcareous cliffs] ..... ***M. cuspidata***
      7 Callus bearded (sometimes only slightly so) (glabrous in *M. glabriflora*); plant with scaly rhizomes; leaves (1-) 2-14 mm wide; [collectively of various habitats].
        8 Panicle linear, loosely flowered, much exceeding the leaves; culm erect, simple or sparingly branched; glumes relatively broad, the body ovate, 1.2-2.5 mm long, abruptly narrowed to the acuminate tip; ligule obsolete or shorter than the elongate cartilaginous summit of the leaf sheath.
          9 Lemmas awnless or awn < 0.5 mm long; spikelets 1.5-2.5 mm long; leaf blades usually (1-) 2-6 mm wide ..... ***M. sobolifera***
          9 Lemma awn 1-11 mm long (rarely awnless); spikelets 3-5 mm long; leaf blades (2) 6-10 (-13) mm wide (often > 8 mm wide) ..... ***M. tenuiflora***
        8 Panicle lanceolate, densely (rarely loosely) flowered, leaves often extending conspicuously into the inflorescence; culm geniculate, freely branched; glumes relatively narrow, the body lanceolate, 2-3 mm long, tapering from base to apex; ligule usually obvious above the short cartilaginous summit of the leaf sheath.
          10 Culm glabrous throughout (including below the nodes).
            11 Glumes 1.4-2.0 mm long; ligule 0.2-0.5 mm long ..... ***M. bushii***

11 Glumes 2-4 (-5) mm long; ligule 0.8-1.5 mm long ..... ***M. frondosa***
10 Culm pubescent, at least below the nodes.
12 Lemma awn 7-12 mm long; spikelets loosely clustered, on pedicels 2-4 mm long ..... ***M. sylvatica***
12 Lemma awnless or with a short awn tip (rarely to 9 mm long); spikelets densely clustered, on pedicels < 1 mm long.
13 Lemma glabrous below, or with short basal bearding; ligule 0.5-1.5 mm long ..... ***M. glabrifloris***
13 Lemma pilose basally; ligule 0.5-1 mm long ..... ***M. mexicana***

Muhlenbergia bushii Pohl, Bush's Muhly. Pd (VA), Mt (GA), Cp (KY), {NC}: wet oak flatwoods, bottomlands, and other moist forests; rare. IN west IA, south to NE and TX; apparently disjunct eastward in scattered localities, including in n. GA (Jones & Coile 1988) and VA. The habitat is variously given in floras as "dry woods" or "moist woods." [= C, FNA, K; = *M. brachyphylla* Bush – F, G, HC]

Muhlenbergia capillaris (Lamarck) Trinius, Hairgrass. Pd (GA, NC, SC, VA), Cp (FL, GA, KY, NC, SC, TN, VA), Mt (GA, KY, NC, TN, VA), Ip (KY, TN): in the Piedmont and Interior Low Plateau primarily in clayey or thin rocky soils (especially in areas which formerly burned and were prairie-like) and in open woodlands, in the Coastal Plain in savannas, dry woodlands, and coastal grasslands (where sometimes in close proximity with *M. sericea*), in the Mountains around calcareous rock outcrops; uncommon (rare in KY Mountains and Coastal Plain). Late August-October. The species is widespread in e. North America. *M. capillaris* and its relatives, *M. expansa* and *M. sericea*, have been the subject of an herbarium morphological study by Morden & Hatch (1989), who conclude that the three taxa are not sharply separable and should be recognized only at the varietal level. If one considers behavior in the field, ecology, and geography in conjunction with morphologic characters, however, there is little doubt that the three taxa are biological species. Distribution and typical habitat are different for the three species, but *M. capillaris* can be found growing with or in proximity to each of the other two (I have not seen *M. sericea* and *M. expansa* together). In such situations, the two taxa present are readily distinguishable at a glance, and there is no evidence of intermediates or hybrids. Gustafson & Peterson (2007) also concluded that the three taxa are separable as species. [= F, FNA, G, W, Y; < *M. capillaris* – RAB, GW (also see *M. sericea*); = *M. capillaris* var. *capillaris* – C, HC, K, S, Z]

Muhlenbergia cuspidata (Torrey ex Hooker) Rydberg, Plains Muhly. Mt (VA), Ip (KY, TN): dolomite and limestone palisade cliffs; rare. OH west to MT and Alberta, south to sw. VA, KY, MO, OK, and NM. The VA occurrences are on dolomite and limestone palisade cliffs along the New, Roanoke, and Shenandoah rivers. [= C, F, FNA, G, HC, K]

Muhlenbergia expansa (Poiret) Trinius, Savanna Hairgrass. Cp (FL, GA, NC, SC, VA): pine savannas, pine flatwoods, mesic areas in sandhill-pocosin ecotones; common (rare in VA). September-October. Se. VA south to FL, west to e. TX (nearly exactly the range of *Pinus palustris*). An important part of the grassy component of many longleaf pine savannas, *M. expansa*'s flowering is stimulated by fire, and, lacking fire, it may be found in large populations in solely vegetative condition. It can be distinguished in sterile condition from other savanna bunchgrasses (*Sporobolus teretifolius*, *S. pinetorum*, *S. floridanus*, *S. curtissii*, *Aristida stricta*, and *A. beyrichiana*) by the following characteristics: old leaf bases fibrous and curly (rather than hardened and cartilaginous) and ligules 1-3 mm long (rather than 0.2 to 0.5 mm long). The open panicle somewhat resembles that of several species of similar habitat which often co-occur with *M. expansa* – *Sporobolus teretifolius*, *S. pinetorum*, *S. curtissii*, *S. floridanus*, and *Calamovilfa brevipilis*, but the panicle of *M. expansa* is capillary, flexuous, and fragile, tending to break up over the winter (vs. fine-textured but not capillary, the branches rigid and ascending, more likely to persist over the winter in relatively intact condition). The vegetative characters listed above and under *Calamovilfa brevipilis* are also useful. See *M. capillaris* for a discussion of recent studies on the *M. capillaris* complex. [= RAB, F, FNA, GW, HC, S, Y; = *M. capillaris* var. *trichopodes* (Elliott) Vasey – C, K, Z]

Muhlenbergia frondosa (Poiret) Fernald, Smooth Wirestem Muhly. Mt (GA, KY, NC, VA), Pd (GA, NC, VA), Cp (KY, NC), Ip (KY): moist forests and disturbed areas; uncommon (rare in Piedmont, rare in NC Coastal Plain, rare in KY Mountains). September-October. This species is widespread in e. North America, south to ne. GA and west into the Plains. [= RAB, C, F, FNA, G, GW, HC, K, W, WV; ≠ *M. mexicana* – S, misapplied]

Muhlenbergia glabriflora Scribner, Clay-pan Muhly. Ip (KY, TN), Cp (KY), Pd (NC, VA): open oak flatwoods, other open habitats, in clayey soils; rare. October-November. VA and NC west to IA, MO, AL, and TX, local and apparently rare in all of that range. In NC, only known from one collection, that from Durham County in 1936, with vague habitat data. F describes the habitat as "dry exsiccated or baked soils, prairies, gravels or rocky slopes," Pohl (1969) as "mostly on low ground, in shade on heavy clay soils." [= C, F, G, HC, K; = *M. glabrifloris* – FNA, orthographic variant]

Muhlenbergia glomerata (Willdenow) Trinius, Spiked Muhly. Mt (NC, VA): fens and seeps over mafic (amphibolite) or ultramafic (olivine) rocks; rare. August-October. This species is widespread in n. North America, ranging south in a scattered and disjunct pattern to NC. [= RAB, C, F, FNA, GW, HC, K, W; < *M. racemosa* (Michaux) Britton, Sterns, & Poggenburg – G, S]

Muhlenbergia mexicana (Linnaeus) Trinius, Hairy Wirestem Muhly. Mt (NC, VA), Pd (VA): forest edges; uncommon (rare in NC). September-October. The epithet is a misnomer; the species is largely northern, occurring nearly throughout the United States and s. Canada. [= RAB, C, F, G, HC, K, W, WV; > *M. mexicana* var. *filiformis* (Torrey) Scribner – FNA; > *M. mexicana* var. *mexicana* – FNA; = *M. foliosa* (Roemer & J.A. Schultes) Trinius – S]

Muhlenbergia schreberi J.F. Gmelin, Nimblewill, Dropseed. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA), Ip (KY): bottomland and other moist forests, disturbed areas; common (uncommon in FL). August-October. This species is widespread in e. United States. [= RAB, C, F, FNA, GW, HC, K, S, W, WV; > *M. schreberi* var. *schreberi* – G; > *M. schreberi* var. *palustris* (Scribner) Scribner – G; > *M. palustris* Scribner]

Muhlenbergia sericea (Michaux) P.M. Peterson, Dune Hairgrass, Sweet Grass. Cp (FL, GA, NC, SC): maritime dry grasslands, maritime wet grasslands, interdune swales, low dunes, sometimes edges of freshwater or brackish marshes, apparently limited to the barrier islands (sometimes in close proximity with *M. capillaris*); uncommon, though sometimes locally abundant (SC Rare). October-November. This species is a very conspicuous part of the Outer Banks flora in the autumn, especially showy and abundant between Rodanthe (Chicamacomico) and Avon (Kinnakeet), Dare County, NC, and also abundant on Ocracoke

Island, Hyde County, NC. The capillary pedicels and awns of its purple inflorescences are so light as to be moved by the slightest breeze. By December or January they fade to tan, but remain showy. This grass is a major component of baskets made in the Low Country of SC by the Gullah, who call it "sweet grass." I agree with Curtis (1843), Blomquist (1948), Pinson & Batson (1971), Gould (1975), and others who consider *M. sericea* (as *M. filipes*) a species distinct from *M. capillaris*. Its range is from NC (slightly north of Oregon Inlet, Dare County, south of Nags Head) south to FL and west to TX, primarily on barrier islands. In addition to a discussion of its relationship to *M. capillaris*, Pinson and Batson (1971) and Morden & Hatch (1989) provide descriptions, not elsewhere available. See *M. capillaris* for a discussion of recent studies on this complex. [= FNA, Y; < *M. capillaris* – RAB, GW; = *M. capillaris* var. *filipes* (M.A. Curtis) Chapman ex Beal – HC, K, S, Z; = *M. filipes* M.A. Curtis]

Muhlenbergia sobolifera (Muhlenberg ex Willdenow) Trinius, Rock Muhly. Mt (GA, KY, NC, VA), Pd (VA), Cp (VA), Ip (KY), Cp (KY): dry wooded limestone slopes, rock outcrops and rocky forests; uncommon (uncommon in VA, rare in GA and NC, rare in VA Coastal Plain). July-September. ME, WI, and KS south to n. GA, n. AL, n. MS, and c. TX. [= RAB, C, F, FNA, G, HC, K, S, W, WV]

Muhlenbergia sylvatica Torrey ex A. Gray, Woodland Muhly. Mt (GA, KY, NC, SC, VA), Pd (NC, VA), Ip (KY), Cp (KY, VA): bottomland and other moist forests, calcareous streambanks; uncommon (rare in GA and NC). September. ME and MN south to SC, ne. GA, AL, and TX. [= RAB, C, FNA, K, W, WV; > *M. sylvatica* var. *sylvatica* – F, G, GW, HC; = *M. umbrosa* Scribner – S]

Muhlenbergia tenuiflora (Willdenow) Britton, Sterns, & Poggenburg, Slender Muhly. Mt (GA, KY, NC, VA), Pd (GA, NC, VA), Cp (VA), Ip (KY), {SC}: moist forests and disturbed areas, up to at least 1400m; uncommon (rare in Piedmont south of VA, rare in VA Coastal Plain). August-October. NH, WI, and NE south to GA, AL, MS, and OK. Two varieties are sometimes recognized: var. *tenuiflora*, with lemma awn 4-11 mm long and the sheaths and stems retrorsely hirsute, especially around the nodes, and var. *variabilis* (endemic to the Southern Appalachians), with lemma awn 1-4 mm long or absent, and the sheaths and stems glabrous or nearly so. The validity of the varieties needs further assessment. [= RAB, F, FNA, G, HC, K, S, W, WV; > *M. tenuiflora* var. *tenuiflora* – C; > *M. tenuiflora* var. *variabilis* (Scribner) Pohl – C]

Muhlenbergia torreyana (J.A. Schultes) A.S. Hitchcock, Pinebarren Smokegrass. Cp (GA, NC), Ip (TN), {KY?}: in the Coastal Plain in moist soils of depression meadows and clay-based Carolina bays, often under or near *Taxodium ascendens*, in the Interior low Plateau and Cumberland Plateau in moist grassy oak savannas; rare. August-November. NJ to GA in the Coastal Plain, and disjunct in KY (?)and TN; currently known to be extant only in NJ, NC, and TN. It was first discovered in NC in 1987. Although it rarely flowers except following fire, it can be recognized in sterile condition by its forming clonal patches with evenly spaced, upright, blue-green tufts, each tuft a flattened stem with 5-10 ascending-erect, rather stiff, usually conduplicate leaves, the summit of each sheath with a pronounced cartilaginous thickening, easily felt by running the flattened stem from base to apex between thumb and forefinger. [= C, F, FNA, G, HC, K; = *Sporobolus torreyanus* (J.A. Schultes) Nash – S]

Muhlenbergia asperifolia (Nees & Meyen ex Trinius) Parodi, Alkali Muhly, Scratchgrass. Alkaline soils, wetlands, lawns. Reported east and south to MD, PA, and OH (Kartesz 1999). [= C, F, FNA, G, HC, K] {not yet keyed}

* *Muhlenbergia emersleyi* Vasey, Bull Muhly, is reported as introduced in NC (Kartesz 1999) from its native range in TX, NM, AZ, and Mexico, based on a specimen at the UNC Herbarium. However, the specimen makes clear that it was cultivated at a Soil Conservation Service test nursery; there is no evidence that the species is established in our area. [= FNA, HC, K] {not keyed}

Muhlenbergia uniflora (Muhlenberg) Fernald. Bogs, wet meadows. South to NJ and se. PA (Rhoads & Klein 1993). [= C, FNA, G, HC, K; > *M. uniflora* var. *uniflora* – F] {not yet keyed}

Nassella (Trinius) Desvaux 1846

A genus of ca. 116 species, mainly perennials, mainly of South America. References: Barkworth in FNA (2007a). Key based on Barkworth in FNA (2007a).

1 Florets 1.5-2.5 mm long; leaves 0.2-0.6 mm wide, stiff and tightly convolute ..... ***N. trichotoma***
1 Florets 3.4-13 mm long; leaves 1-8 mm wide, flat or convolute.
  2 Crown (surrounding the base of the awn) as wide or wider than long, the rim with hairs <0.5 mm long; floret widest just below the the crown ..... ***[N. neesiana]***
  2 Crown longer than wide, the rim with hairs 1-2 mm long; floret widest near or only slightly above the middle.
    3 Florets 6.5-13 mm long; crown usually flaring at the tip; awns 40-90 mm long ..... ***N. leucotricha***
    3 Florets 6-8 mm long; crown parallel-sided; awns 30-50 mm long ..... ***[N. manicata]***

* ***Nassella leucotricha*** (Trinius & Ruprecht) Pohl, Texas Needlegrass. Cp (SC): waste areas near wool-combing mill; rare, native of sc. United States and Mexico. [= FNA, K; = *Stipa leucotricha* Trinius & Ruprecht – HC]

* ***Nassella trichotoma*** (Nees) Hackel ex Arechavaleta, Serrated Tussockgrass. Cp, Pd (NC, SC): fields; rare, native of South America, perhaps extirpated as a noxious weed. [= FNA; = *Stipa trichotoma* Nees]

* *Nassella manicata* (E. Desv.) Barkworth, Andean Tussockgrass. Reported from MS; perhaps only a waif. [= FNA; = *Stipa manicata* E. Desv.]

* *Nassella neesiana* (Trinius & Ruprecht) Barkworth, Uruguayan Tussockgrass. Known only from old collections on ballast from Mobile, AL. [= FNA; = *Stipa neesiana* Trinius & Ruprecht]

Neeragrostis Bush 1903

A monotypic genus of warm temperate North America and tropical Central America and n. South America. References: Peterson & Harvey (in prep.)=Z.

Neeragrostis reptans (Michaux) Nicora, is reported for scattered locations as far east as c. TN by Chester et al. (1993), as well as in WV, KY, and possibly GA (Kartesz 1999). [= K, Z; = *Eragrostis reptans* (Michaux) Nees – C, F, G, GW, HC]

Oplismenus Palisot de Beauvois 1807 (Woods-grass, Basket-grass)

A genus of about 5 species, widespread in the New World and Old World tropics, subtropics, and warm temperate areas. References: Wipff in FNA (2003a); Crins (1991)=Z; Scholz (1981)=Y; Peterson et al. (1999).

1 Sheath and culm axis glabrous or with a few scattered hairs, the hairs < 1 mm long; lemma (7-) 9-11-veined..... ***O. hirtellus*** *ssp.* ***setarius***
1 Sheath and culm axis noticeably pilose, the hairs 1-3 mm long; lemma 7-veined ..... ***[O. hirtellus*** *ssp.* ***undulatifolius]***

Oplismenus hirtellus (Linnaeus) Palisot de Beauvois *ssp.* ***setarius*** (Lamarck) Mez ex Ekman, Woods-grass. Cp (FL, GA, NC, SC), Pd (GA, SC): hammocks, maritime forests, shell middens, moist forests; common (uncommon north of FL). August-October. *O. hirtellus* is widespread in tropical and subtropicals areas of the New and Old World; ssp. *setarius* ranges from e. NC south to FL, west to AR and TX, and south through the Caribbean and Central America to central South America. Scholz (1981) recognizes many other sspp. This species is undoubtedly native in our area, occurring in undisturbed habitats in natural communities entirely devoid of alien species; the basis of Gould's (1975) assertion that *Oplismenus* is "introduced or adventive in the United States" is unknown. Superficially, *Oplismenus* resembles *Arthraxon*, but has the leaves only slightly cordate at the base (vs. strongly cordate-clasping). Crins (1991) favors treating *O. setarius* as a taxonomically unrecognized component within a polymorphic *O. hirtellus*. [= FNA, K, Y; = *O. setarius* (Lamarck) Roemer & J.A. Schultes – RAB, HC, S; < *O. hirtellus* (Linnaeus) Palisot de Beauvois – Z]

* *Oplismenus hirtellus* (Linnaeus) Palisot de Beauvois ssp. *undulatifolius* (Ard.) U. Scholz, native to the Eastern Hemisphere, has been reported as an introduction in Baltimore Co., MD (Peterson et al. 1999). It can be expected to spread, and may likely be found in our area. [= FNA, K, Y; < *O. hirtellus* (Linnaeus) Palisot de Beauvois – Z]
* *Oplismenus burmannii* (Retzius) Palisot de Beauvois has been collected in peninsular FL just south of our area and may eventually appear farther north (Davis, Judd, & Perkins (2006). {not keyed}

Oryza Linnaeus 1753 (Rice)

A genus of about 20 species, native of tropical and warm temperate portions of the Old World. References: Barkworth & Terrell in FNA (2007a); Tucker (1988)=Z; Judziewicz et al. (2000)=Y; Nanda & Sharma (2003)=X.

* ***Oryza sativa*** Linnaeus, Rice. Cp (GA, NC, SC, VA?): marshes, impoundments; rare, of only sporadic occurrence outside of cultivation, native of Asia. October. Perhaps the single most important food crop in the world, developed as a crop in Asia and cultivated at least since 10,000 years BP (Hancock 2004). Rice was an important crop before the Civil War in SC, GA, and extreme se. NC. Most rice planted today in our area is in waterfowl impoundments. [= RAB, C, FNA, G, GW, HC, K, S, X, Y, Z]

Oryzopsis Michaux 1803 (Ricegrass)

A monospecific genus, a perennial, of ne. North America. References: Barkworth in FNA (2007a). [also see *Piptatherum*]

Oryzopsis asperifolia Michaux, Rough-leaved Ricegrass, Whiteseed Mountain-ricegrass. Mt (VA): high elevation pine-oak/heath barrens and woodlands; rare. Newfoundland west to British Columbia, south to w. VA (Rockingham County), WV, n. IN, SD, NM, and UT. This grass forms large cespitose clumps, the leaves evergreen and somewhat bicolored (green on the upper surface, bluish on the lower). [= C, F, FNA, G, HC, K, WV]

Panicum Linnaeus 1753 (Panic Grass)
(contributed by Richard J. LeBlond)

{INTRODUCTION: Describe differences between *Panicum*, *Dichanthelium*, *Urochloa* (=*Brachiaria*), and *Paspalidium* (now in *Setaria)*, all of which are treated as *Panicum* in RAB. Describe collection methods and character analysis.} [also see *Dichanthelium, Megathyrsus, Phanopyrum, Setaria, Steinchisma*, and *Urochloa*]

There has been considerable controversy over the generic limits of *Panicum*. In its broader recent conceptions, it has been considered to include (in our area) taxa sometimes and variously segregated as *Brachiaria, Dichanthelium, Eriochloa, Paspalidium, Phanopyrum, Steinchisma*, and *Urochloa*. All were originally recognized based on morphological characteristics, to which have recently been added anatomical, chemical, and other evidence. Crins (1991) recognizes *Eriochloa*, *Urochloa* (including *Brachiaria*), *Paspalidium*, and *Panicum* as genera, with *Panicum* subdivided into subgenera *Panicum*, *Agrostoides*,

Dichanthelium, *Phanopyrum*, and *Steinchisma*. We prefer to recognize most of the segregates as genera, pending further analyses, since there is little evidence that these groups are more closely related to one another than they are to other genera recognized in the Paniceae. *Phanopyrum* and *Dichanthelium* are the only segregate groups with C_3 photosynthesis. *Eriochloa* and *Urochloa* (including *Brachiaria*) have C_4 photosynthesis, with PEP-ck decarboxylation. *Panicum* and *Setaria* (*Paspalidium)* have C_4 photosynthesis, with NAD-me or NADP-me decarboxylation. *Steinchisma*, in addition to its unusual expansion of the palea, apparently has a peculiar photosynthetic pathway, described by Crins (1991) as "intermediate between" C_3 and C_4 photosynthesis; "the leaves have Kranz anatomy, but there are fewer organelles than usual in the outer sheath."

We agree with Hansen & Wunderlin (1988) that "*Dichanthelium* is as 'good' a grass genus as many others (e.g. *Brachiaria*, *Sacciolepis*, and many more in other tribes)." Despite arguments to the contrary, there is little doubt that *Dichanthelium* is a natural group. Zuloaga, Ellis, and Morrone (1993) argue against the recognition of *Dichanthelium* as a genus, preferring to treat it as a subgenus under *Panicum*. They state, however, "within *Panicum*, *Dichanthelium* can be distinguished at the subgeneric level by the following set of characters: lax inflorescences; ellipsoid to obovoid spikelets; upper glume and lower lemma usually 7-11 nerved; upper anthecium apiculate or shortly crested, and simple papillae on the lemma and palea. Anatomically, all species are non-Kranz or C_3, with the outer parenchymatous sheath lacking specialized chloroplasts", etc. The argument that *Phanopyrum* also has C_3 photosynthesis does not materially affect the issue of the taxonomic rank at which to recognize the groups.

We also agree with Hansen & Wunderlin (1988) that "the acceptance of *Dichanthelium* provides a more consistent generic classification." It offers conveniences, as well, in our area, where *Dichanthelium* and *Panicum* are readily distinguishable from each other, and the combined genus would be very large, indeed. References: Lelong (1986)=Z; Zuloaga & Morrone (1996)=Y; Freckmann & Lelong in FNA (2003a).

1 Spikelets tuberculate.
  2 Lower lemmas tuberculate-hispid; spikelets 3.2-4.0 mm long; [of dry to mesic prairies and pinelands]..... ***P. brachyanthum***
  2 Lower lemmas warty; spikelets 1.7-2.2 mm long; [of wetlands]..... ***P. verrucosum***
1 Spikelets smooth, not tuberculate.
  3 Panicle < 2 cm wide at maturity.
    4 Spikelets > 4.5 mm long; first glume > 2.4 mm long; ligule 4-6 mm long; [of coastal dunes]; [subgenus *Panicum*, section *Repentia*]..... ***P. amarum var. amarum***
    4 Spikelets < 4 mm long; first glume < 2.1 mm long; ligule < 2 mm long; [not of coastal dunes].
      5 Blades involute, 1.5-4 mm wide; culms wiry; [subgenus *Agrostoides*, section *Tenera*]..... ***P. tenerum***
      5 Blades flat, the larger 6-20 mm wide; culms stout.
        6 Panicles constricted, 0.3-1.6 cm wide; spikelets subsessile to short-pediceled; summit of fertile palea not enclosed by fertile lemma..... ***P. hemitomon***
        6 Panicles > 1 cm wide; spikelets short to long-pediceled; summit of fertile palea enclosed by fertile lemma; [subgenus *Agrostoides*, section *Agrostoidea*].
          7 Plants tufted, without rhizomes; culms strongly compressed below; fertile lemma 1.3-1.5 mm long ..... ***P. rigidulum var. condensum***
          7 Plants rhizomatous; culms slightly compressed below; fertile lemma 1.8-2.2 mm long.
            8 Rhizomes short, usually < 3 cm long; leaves 20-50 cm long, 4-18 mm wide; spikelets 2.5-3.9 mm long, acuminate; first glume with 3-5 green nerves..... ***P. anceps var. anceps***
            8 Rhizomes elongate, often > 4 cm long; leaves 10-30 (-40) cm long, 2-10 mm wide; spikelets 2.2-2.8 mm long, acute to short-acuminate; first glume with 1-3 green nerves..... ***P. anceps var. rhizomatum***
  3 Panicle > 2 cm wide at maturity.
    9 Lower primary panicle branches in whorls of 4-7 at the nodes, stiffly spreading, naked on the proximal ½, the axils strongly pilose; lower culm internodes appressed papillose-pubescent; first glume acuminate, ½ as long as spikelet; fertile lemma chestnut brown at maturity..... ***P. bergii***
    9 Plants without the above combination of characters.
      10 Plants from a cluster of fibrous roots, without rhizomes or hard knotty crowns, annual.
        11 First glume 1/5 to 1/4 length of spikelet, broadly rounded to truncate; sheaths usually glabrous; nodes glabrous; [subgenus *Panicum*, section *Dichotomiflora*]
          12 Spikelets oblong-lanceolate, (2.0-) 2.4-3.6 mm long, widest below middle, tapering to acuminate tips, second glume and sterile lemma firm, subcoriaceous; most pedicels < 3 mm long and shorter than spikelets..... ***P. dichotomiflorum var. dichotomiflorum***
          12 Spikelets ovoid to slenderly ellipsoid, 1.6-2.3 mm long, widest at middle with acute tips, second glume and sterile lemma thin, submembraneous; some to many pedicels > 3 mm long and longer than spikelets..... ***P. dichotomiflorum var. puritanorum***
        11 First glume 1/3 to 1/2 length of spikelet, acute to subacute; sheaths villous or hispid; nodes often bearded; [subgenus *Panicum*, section *Panicum*].
          13 Spikelets 4.5-6 mm long; panicle branches often nodding or drooping at maturity..... ***P. miliaceum***
          13 Spikelets 1.8-3.6 mm long; panicle branches ascending-spreading at maturity.
            14 Spikelets long-acuminate, (2.6-)3.0-3.6 mm long; mature panicle slender, usually 2-3 times as long as wide..... ***P. flexile***
            14 Spikelets short-pointed to acuminate, 1.8-2.5 (-2.8) mm long; mature panicle usually > ½ as wide to wider than long.
              15 Sheaths glabrous except for the short-ciliate margins; culm nodes and internodes glabrous..... ***P. bisulcatum***
              15 Sheaths hispid to villous; culm nodes usually pubescent to bearded, internodes hispid to glabrous.
                16 Panicle usually equal to or longer than culm; largest blades usually 10-20 mm wide; spikelets acuminate, lanceolate to lance-ovoid..... ***P. capillare***
                16 Panicle usually not as long as culm; largest blades usually 10 mm or less wide; spikelets short-pointed, ellipsoid, ovoid, or obovoid.
                17 Herbage purple-tinged; blades 2-6 mm wide, ascending; pulvini glabrous to sparsely pilose; spikelets 1.8-2.2 mm long, > 2× as long as wide; mature fertile lemma blackish..... ***P. lithophilum***

17 Herbage yellow-green to green; blades 2-12 mm wide, spreading; pulvini glabrous or pilose; spikelets 1.4-2.4 mm long, < 2× as long as wide; mature fertile lemma straminous.
18 Culm blades 5-12 mm wide; blade of flag (inflorescence bract) usually > ½ as long as panicle; panicle ellipsoid to obovoid; pulvini glabrous; secondary panicle branches and pedicels divergent; spikelets 1.9-2.4 mm long ..... ***P. gattingeri***
18 Culm blades 2-6 mm wide; blade of flag usually < ½ as long as panicle; panicle broadly ovoid to deltoid; pulvini pilose; secondary panicle branches and pedicels appressed; spikelets 1.4-2.1 mm long ..... ***P. philadelphicum***

10 Plants with rhizomes or hard knotty crowns, perennial.
19 Plants with hard crowns, lacking rhizomes; fertile lemma 1.2-1.6 mm long; [subgenus *Agrostoides*, section *Agrostoidea*].
20 Ligule of white hairs 0.5-3 mm long; culms to 1 m long; cauline blades 2-8 mm wide, usually pilose adaxially near the base; spikelets 2.0-4.0 mm long.
21 Ligules 1-3 mm long; spikelets 2.0-2.7 mm long, 2.5-4× as long as wide, often obliquely set on the pedicels ..... ***P. longifolium var. longifolium***
21 Ligules 0.5-1.5 mm long; spikelets 2.4-4.0 mm long, 3.5-5× as long as wide, erect on the pedicels ..... ***P. longifolium var. combsii***
20 Ligule a tawny membrane 0.5-1.0 mm long, often erose or lacerate, or with a minute ciliate fringe; culms to 1.8 m long; cauline blades 4-12 mm wide, usually glabrous; spikelets 1.6-2.8 mm long.
22 Spikelets 2.4-2.8 mm long, long-acuminate, usually < 0.7 mm wide; fertile lemma often conspicuously stipitate ..... ***P. rigidulum var. elongatum***
22 Spikelets 1.6-2.5 mm long, short-acuminate, usually > 0.7 mm wide; fertile lemma estipitate to short stipitate.
23 Culms to 1 m long; mature panicle ½ to nearly as wide as long, the branches ascending to spreading; spikelets 1.6-2.2 mm long ..... ***P. rigidulum var. rigidulum***
23 Culms to 1.8 m long; mature panicle < 1/3 as wide as long, the branches erect; spikelets 2.0-2.5 mm long ..... ***P. rigidulum var. condensum***
19 Plants with rhizomes; fertile lemma 1.6-4 mm long.
24 Rhizomes about 1 cm thick with pubescent scale-like leaves; lower portion of culm hard, nearly woody ..... ***P. antidotale***
24 Rhizomes less than 1 cm thick with glabrous scale-like leaves; culms not woody.
25 First glume truncate apically ..... ***P. repens***
25 First glume acute to obtuse.
26 Culms slightly compressed below; ligules 0.5 mm long or less; spikelets subsessile and subsecund, usually some obliquely bent above the first glume; fertile lemma 1.8-2.2 mm long; [subgenus *Agrostoides*, section *Agrostoidea*].
27 Rhizomes short, usually < 3 cm long; leaves 20-50 cm long, 4-18 mm wide; spikelets 2.5-3.9 mm long, acuminate; first glume with 3-5 green nerves ..... ***P. anceps var. anceps***
27 Rhizomes elongate, often > 4 cm long; leaves 10-30 (-40) cm long, 2-10 mm wide; spikelets 2.2-2.8 mm long, acute to short-acuminate; first glume with 1-3 green nerves ..... ***P. anceps var. rhizomatum***
26 Culms terete; ligules 1-6 mm long; spikelets pediceled and not at all secund, essentially straight; fertile lemma 2-4 mm long; (subgenus *Panicum*, section *Repentia*].
28 Panicle narrow, the branches erect; sheaths longer than internodes; spikelets 4.3-7.7 mm long; fertile lemma 3-4 mm long.
29 Rhizomes usually elongate; culms solitary to loosely tufted, 0.2-1.5 m tall; leaves 0.7-3.6 dm long; panicles 2-6 cm wide, the primary branches usually 1-2 per node, loosely flowered; spikelets 4.7-7.7 mm long; first glumes 2.5-5.5 mm long, ⅔-¾ as long as the spikelet, 7-9 nerved, the nerves thickened and raised; fertile lemma 1.3-1.8 mm wide .. .. ***P. amarum var. amarum***
29 Rhizomes usually short; culms usually tufted, 1-2 (-3) m tall; leaves 2-5 dm long; panicles 3-10 cm wide, the primary branches usually 2 or more per node, densely flowered; spikelets 4.0-5.9 mm llong; first glumes 2-3.5 mm long, ½-⅔ as long as the spikelet, 3-5 (-7) nerved, the nerves thin and wiry; fertile lemma 1.0-1.5 mm wide ..... ***P. amarum var. amarulum***
28 Panicle with divergent to spreading-ascending branches; upper sheaths shorter than internodes; spikelets 2.8-5 mm long; fertile lemma 2-2.6 mm long.
30 Spikelets 2.8-3.5 mm long; first glume ½ length of spikelet, blunt to acute ..... ***P. virgatum var. cubense***
30 Spikelets 3.2-5 mm long; first glume b length of spikelet, acuminate.
31 Rhizomes short, densely interlocking, culms subascending at base, densely clumped ..... ***[P. virgatum var. spissum]***
31 Rhizomes elongate, or if short, then culms horizontally divergent at base, loosely clumped ..... ***P. virgatum var. virgatum***

Panicum amarum Elliott *var.* ***amarulum*** (A.S. Hitchcock & Chase) P.G. Palmer, Southern Seabeach Grass. Cp (FL, GA, NC, SC, VA): coastal dunes and shores, sandflats, and sandhills; rare. July-November. NJ s. to FL and West Indies, w. to TX and Mexico; restricted to the Coastal Plain except for WV. Although well-marked individuals of var. *amarulum* and var. *amarum* are quite distinctive, only the number and structure of first glume nerves appears to be a constant over the range of the two taxa (Palmer 1975). Primarily a coastal plant, var. *amarulum* has been found in the Sandhills of NC (Richmond Co.). Blomquist 1948 says this taxon "does not seem to grow naturally in North Carolina." [= K, Z; = *P. amarulum* A.S. Hitchcock & Chase – RAB, C, F, G, HC, S, WV; = *P. amarum* ssp. *amarulum* (A.S. Hitchcock & Chase) Freckmann & Lelong – FNA; not ***Panicum***]

Panicum amarum Elliott *var.* ***amarum***, Bitter Seabeach Grass. Cp (FL, GA, NC, SC, VA): coastal dunes and shores; common. August-November. CT s. to FL, w. to TX; restricted to the coast. See note under var. *amarulum*. [= K, Z; = *P. amarum* – RAB, C, F, G, HC, S; = *P. amarum* ssp. *amarum* – FNA; not ***Panicum***]

Panicum anceps Michaux *var.* ***anceps***, Beaked Panic Grass. Mt, Pd (NC, SC, VA), Cp (FL, NC, SC, VA), {GA}: moist sandy woods, swamps, sloughs, roadsides, fields, waste places; common. June-October. NJ w. to IL, s. to FL and TX. The sheaths of var. *anceps* are glabrous to pilose, while those of var. *rhizomatum* are often villous; the leaves of var. *rhizomatum* also tend to be hairier. [= RAB, F, G, Z; < *P. anceps* – C, GW, K, W; = *P. anceps* ssp. *anceps* – FNA; = *P. anceps* – HC, S, WV; not ***Panicum***]

Panicum anceps Michaux *var.* ***rhizomatum*** (A.S. Hitchcock & Chase) Fernald, Small Beaked Panic Grass. Cp (FL, GA, NC, SC, VA): moist to dry sandy or loamy pinelands, ditches; common (rare in VA). July-October. Se. VA and KY s. to FL and TX. See note under var. *anceps*. [= RAB, F, G, Z; < *P. anceps* – C, GW, K; = *P. anceps* ssp. *rhizomatum* (A.S. Hitchcock & Chase) Freckmann & Lelong – FNA; = *P. rhizomatum* A.S. Hitchcock & Chase – HC, S; not ***Panicum***]

* ***Panicum antidotale*** Retzius, Blue Panic Grass. Cp (NC?, SC): open, disturbed areas and fields; rare, native of India and c. Asia. Reported for NC and SC (FNA, Kartesz 1999). Established in NC, SC; AL; TX west to CA. [= FNA, HC, K; not ***Panicum***]

* ***Panicum bergii*** Arechavaleta, Berg's Panic Grass. Cp (GA): ditches and shallow, sporadically flooded depressions in grasslands; rare, native of South America. Reported for sc. GA (HC), AL (Kartesz 1999), and se. TX. [= FNA, HC, K, S; > *P. pilcomayense* Hackel; ***Panicum*** s.s.]

* ***Panicum bisulcatum*** Thunberg, Blackseed Panic Grass. Cp (GA, SC): wet, disturbed, open areas; rare, native of Asia. Reported introduction in SC, GA, and PA (Kartesz 1999), and as a ballast plant for se. PA (Philadelphia) (Rhoads & Klein 1993, as *P. acroanthum* Steudel). [= FNA, K; > *P. acroanthum* Steudel]

Panicum brachyanthum Steudel, Prairie Panic Grass. Cp (GA): prairies and pinelands; rare. W. LA, AR, OK, and e. TX; disjunct eastward in sc. MS and sw. GA. [= FNA, HC, K]

Panicum capillare Linnaeus, Old-witch Grass, Tumbleweed, Tickle Grass. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, VA): open sandy or stony soil, fields, roadsides, waste places, often weedy in cultivated soil; common (rare in SC). August-November. E. to c. Canada, s. to FL and TX; Bermuda. Plants formerly known as *P. capillare* var. *occidentale* Rydberg, ranging from Canada south to NJ, WV, KY, TX, and CA, are distinguished by long-acuminate spikelets 2.5-4 mm long that are mostly subsessile or short-pedicelled. In our region, *P. capillare* has short-acuminate spikelets 1.8-2.8 mm long, mostly on long pedicels. [= RAB, K, S, WV, Z; < *P. capillare* – C, Y (also see *P. gattingeri*); > *P. capillare* var. *capillare* – F, HC, W; = *P. capillare* ssp. *capillare* – FNA; = *P. capillare* var. *agreste* Gattinger – G; ***Panicum*** s.s.]

Panicum dichotomiflorum Michaux *var.* ***dichotomiflorum***, Spreading Panic Grass, Fall Panic Grass. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): marshy shores, exposed wet soils, alluvial deposits in floodplain forests, spoil banks, ditches; common. July-October. E. Canada west to British Columbia, south to FL and TX; also in the Bahamas (Sorrie & LeBlond 1997). Plants with geniculate bases, enlarged lower nodes and sheaths, and panicles with included peduncles and divergent branches have been recognized as var. *geniculatum* (A. Wood) Fernald. [= F, G, K, W; < *P. dichotomiflorum* – RAB, GW, S, Z; > *P. dichotomiflorum* var. *geniculatum* (Wood) Fernald – F, G, W; = *P. dichotomiflorum* ssp. *dichotomiflorum* – FNA; < *P. dichotomiflorum* var. *dichotomiflorum* – HC; ***Panicum*** s.s.]

Panicum dichotomiflorum Michaux *var.* ***puritanorum*** Svenson, Puritan Panic Grass. Cp (VA): wet sands and peats of seasonally exposed pond and lake shores; local. July-October. Nova Scotia, NH, and NY south to DE and VA; IN and IL. Plants from DE northward typically have slender culms 0.3-6 dm long and leaves 1-8 mm wide. Plants with floral characters of var. puritanorum but with nominate-like stout culms 0.8-2 m long and leaves 7-25 mm wide occur in bottomlands in se. VA, and have been recognized as P. dichotomiflorum var. imperiorum Fernald. For the time being they are placed here based on floral characters (they will key here), but need further study. [= F, G, K; < *P. dichotomiflorum* – C; > *P. dichotomiflorum* var. *imperiorum* Fernald – F; = *P. dichotomiflorum* ssp. *puritanorum* (Svenson) Freckmann & Lelong – FNA; > *P. dichotomiflorum* var. *puritanorum* – HC; ***Panicum*** s.s.]

Panicum flexile (Gattinger) Scribner, Wiry Panic Grass. Pd (GA, NC, SC, VA), Mt (GA, NC, VA), Cp (FL): glades and openings over mafic rocks, damp sandy meadows, open woods; rare. July-October. NY, sw. Québec, S. Ontario, and ND south to FL and TX. First reported for SC by Nelson & Kelly (1997). [= RAB, C, F, FNA, G, HC, K, S, W, WV, Y, Z; ***Panicum*** s.s.]

Panicum gattingeri Nash, Gattinger's Panic Grass. Mt, Pd (NC, VA), {GA}: damp or dry, usually calcareous sandy soils of fields, roadsides, shores, and cultivated ground; common in Mountains, uncommon in Piedmont (rare in VA). August-October. NY, sw. Québec, and MN south to NC, TN, GA, AL, and AR. [= RAB, F, HC, K, S, WV; < *P. capillare* – C, Y; = *P. philadelphicum* Bernhardi ex Trinius ssp. *gattingeri* (Nash) Freckmann & Lelong – FNA; = *P. capillare* Linnaeus var. *campestre* Gattinger – G, W; ***Panicum*** s.s.]

Panicum hemitomon J.A. Schultes, Maidencane. Cp (FL, GA, NC, SC, VA), Mt (VA): lake, pond, and river shores, swamp borders, marshes, ditches, often in shallow water; common (rare in VA). June-July. Coastal Plain from s. NJ south to FL, west to TX; also TN; South America. Often forming dense colonies in the low margin and shallow waters of limesink ponds. [= RAB, C, F, FNA, G, GW, HC, K, S, W, Z; not ***Panicum***]

Panicum lithophilum Swallen, Flatrock Panic Grass. Pd (GA, NC, SC), Mt (NC): soil islands on granitic flatrocks and domes; rare. August-October. Restricted to granite outcrops in NC, SC, and ec. GA. There is some question about the distinctness of this taxon from *P. philadelphicum*; Zuloaga & Morrone (1996) did not consider it separable from *P. philadelphicum*. [= RAB, HC, K; = *P. philadelphicum* Bernhardi ex Trinius ssp. *lithophilum* (Swallen) Freckmann & Lelong – FNA; < *P. capillare* Linnaeus var. *sylvaticum* Torrey – W; < *P. philadelphicum* – Y; ***Panicum*** s.s.]

Panicum longifolium Torrey *var.* ***combsii*** (Scribner & Ball) Fernald, Combs Panic Grass. Cp (FL, GA, NC, SC, VA): pond shores, depression meadows, cypress savannas, marshes, low woods; uncommon (rare in VA). July-October. Scattered on the outer Coastal Plain from se. MA, NJ, se. VA, se. NC, e. SC, e. GA, and FL, west to se. LA. First glumes of var. *combsii* typically are longer than 1.5 mm long, while those of var. *longifolium* are shorter than 1.5 mm long. [= RAB, F, G; = *P. rigidulum* Bosc ex Nees ssp. *combsii* (Scribner & Ball) Freckmann & Lelong – FNA; = *P. rigidulum* Bosc ex Nees var. *combsii* (Scribner & Ball) Lelong – K, Z; < *P. longifolium* – C; = *P. combsii* Scribner & Ball – HC, S; not ***Panicum***]

Panicum longifolium Torrey *var.* ***longifolium***, Long-leaved Panic Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): wet sandy or peaty soils of bogs, savannas, pond shores, depression meadows; common (uncommon in Piedmont, rare in Mountains). July-October. Nova Scotia, NH, MA, PA, and IN south to FL, west to TX. See note under var. *combsii*. [= RAB, G; = *P. rigidulum* Bosc ex Nees ssp. *pubescens* (Vasey) Freckmann & Lelong – FNA; = *P. rigidulum* Bosc ex Nees var. *pubescens* (Vasey) Lelong – K, W, Z; < *P. longifolium* – C, GW; = *P. longifolium* – HC, S; > *P. longifolium* var. *longifolium* – F; > *P. longifolium* var. *pubescens* (Vasey) Fernald – F; not ***Panicum***]

* ***Panicum miliaceum*** Linnaeus *ssp.* ***miliaceum***, Broomcorn Millet, Proso Millet, Hog Millet. Cp (FL, NC), Mt (VA), Pd (VA): planted in wildlife food plots, sometimes persistent or self-sowing; rare, introduced, native of Eurasia. July-October. [= C, FNA, K; < *P. miliaceum* – F, G, HC, S, Y; ***Panicum*** s.s.]

Panicum philadelphicum Bernhardi ex Trinius, Woodland Panic Grass. Pd, Mt (GA, NC, SC, VA), Cp (VA): glades, barrens, desiccated pondshores, riversides, or other rocky or dry sandy soil of open woods and roadsides; common (rare in SC). Nova Scotia west to WI, south to GA and e. TX. Plants formerly known as *P. tuckermanii* Fernald, ranging from se. Canada south to n. VA and OH, are distinguished by included or short-exerted peduncles less than one-third as long as the panicles. [= RAB, C, G, K, S, WV; > *P. philadelphicum* – F, HC; > *P. tuckermanii* Fernald – F, HC; = *P. philadelphicum* Bernhardi ex Trinius ssp. *philadelphicum* – FNA; < *P. capillare* Linnaeus var. *sylvaticum* Torrey – W; < *P. philadelphicum* – Y (also see *P. lithophilum*); ***Panicum*** s.s.]

* ***Panicum repens*** Linnaeus, Torpedo Grass. Cp (FL, GA, NC, SC): disturbed coastal sands, in area where ship's ballast was deposited; common (rare north of FL), native of Europe. First reported for NC by Leonard (1971b). [= FNA, GW, HC, K, S; ***Panicum*** s.s.]

Panicum rigidulum Bosc ex Nees *var.* ***condensum*** (Nash) Mohlenbrock, Dense Panic Grass. Cp (FL, GA, NC, SC, VA): marshes, meadows, low woods, ditches, stream and pond shores, freshwater tidal shores; uncommon. September-October. Coastal Plain south from se. MA to FL, west to se. TX and AR; West Indies. Usually readily identified by its tall stature and compact inflorescence, somewhat resembling a large *P. hemitomon*, with which it occasionally occurs. [= *P. agrostoides* Sprengel var. *condensum* (Nash) Fernald – RAB, F; < *P. rigidulum* – C, GW; < *P. rigidulum* Bosc ex Nees ssp. *rigidulum* – FNA; < *P. agrostoides* – G; = *P. condensum* Nash - HC, S; < *P. rigidulum* var. *rigidulum* – K, Z; not ***Panicum***]

Panicum rigidulum Bosc ex Nees *var.* ***elongatum*** (Pursh) Lelong, Tall Flat Panic Grass. Pd, Cp, Mt (GA, NC, SC, VA): marshes, low woods, ditches, swamps, shores, meadows; uncommon (common in Piedmont). August-October. CT and NY west to IN, south to GA, LA, and ne. TX. [= K, W, Z; = *P. stipitatum* Nash – RAB, F, HC, S, WV; = *P. rigidulum* Bosc ex Nees ssp. *elongatum* (Pursh) Freckmann & Lelong – FNA; < *P. rigidulum* – C, GW; = *P. agrostoides* Sprengel var. *elongatum* (Pursh) Scribner – G; not ***Panicum***]

Panicum rigidulum Bosc ex Nees *var.* ***rigidulum***, Redtop Panic Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): wet sandy or peaty soils low woods, meadows, marshes, shores, swamps, ditches; common. July-October. ME and MI south to FL and TX; also in CA and British Columbia; Central America. [= W; = *P. agrostoides* Sprengel var. *agrostoides* – RAB, G; < *P. rigidulum* Bosc ex Nees ssp. *rigidulum* – FNA; < *P. rigidulum* var. *rigidulum* – K, Z; < *P. rigidulum* – C, GW; > *P. agrostoides* var. *agrostoides* – F, HC; > *P. agrostoides* var. *ramosius* (C. Mohr) Fernald – F, HC; = *P. agrostoides* – S, WV; not ***Panicum***]

Panicum tenerum Beyrich ex Trinius, Southeastern Panic Grass. Cp (FL, GA, NC, SC): limesink ponds, depression meadows, cypress savannas, wet pinelands, bogs; uncommon (rare north of FL). June-September. Coastal Plain from se. NC to FL, west to e. TX; West Indies. The rhizomes produce lines of closely spaced culms. Though 0.5-1 m tall, the culms are narrow and inconspicuous. [= RAB, FNA, GW, HC, K, S, Z; not ***Panicum***]

Panicum verrucosum Muhlenberg, Warty Panic Grass. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): wet pinelands, marshes, shores, ditches; common (uncommon in Piedmont, rare in Mountains). August-October. MA and PA west to MI and IN, south to FL and se. TX. Spikelets deep green, the warty surface unique among *Panicum* in our region. [= RAB, C, F, FNA, G, GW, HC, K, S, W, Z; not ***Panicum***]

Panicum virgatum Linnaeus *var.* ***cubense*** Grisebach, Blunt Panic Grass. Cp (FL, GA, NC, SC, VA?): wet to dry sandy pinelands; uncommon. June-October. Coastal Plain from MA to FL, west to MS; also in MI; West Indies. [= F, HC, S; < *P. virgatum* – RAB, C, FNA, G, GW, W, Z; < *P. virgatum* var. *virgatum* – K]

Panicum virgatum Linnaeus *var.* ***virgatum***, Switchgrass. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry or wet sandy soils of pinelands, fresh and brackish marshes, shores; common (uncommon in Mountains). June-October. Sw. Québec and ND south to FL and TX, west to NV; Bermuda; Central and South America. [= F, HC, S; < *P. virgatum* – RAB, C, FNA, G, GW, W, WV, Z; < *P. virgatum* var. *virgatum* – K; not ***Panicum***]

* *Panicum miliaceum* Linnaeus ssp. *ruderale* (Kitagawa) Tzvelev, Panic Millet. [= FNA, K; = *P. miliaceum* ssp. *spontaneum* (Kit.) Tzvelev – C; < *P. miliaceum* – F, G, HC; ***Panicum*** s.s.] {not yet keyed}

Panicum virgatum Linnaeus var. *spissum* Linder, Tufted Switchgrass. Gravelly or sandy fresh to brackish shores and swamps. E. Canada south to PA, MD, and DE (Kartesz 1999). [= F, HC, K; < *P. virgatum* – C, FNA, G; not ***Panicum***]

Parapholis C.E. Hubbard 1946 (Sickle Grass)

A genus of 6 species, annuals, of Eurasia. References: Worley in FNA (2007a); Tucker (1996)=Z.

* ***Parapholis incurva*** (Linnaeus) C.E. Hubbard, Sickle Grass, Hard Grass, Thin-tail. Cp (NC, VA): sandy and muddy flats, brackish or salt marshes; rare, native of Europe. [= RAB, C, FNA, HC, K, Z; = *Pholiurus incurvus* (Linnaeus) Schinzius & Thellung – F, G; ? *Lepturus filiformis* (Roth) Trinius]

Pascopyrum A. Löve 1980 (Wheatgrass)

A monotypic genus, perennial, of c. and w. North America. *Pascopyrum* is octoploid, derived from *Elymus* and *Leymus*. References: Barkworth in FNA (2007a).

* ***Pascopyrum smithii*** (Rydberg) A. Löve, Western Wheatgrass. Mt (GA): disturbed areas; rare. Reported for ne. GA (Rabun County) by Jones & Coile (1988), as *Agropyron smithii* Rydberg. It is also reported for TN and KY (Kartesz 1999). [= FNA, K; = *Elytrigia smithii* (Rydberg) Nevski – C; = *Agropyrum smithii* Rydberg – F, G, W]

Paspalum Linnaeus 1759 (Paspalum, Crown Grass, Beadgrass)
(by Alan S. Weakley & Richard J. LeBlond)

A genus of 300-400 species, of tropical and warm temperate regions. References: Allen & Hall in FNA (2003a); Banks (1966)=Z; Silveus (1942)=Y. Key based closely only on FNA and on Banks (1966).

1 Spikelets solitary, not associated with rudimentary spikelets or naked pedicels.
  2 Panicles usually composed of a terminal pair of branches, sometimes with 1 (-5) additional branches below the terminal pair.
    3 Upper glumes pubescent on the back or margins.
      4 Spikelets 1.3-1.9 mm long; upper glumes pilose along the margins ..... *[P. conjugatum]*
      4 Spikelets 2.4-3.2 mm long; upper glumes sparsely pubescent on the back ..... ***P. distichum***
    3 Upper glumes glabrous.
      5 Spikelets elliptic, acute or acuminate at the tip ..... ***P. vaginatum***
      5 Spikelets ovate to broadly elliptic, obtuse to broadly acute at the tip.
        6 Spikelets 1.9-2.3 mm long; leaf blades flat ..... ***P. minus***
        6 Spikelets 2.5-4.0 mm long; leaf blades flast or longitudinally folded ..... ***P. notatum***
  2 Panicles with 1-70 branches, if > 1, the branches arranged racemosely.
    7 Panicle branches 7-70, the axes extending beyond the outermost spikelets; panicle branches disarticulating at maturity ..... ***P. fluitans***
    7 Panicle branches 1-6, terminating in a spikelet; panicle branches persistent.
      8 Upper florets olive to dark brown ..... ***P. scrobiculatum***
      8 Upper florets pale to tan.
        9 Axes of panicle branches not broadly winged, 0.6-1.3 mm wide.
          10 Spikelets orbicular, 2.8-3.2 mm wide ..... ***P. laeve var. circulare***
          10 Spikelets slightly longer than broad, 2.0-2.5 mm wide ..... ***P. laeve var. laeve***
        9 Axes of panicle branches broadly winged, 1.8-3.3 mm wide.
          11 Spikelets 3.2-4.0 mm long; upper lemmas with a few short hairs at their tips ..... ***P. acuminatum***
          11 Spikelets 1.7-2.1 mm long; upper lemmas glabrous ..... ***P. dissectum***
1 Spikelets paired, or at least the second nonfunctional spikelet represented by a naked pedicel.
  12 Spikelets 1.0-1.3 mm long ..... *[P. paniculatum]*
  12 Spikelets 1.3-4.1 mm long
    13 Margins of upper glumes and lower lemmas pilose.
      14 Panicle branches 2-7; spikelets 2.3-4.0 mm long ..... ***P. dilatatum***
      14 Panicle branches (4-) 10-30; spikelets 1.8-2.8 mm long ..... ***P. urvillei***
    13 Margins of upper glumes and lower lemmas neither ciliate-lacerate, winged, nor pilose (if pubescent, the hairs not pilose).
      15 Upper florets olive to dark brown.
        16 Panicle branches 10-28 (or more).
          17 Plants annual; axes of panicle branches broadly winged, the wings about as wide as the central portion; [common native] ..... ***P. boscianum***
          17 Plants perennial; axes of panicle branches narrowly winged, the wings narrower than the central portion; [rare exotics].
            18 Axes of panicle branches 0.5-1.2 mm wide; spikelets 1.1-1.8 mm wide ..... ***P. conspersum***
            18 Axes of the panicle branches 1.0-1.7 mm wide; spikelets 1.8-2.4 mm wide ..... ***P. virgatum***
        16 Panicle branches 1-10 (or to 28 in *P. boscianum*, keyed under both leads).
          19 Plants annual.
            20 Spikelets 1.3-1.8 mm wide, broadly elliptic to orbicular, glabrous; panicles with 1-10 (-28) branches, the axes 0.7-2.3 mm wide ..... ***P. boscianum***
            20 Spikelets 1.7-2.4 mm wide, broadly obovate, shortly pubescent; panicles with 1-5 branches, the axes 0.8-1.3 mm wide ..... *[P. convexum]*
          19 Plants perennial.
            21 Plants cespitose, rhizomes poorly developed; culms 10-20 dm tall; panicle branches ascending, divaricate, or reflexed.
              22 Leaves 7-18 mm wide ..... ***P. conspersum***
              22 Leaves 2.5-4 mm wide ..... ***P. plicatulum***
            21 Plants not cespitose, rhizomatous; culms 1-15 dm tall; panicle branches ascending.
              23 Rhizomes long, evident ..... ***P. nicorae***
              23 Rhizomes short, indistinct ..... ***P. plicatulum***
      15 Upper florets white, stramineous, or golden brown.
        24 Lower lemmas with well-developed cross-ribs over the veins; upper glumes absent ..... ***P. malacophyllum***
        24 Lower lemmas not ribbed over the veins; upper glumes present.
          25 Panicles with 15-100 branches.
            26 Plants annual; upper glumes and lower lemmas rugose ..... *[P. racemosum]*
            26 Plant perennial; upper glumes and lower lemmas smooth.
              27 Plant rhizomatous; panicle branch axes 0.9-1.2 mm wide; panicle branches often arcing ..... ***P. intermedium***
              27 Plant cespitose; panicle branch axes 0.3-0.6 mm wide; panicle branches straight.
                28 Panicle branches spreading to reflexed (rarely ascending); leaf blades 10-23 mm wide; axes of panicle branches 0.3-0.4 mm wide ..... ***P. coryphaeum***
                28 Panicle branches erect to ascending; leaf blades 4.9-6.1 mm wide; axes of panicle branches 0.5-0.6 mm wide ..... *[P. quadrifarium]*
          25 Panicles with 1-15 branches.

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29 Spikelets 1.3-2.5 mm long.
30 Upper glumes (and usually also the lower lemmas) shortly pubescent.
31 Lower glumes present ..... *[P. langei]*
31 Lower glumes absent.
32 Panicles both terminal and axillary, the axillary panicles partially or completely enclosed by the subtending leaf sheath ..... [see Key to *Paspalum setaceum* complex]
32 Panicles all terminal ..... ***P. caespitosum***
30 Upper glumes and lower lemmas glabrous.
33 Panicles both terminal and axillary, the axillary panicles partially or completely enclosed by the subtending leaf sheath ..... [see Key to *Paspalum setaceum* complex]
33 Panicles all terminal.
34 Upper panicle branches erect ..... ***P. monostachyum***
34 Upper panicle branches spreading to ascending.
35 Upper glumes and lower lemmas 5-veined ..... ***P. caespitosum***
35 Upper glumes and lower lemmas 3-veined.
36 Lower sheaths villous or hirsute ..... ***P. praecox*** *var.* ***curtisianum***
36 Lower sheaths glabrous or sparsely papillose pubescent ..... ***P. praecox*** *var.* ***praecox***
29 Spikelets 2.5-4.1 mm long.
37 Spikelet pairs barely if at all imbricate; lower glumes usually present ..... ***P. bifidum***
37 Spikelet pairs imbricate; lower glumes absent or present.
38 Upper glumes pubescent; lower lemmas usually pubescent.
39 Lower glumes present ..... *[P. langei]*
39 Lower glumes absent ..... ***P. pubiflorum***
38 Upper glumes glabrous; lower lemmas usually glabrous.
40 Upper florets golden brown ..... ***P. floridanum***
40 Upper florets pale to tan.
41 Terminal panicle branches erect ..... *[P. monostachyum]*
41 Terminal panicle branches spreading to ascending.
42 Plants decumbent, rooting at the lower nodes; spikelets obovate to elliptic ..... ***P. pubiflorum***
42 Plants rhizomatous; spikelets orbicular to elliptic.
43 Spikelets 2.9-4.1 mm long; 1.9-3.1 mm wide, suborbicular to elliptic; upper glumes 5-veined; leaf blades flat ..... ***P. floridanum***
43 Spikelets 2.1-3.1 mm long, 2.0-2.8 mm wide, orbicular or nearly so; upper glumes 3-veined; leaf blades laterally folded.
44 Lower sheaths villous or hirsute ..... ***P. praecox*** *var.* ***curtisianum***
44 Lower sheaths glabrous or sparsely papillose pubescent ..... ***P. praecox*** *var.* ***praecox***

Key to *Paspalum setaceum* complex
(by Richard J. LeBlond)

1 Leaves glabrous to glabrate (if glabrate, also see var. *stramineum* in couplet 8).
2 Blades crowded toward the base, often recurved, 3-8 mm wide; spikelets 1.4-1.9 mm long, usually glabrous ..... ***P. setaceum*** *var.* ***longepedunculatum***
2 Blades not especially crowded toward the base, erect, ascending or spreading, 2-20 mm wide; spikelets 1.6-2.6 mm long, pubescent or glabrous.
3 Blades 3-8 mm wide; spikelets 1.6-1.9 mm long, pubescent, subacute; [of GA and FL southward] ..... ***P. propinquum***
3 Blades 2-20 mm wide; spikelets 1.7-2.6 mm long (if < 2.0 then larger leaves usually > 7 mm wide), glabrous or pubescent, rounded to blunt; [plants of FL northward and westward].
4 Plants erect to spreading; blades 3-20 mm wide; spikelets 1.7-2.6 mm long; [of NJ to TX] ..... ***P. setaceum*** *var.* ***ciliatifolium***
4 Plants stiffly erect; blades 2-6 mm wide; spikelets 2.0-2.6 mm long; [of GA and FL] ..... ***P. setaceum*** *var.* ***rigidifolium***
1 Leaves variously pubescent.
5 Leaves villous to villous-hirsute, 2-10 mm wide; spikelets 1.3-1.9 mm long.
6 Leaves villous, 2-7 mm wide, not especially crowded toward the base, erect to spreading; [widespread] ..... ***P. setaceum*** *var.* ***setaceum***
6 Leaves villous-hirsute, 3-10 mm wide, crowded toward the base, recurved; [of n. FL south to Cuba] ..... ***P. setaceum*** *var.* ***villosissimum***
5 Leaves puberulent, pilose, or hirsute, 3-15 mm wide; spikelets 1.6-2.5 mm long.
7 Leaves puberulent at least distally on the adaxial surface (and often also pilose in var. *stramineum*); spikelets 1.6-2.2 mm long.
8 Plants erect to spreading; leaves puberulent and often pilose to nearly glabrous except for the puberulent distal adaxial surface; spikelets glabrous to pubescent ..... ***P. setaceum*** *var.* ***stramineum***
8 Plants spreading to prostrate; leaves densely puberulent; spikelets pubescent ..... ***P. setaceum*** *var.* ***psammophilum***
7 Leaves pilose or hirsute but not puberulent; spikelets 1.8-2.5 mm long.
9 Plants mostly erect; leaves pilose; spikelets usually glabrous; sterile lemma midnerve usually present ..... ***P. setaceum*** *var.* ***muhlenbergii***
9 Plants mostly widely spreading; leaves hirsute; spikelets glabrous or pubescent; sterile lemma midnerve present or absent ..... ***P. setaceum*** *var.* ***supinum***

Paspalum acuminatum Raddi, Brook Paspalum, Canoe Grass. Pd (GA): wet areas, often disturbed; rare, possibly only adventive in our area. C. GA and ne. TX south to s. FL and s. TX, south through the New World tropics to s. South America. [= FNA, HC, K]

Paspalum bifidum (Bertoloni) Nash, Pitchfork Paspalum, Pitchfork Crown Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, SC): mesic to wet longleaf pine savannas and mesic swales in sandhills; uncommon (rare north of SC). August-October. Se.

VA south to s. FL, west to se. MO, se. OK, and e. TX. [= RAB, C, GW, HC, K, S, Y; > *P. bifidum* var. *bifidum* – F, G; > *P. bifidum* var. *projectum* Fernald – F, G]

Paspalum boscianum Flügge, Bull Paspalum. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, SC, VA): low fields, ditches; common (uncommon in VA). July-October. MD, KY, and TX south through tropical America. [= RAB, C, F, FNA, G, GW, HC, K, S, W, Y]

Paspalum caespitosum Flügge. Cp (AL, FL): pinelands, hammocks; rare. S. AL and n. FL south to s. FL; West Indies, Mexico and Central America. [= FNA, GW, HC, K, S]

Paspalum conjugatum Bergius, Sour Paspalum. Cp (AL, FL, LA, MS): disturbed areas, forest edges; uncommon. Ne. FL, FL Panhandle, and s. AL west to e. TX, south in the New World tropics; Old World tropics. [= FNA, HC, K, S] {synonymy incomplete}

* ***Paspalum conspersum*** Schrad., Scattered Paspalum. Cp (GA): roadsides, other disturbed areas; rare, native of Mexico south to South America. [= FNA] {synonymy incomplete}

* ***Paspalum coryphaeum*** Trinius, Emperor Crown-grass. Cp (FL), Pd (NC): disturbed areas; rare, native of South America. [= FNA, K] {synonymy incomplete}

* ***Paspalum dilatatum*** Poiret, Dallis Grass. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): roadsides, fields, disturbed areas; common, native of tropical America. May-October. [= RAB, C, F, FNA, G, GW, HC, K, S, W, Y]

Paspalum dissectum (Linnaeus) Linnaeus, Mudbank Crown Grass, Walter Paspalum. Cp (GA, NC, SC, VA), Pd (NC, SC), Mt (VA): mud flats, drawdown zones; uncommon (rare north of GA). September. NJ, IL, and KS south to s. FL and e. TX; Cuba. [= RAB, C, F, FNA, G, GW, HC, K, S, Y]

Paspalum distichum Linnaeus, Joint Paspalum, Knotgrass. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC): brackish and freshwater marshes; uncommon (rare in VA). June-August. NJ, KS, and WA south to s. FL, s. TX, s. CA and through the New World and Old World tropics. [= RAB, C, F, FNA, G, HC, K, S, W, Y; < *P. distichum* – GW (also see *P. vaginatum*); = *P. paspaloides* (Michaux) Scribner]

Paspalum floridanum Michaux, Florida Paspalum. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): wet forests, pine savannas; common (rare in Mountains). August-October. NJ, IL, and KS south to s. FL and e. TX. [= RAB, C, FNA, GW, K, W; > *P. floridanum* – G; > *P. difforme* Le Conte – G, HC, S, Y; > *P. floridanum* var. *floridanum* – F, HC, S, Y; > *P. floridanum* var. *glabratum* Engelmann ex Vasey – F, HC, S, Y; > *P. giganteum* Baldwin ex Vasey – HC, S, Y]

Paspalum fluitans (Elliott) Kunth, Water Paspalum, Horsetail Crown Grass. Cp (GA, NC, SC, VA), Pd (NC, VA): mucky soils in swamp forests; uncommon. October. MD, IL, and KS south to s. FL and s. TX, and south through tropical America to c. South America. [= RAB, C, F, G, HC, K; = *P. repens* P.J. Bergius – FNA, GW, S, Y]

* ***Paspalum intermedium*** Munro ex Morong. Cp (GA): drainage canals; rare, native of South America. Escaped in sc. GA (Tift County, where growing along drainage canals in Tifton) (Jones & Coile 1988). [= FNA, HC, K]

Paspalum laeve Michaux *var.* ***circulare*** (Nash) Stone. {FL?, GA, NC, VA}: {need additional herbarium work to fully determine range and abundance of varieties} June-August. [= F; < *P. laeve* – RAB, C, FNA, G, GW, K, W; = *P. circulare* Nash – HC, S, WV, Y]

Paspalum laeve Michaux *var.* ***laeve***. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): forest edges and disturbed areas; common. {need additional herbarium work to fully determine range and abundance of varieties} June-August. Overall distribution of *P. laeve* s.l.: MA, NY, MI, and KS south to s. FL and e. TX. [< *P. laeve* – RAB, C, FNA, G, GW, K, W; > *P. laeve* var. *laeve* – F; > *P. laeve* var. *pilosum* Scribner – F; > *P. laeve* – HC, S, WV, Y; > *P. longipilum* Nash – HC, S, WV, Y]

Paspalum langei (E. Fournier) Nash, Rustyseed Paspalum. Cp (FL, LA): calcareous hardwood hammocks; rare. N. peninsular FL (Alachua County) and Panhandle FL (Jackson County) west to se. TX, and south through the New World tropics to South America. [= FNA, K; ? *P. botteri* (E. Fournier) Chase] {synonymy incomplete}

* ***Paspalum malacophyllum*** Trinius, Ribbed Paspalum. Cp (GA): disturbed areas; rare, native of Mexico to South America. [= FNA, HC]

Paspalum minus E. Fournier, Matted Paspalum. Cp (AL, FL, LA, MS): disturbed areas; uncommon. FL Panhandle (Escambia County) and s. AL west to e. TX. [= FNA, K] {synonymy incomplete}

Paspalum monostachyum Vasey, Gulfdune Paspalum. Cp (MS): coastal dunes, wet prairies; rare. S. FL peninsula; s. MS; sw. LA west to TX and Tamaulipas. [= FNA, HC, K, S] {synonymy incomplete}

* ***Paspalum nicorae*** Parodi, Brunswickgrass. Cp (GA): disturbed areas; rare, native of Brazil. Also reported for peninsular FL (Wunderlin & Hansen 2006). [= FNA, HC, K]

* ***Paspalum notatum*** Flügge, Bahia Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, SC, VA), Mt (GA): roadsides and disturbed areas, sometimes planted as a coarse turfgrass or a pasture grass; common (uncommon north of FL, rare in VA Piedmont, native of tropical America. June-October. [= FNA, G, GW, Y; > *P. notatum* var. *notatum* – HC, K; > *P. notatum* Flügge var. *saurae* Parodi – RAB, HC, K]

Paspalum plicatulum Michaux, Brownseed Paspalum. Cp (FL, GA, SC): pine savannas, fields; common (uncommon south of FL). May-July. Se. SC south to s. FL, west to s. TX, and south through tropical America to s. South America. [= RAB, FNA, GW, HC, K, S, Y]

Paspalum praecox Walter *var.* ***curtisianum*** (Steudel) Vasey, Curtis's Crown Grass. Cp (FL, GA, NC, SC, VA): pine savannas; rare (NC Watch List, VA Rare). June-October. NC south to s. FL, west to e. TX. The variety was named for the Rev. Moses Ashley Curtis (of Hillsborough, NC), not Allen Hiram Curtiss (of Jacksonville, FL); the correct spelling of the epithet is therefore "*curtisianum*." [= RAB, F, G; = *P. praecox* var. *curtissianum* – C, orthographic error; < *P. praecox* – FNA, GW, K; = *P. lentiferum* Lamarck – HC, S, Y]

Paspalum praecox Walter *var.* ***praecox***, Early Crown Grass. Cp (FL, GA, NC, SC): pine savannas; common (rare north of FL) (NC Watch List). May-July. [= RAB, C, F, G; < *P. praecox* – FNA, GW, K; = *P. praecox* – HC, S, Y]

Paspalum propinquum Nash. Cp (FL, GA): {habitat}; uncommon. June-September. GA and FL. [= HC, S; < *P. setaceum* – K]

Paspalum pubiflorum Ruprecht *var.* ***glabrum*** Vasey, Hairyseed Crown Grass. Mt, Pd (GA, NC, VA), Cp (FL, SC, VA): disturbed areas; uncommon (rare in FL) (NC Watch List). September-October. PA west to KS and CO, south to FL and s. TX and Mexico; Cuba. [= C, F, G, HC, S, Y; < *P. pubiflorum* – RAB, FNA, GW, K, W]

* ***Paspalum scrobiculatum*** Linnaeus, Indian Paspalum. Cp (GA): disturbed areas; rare, native of India. [= FNA, HC, K]

Paspalum setaceum Michaux *var.* ***ciliatifolium*** (Michaux) Vasey. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): dry open areas and woodlands, disturbed areas; common. June-September. S. NJ south to s. FL, west to e. TX, interior to s. WV, se. KY, e. TN, n. AL, n. MS, c. AR, and e. OK. [= FNA, Z; < *P. setaceum* – RAB, GW, K, W; < *P. setaceum* var. *ciliatifolium* – C (also see var. *longepedunculatum*); = *P. ciliatifolium* Michaux var. *ciliatifolium* – F, G; = *P. ciliatifolium* Michaux – HC, S, WV, Y]

Paspalum setaceum Michaux *var.* ***longepedunculatum*** (LeConte) A. Wood. Cp (FL, GA, NC, SC): pine flatwoods and pine savannas; rare. June-September. Se. NC south to s. FL, west to s. MS. [= F, FNA, Z; < *P. setaceum* – RAB, GW, K, W; < *P. setaceum* var. *ciliatifolium* – C; = *P. longepedunculatum* LeConte – G, HC, S, Y]

Paspalum setaceum Michaux *var.* ***muhlenbergii*** (Nash) Fernald. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry or moist soils; common. June-September. NH west to MI, c. IL, s. IA, and c. KS, south to n. FL, s.AL, s. MS, s. LA, and c. TX. [= C, FNA, Z; < *P. setaceum* – RAB, GW, K, W; > *P. setaceum* var. *calvescens* Fernald – F; > *P. ciliatifolium* Michaux var. *muhlenbergii* (Nash) Fernald – F; = *P. ciliatifolium* Michaux var. *muhlenbergii* (Nash) Fernald – G; = *P. pubescens* Muhlenberg ex Willdenow – HC, S, WV, Y]

Paspalum setaceum Michaux *var.* ***psammophilum*** (Nash) D. Banks. Cp? (VA?): maritime grasslands, sandy disturbed areas; rare. June-September. MA south to DC (VA?) in the Coastal Plain. [= C, FNA, Z; < *P. setaceum* – K; = *P. psammophilum* Nash – F, G, HC, Y]

Paspalum setaceum Michaux *var.* ***rigidifolium*** (Nash) D. Banks. Cp (FL, GA, NC?, SC?): sandhills; rare. June-September. Ne. GA, immediately adjacent to SC (and reported for NC by HC) south to s. FL; Cuba. [= FNA, Z; < *P. setaceum* – RAB, GW, K, W; = *P. rigidifolium* Nash – HC, S, Y]

Paspalum setaceum Michaux *var.* ***setaceum***, Thin Paspalum. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): sandhills, savannas, dry soils; common (uncommon in Piedmont and Mountains). June-September. MA and CT south to s. FL, west to e. TX, inland to w. VA, s. WV, s. MO and AR; Cuba. [= C, FNA, Z; < *P. setaceum* – RAB, GW, K, W; > *P. setaceum* – G, HC, S, WV, Y; > *P. debile* Michaux – F, HC, S, Y; > *P. setaceum* var. *setaceum* – F]

Paspalum setaceum Michaux *var.* ***stramineum*** (Nash) D. Banks, Yellow Sand Paspalum. Cp (FL, GA, NC): dry sandy soils; rare. June-September. MI west to MT, south to LA, and NM; scattered eastwards, especially near the coast, perhaps at least in part as introductions [= C, FNA, Z; < *P. setaceum* – RAB, GW, K, W; = *P. ciliatifolium* Michaux var. *stramineum* (Nash) Fernald – F, G; = *P. stramineum* Nash – HC, Y]

Paspalum setaceum Michaux *var.* ***supinum*** (Bosc ex Poiret) Trinius. Cp (FL, GA, NC, SC, VA?): sandy soils, old fields; uncommon. June-September. E. NC (e. VA?) south to s. FL, west to s. MS. Also reported for the Coastal Plain of Virginia by Tatnall (1946); needing confirmation of the specimen identification. [= F, FNA, Z; < *P. setaceum* – RAB, GW, K, W; = *P. supinum* Bosc ex Poiret – HC, S]

Paspalum setaceum Michaux *var.* ***villosissimum*** (Nash) D. Banks. Cp (FL): sandy pine flatwoods and fields; uncommon. N. FL (very near GA) south to s. FL; Cuba. [= FNA, Z; < *P. setaceum* – GW, K; < *P. debile* Michaux – HC; = *P. villosissimum* Nash – S]

* ***Paspalum urvillei*** Steudel, Vasey Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): roadsides, fields, and disturbed areas; common, native of South America. May-July. [= RAB, C, F, FNA, G, GW, HC, K, S, Y]

Paspalum vaginatum Swartz, Sand Knotgrass, Seashore Crown Grass. Cp (FL, GA, NC, SC), Pd (NC): brackish marshes, rarely inland in disturbed places; rare. July. NC south to s. FL, west to s. TX, southward through the New World tropics; Old World tropics. [= RAB, FNA, HC, K, S, Y; < *P. distichum* – GW]

* ***Paspalum virgatum*** Linnaeus, Talquezal. Cp (GA): disturbed areas; rare, native of Mexico, Central America, and South America. [= FNA, K] {synonymy incomplete}

* *Paspalum convexum* Flügge, Mexican Paspalum. Disturbed areas. MS, LA, and e. TX, native of tropical America. [= FNA, K] {synonymy incomplete}

* *Paspalum paniculatum* Linnaeus, Arrocillo. Disturbed areas, native of tropical America. Ec. MS and sw. FL. [= FNA, K] {synonymy incomplete}

* *Paspalum quadrifarium* Lamarck, Tussock Paspalum. Disturbed areas. S. MS. Native of South America. [= FNA] {synonymy incomplete}

* *Paspalum racemosum* Lamarck, Peruvian Paspalum. Disturbed areas. MS and other widely scattered localities in North America, native of n. South America. [= FNA, K] {synonymy incomplete}

Pennisetum L.C. Richard ex Persoon 1805

A genus of 80-130 species, perennials and annuals, mainly of the tropics and subtropics. References: Wipff in FNA (2003a). Key adapted from FNA.

1 Primary bristles (immediately subtending each spikelet) scabrous.
  2 Panicles with 9-16 fascicles per cm of length; plants 0.3-1.2 m tall.....***P. alopecuroides***
  2 Panicles with 30-40 fascicles per cm of length; plants 2-8 m tall.....***P. purpureum***
1 Primary bristles conspicuously long-ciliate.
  3 Spikelets 9-12 mm long.....***P. villosum***
  3 Spikelets 2.5-7 mm long.

4 Fascicles not disarticulating from the rachises; fascicles 33-160 per cm of inflorescence; panicles 4-200 cm long; leaves 7-70 mm wide. ..... ***P. glaucum***
4 Fascicles disarticulating from the rachises at maturity; fascicles 8-37 per cm of inflorescence; panicles 2-32 cm long; leaves 2-13 mm wide.
5 Spikelets 4.5-7 mm long; leaves 2-3.5 mm wide, folded or conduplicate and superficially appearing even narrower; rachis pubescent. ..... ***P. setaceum***
5 Spikelets 2.5-5.6 mm long; leaves 2-13 mm wide, flat; rachis scabrous.
6 Inner bristles fused for < ¼ of their length; many outer bristles exceeding the spikelets; terminal bristles 10.5-23 mm long, noticeably longer than the other bristles in the fascicle ..... ***P. ciliare***
6 Inner bristles fused for ⅓-½ of their length; outer bristles not exceeding the spikelets; terminal bristles 2.9-6.5 mm long, usually not noticeably exceeding the other bristles in the fascicle ..... ***P. setigerum***

* ***Pennisetum alopecuroides*** (Linnaeus) Sprengel, Chinese Fountaingrass. Pd (VA), Mt (VA): disturbed areas; rare, native of e. Asia. [= FNA, HC, K]
* ***Pennisetum ciliare*** (Linnaeus) Link, Buffelgrass. Cp (FL): disturbed areasl rare, native of Africa. Known in our area from ne. FL, s. AL, e. TN, and ec. MS. [= FNA, HC; = *P. ciliare* var. *ciliare* – K; = *Cenchrus ciliaris* Linnaeus]
* ***Pennisetum glaucum*** (Linnaeus) R. Brown, Pearl Millet. Cp (FL), Mt (VA), Pd (VA), {GA, NC, SC}: disturbed areas; rare, native of the Old World. [= RAB, FNA, HC, K; ? *Chaetochloa lutescens* (Weigel) Stuntz – S; = *Setaria glauca* (Linnaeus) Palisot de Beauvois]
* ***Pennisetum purpureum*** Schumacher, Elephant Grass, Napier Grass. Cp (FL): swamps, wet grasslands, disturbed areas; uncommon, native of Africa. Naturalized in FL north to the FL-GA border. [= FNA, HC, K]
* ***Pennisetum setaceum*** (Forskål) Chiovenda, Tender Fountaingrass Cp (FL): disturbed areas; rare, native of e. Mediterranean Europe. Reported as an introduction in FL, TN, and KY (Wipff in FNA). [= FNA, HC, K]
* ***Pennisetum setigerum*** (Vahl) Wipff. Cp (FL): disturbed areas; rare, native of Africa. Known in our area from ne. FL and ec. MS. [= FNA; = *P. ciliare* (Linnaeus) Link var. *setigerum* (Vahl) Leeke – K; = *Cenchrus setigerus* Vahl]
* ***Pennisetum villosum*** R. Brown ex Fresenius, Feathertop. Reported as an introduction in GA (Kartesz 1999). [= C, FNA, HC, K; ? *Cenchrus longisetus* M.C. Johnston]

Phalaris Linnaeus 1753 (Canary-grass)

A genus of about 16-22 species, north temperate and South American. References: Barkworth in FNA (2007a); Tucker (1996)=Z.

1 Perennial, with scaly rhizomes; inflorescence **either** obviously paniculate, 7-25 cm long, with ascending to appressed branches, the main branches of the inflorescence apparent, the inflorescence outline thus appearing lobed, **or** densely spikelike, 1.5-15 cm long.
2 Glumes broadly winged; fertile lemmas ovate-lanceolate, densely pubescent ..... ***Ph. aquatica***
2 Glumes not winged; fertile lemmas narrowly lanceolate, glabrous to sparsely pubescent ..... ***Ph. arundinacea***
1 Annual, without rhizomes; inflorescence densely spikelike or almost capitate, 1-9 cm long, the branches not apparent, the inflorescence outline a single ovoid, ellipsoid, or lanceolate form.
3 Spikelets borne in clusters, the lower 4-7 spikelets in each cluster with a staminate terminal floret ..... ***Ph. paradoxa***
3 Spikelets borne singly; all spikelets with a bisexual terminal floret.
4 Keels of the glumes broadly winged (the wing ca. 1 mm wide); sterile florets 2.0-4.5 mm long ..... ***Ph. canariensis***
4 Keels of the glume narrowly winged (the wing < 0.5 mm wide); sterile florets 0.5-2.5 mm long.
5 Sterile floret 1 ..... ***Ph. minor***
5 Sterile florets 2.
6 Nerves of the glumes scabrous; panicle cylindric in outline, 6-18 cm long; glumes 3.5-4.0 mm long; sterile florets 0.5-1.5 mm long ..... ***Ph. angusta***
6 Nerves of the glumes not scabrous; panicle narrowly ovate in outline, usually 2-6 cm long; glumes 5-6 mm long; sterile florets 1.5-2.5 mm long ..... ***Ph. caroliniana***

* ***Phalaris angusta*** Nees ex Trinius. Cp (FL, GA, SC): waterfowl impoundments, marshes; uncommon, native of tropical America, perhaps native in LA and TX. [= GW, FNA, HC, K, Z]
* ***Phalaris aquatica*** Linnaeus, Bulbous Canary-grass. Cp (NC, SC, VA): disturbed areas; rare, native of Europe. [= K, Z; ? *Ph. tuberosa* Linnaeus var. *stenoptera* (Hackel) Hitchcock – HC]
*? ***Phalaris arundinacea*** Linnaeus, Reed Canary-grass, Ribbon Grass. Mt, Pd (NC, VA), Cp (VA): moist forests, moist disturbed areas, bogs; common (rare in Coastal Plain). June. Newfoundland west to AK, south to NC, TN, AR, NM, CA; Mexico; Eurasia. A variegated form, *Ph. arundinacea* forma *variegata* (Parn.) Druce, is cultivated for ornament, as Ribbon Grass. [= RAB, C, F, FNA, GW, K, S, W, WV, Z; > *Ph. arundinacea* var. *arundinacea* – G, HC; > *Ph. arundinacea* var. *picta* Linnaeus – G, HC]
* ***Phalaris canariensis*** Linnaeus, Birdseed Grass, Canary-grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): disturbed areas; rare, native of Mediterranean Europe. [= RAB, C, F, FNA, G, GW, HC, K, S, WV, Z]
Phalaris caroliniana Walter, Maygrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): ditches, roadsides, disturbed areas; uncommon. May-June. NC west to OR, south into Mexico, the original distribution now obscured. [= RAB, C, F, FNA, G, GW, HC, K, S, Z]
* ***Phalaris minor*** Retzius, Lesser Canary Grass. Cp (SC): waste areas near wool-combing mills; rare, native of Mediterranean Europe. Also reported for other scattered states in e. North America, including peninsular FL (Kartesz 1999). [= FNA, HC, K] {synonymy incomplete}

* ***Phalaris paradoxa*** Linnaeus, Mediterranean Canary Grass, is reported for NC, MD, NJ, and PA (Barkworth in FNA 2007a; Kartesz 1999). [= FNA, K; > *Ph. paradoxa* var. *paradoxa* – HC; > *Ph. paradoxa* var. *praemorsa* (Lamarck) Coss. & Durieu – HC] {synonymy incomplete}

Phanopyrum (Rafinesque) Nash 1903 (Phanopyrum)

Circumscription of this genus is currently in flux. *Phanopyrum* is variously treated as a distinct genus or as a subgenus of *Panicum*. *Panicum verrucosum* perhaps belongs here as well. References: Crins (1991)=Z; Webster (1988)=Y; Freckmann & Lelong in FNA (2003a).

Phanopyrum gymnocarpon (Elliott) Nash, Swamp Phanopyrum, Savanna Phanopyrum. Cp (FL, GA, NC, SC, VA): swamps, seasonally flooded soils of cypress-gum sloughs, tidal (freshwater) cypress-gum swamps, disturbed wet soils, low woods, ditches, muddy banks of streams and lakes, sinks, floodplains, and marshes; uncommon (rare in NC and VA). August-October. Se. VA south to FL, west to TX and AR. [= K, Y; = *Panicum gymnocarpon* Elliott – RAB, FNA, GW, HC, S, Z]

Phleum Linnaeus 1753 (Timothy)

A genus of about 15 species, annuals and perennials, mainly native to Eurasia. References: Barkworth in FNA (2007a); Tucker (1996)=Z; Stace (1997)=Y. Key based on Stace (1997).

1 Spikelets 2.0-3.5 mm long, including the 0.2-1.0 (-1.2) mm long awns; panicle 3-6 mm wide; leaves 2-6 mm wide; ligule usually acute ..... ***Phl. pratense*** *ssp.* ***bertolonii***
1 Spikelets (3.5-) 4-5.5 mm long, including the (0.8-) 1.0-2.0 mm long awns; panicle 6-10 mm wide; leaves 3-9 mm wide; ligule usually obtuse ..... ***Phl. pratense*** *ssp.* ***pratense***

* ***Phleum pratense*** Linnaeus *ssp.* ***bertolonii*** (A.P. de Candolle) Bornm., Small Timothy. (NC) {included based on Fernald's report – corroboration and additional information needed} [= FNA; < *Ph. pratense* – RAB, C, G, HC, K, S, W, Z; = *Ph. pratense* var. *nodosum* (Linnaeus) Hudson – F; = *Ph. bertolonii* A.P. de Candolle – Y]
* ***Phleum pratense*** Linnaeus *ssp.* ***pratense***, Timothy. Mt, Pd, Cp (GA, NC, SC, VA): meadows, pastures, roadsides, disturbed areas; common, native of Europe. June-October. The American common name comes from the name of the man who is believed to have introduced it into the United States in 1720, Timothy Hanson; in England, *Phleum* is called "cat's-tail." [= FNA; < *Ph. pratense* – RAB, C, G, HC, K, S, W, WV, Z; = *Ph. pratense* var. *pratense* – F; = *Ph. pratense* – Y]

* *Phleum subulatum* (Savi) Ascherson & Graebner, Italian Timothy. Waif on ballast, reported for MD and Philadelphia, PA. [= FNA, K, Y] {not keyed}

Phragmites Adanson 1763 (Common Reed)

A genus with one species and 3 or more infrataxa, nearly worldwide in distribution. References: Allred in FNA (2003a), revised in FNA (2007a); Saltonstall & Hauber (2007)=Y; Saltonstall, Peterson, & Soreng (2004)=Z; Saltonstall (2002). Key based on Z.

1 Ligules 1.0-1.7 mm long; lower glumes 3.0-6.5 mm long; upper glumes 5.5-11.0 mm long; lemmas 8.0-13.5 mm long; leaf sheaths caducous with age; culms exposed in the winter, smooth and shiny; [native south to WV and NC]..... ***Phr. australis*** *ssp.* ***americanus***
1 Ligules 0.4-0.9 mm long; lower glumes 2.5-5.0 mm long; upper glumes 4.5-7.5 mm long; lemmas 7.5-12.5 mm long; leaf sheaths not caducous with age; culms not exposed in the winter, **either** smooth and shiny **or** ridged and not shiny.
  2 Culms ridged and not shiny; [introduced and weedy]..... ***Phr. australis*** *ssp.* ***australis***
  2 Culms smooth and shiny; [native on the Gulf Coast, from FL westward] ..... ***Phr. australis*** *ssp.* ***berlandieri***

Phragmites australis (Cavanilles) Trinius ex Steudel *ssp.* ***americanus*** Saltonstall, P.M. Peterson, & Soreng. Cp (VA): freshwater marshes; rare. [= FNA, Y, Z; < *Ph. australis* – C, K; < *Ph. communis* Trinius – RAB, G, HC, WV; < *Ph. communis* var. *berlandieri* (Fournier) Fernald – F]
* ***Phragmites australis*** (Cavanilles) Trinius ex Steudel *ssp.* ***australis***, Common Reed. Cp (GA, NC, SC, VA), Pd, Mt (NC, VA), Mt (VA): marshes, dredge-spoil deposit islands, ditches; common in outer Coastal Plain (rare elsewhere). September-October. Nearly worldwide in distribution. Fox, Godfrey, & Blomquist (1950) report its first collection in NC (in 1948). In most of our area, reed is of relatively recent introduction, reported from only nine counties in RAB, but now becoming a serious weed in coastal areas, where it aggressively colonizes freshwater and brackish marshes, excluding the native species. [= Y; = *Phragmites australis* (Cavanilles) Trinius ex Steudel var. *australis* – FNA, Z; < *Ph. australis* – C, GW, K; < *Ph. communis* Trinius – RAB, G, HC, WV; = *Ph. communis* var. *communis* – F; < *Ph. phragmites* (Linnaeus) Karsten – S]
Phragmites australis (Cavanilles) Trinius ex Steudel *ssp.* ***berlandieri*** (E. Fournier) C.F. Reed, Western Reed. Cp (FL?): marshes; uncommon. Sw. United States south into tropical Amerca, east to Gulf Coast. September-October. [= Y; *Phragmites australis* (Cavanilles) Trinius ex Steudel var. *berlandieri* (E. Fournier) C.F. Reed – FNA, Z; < *Ph. australis* – C, GW, K; < *Ph. communis* Trinius – RAB, G, HC; < *Ph. communis* var. *berlandieri* (Fournier) Fernald – F; < *Ph. phragmites* (Linnaeus) Karsten – S]

Phyllostachys Siebold & Zuccarini 1843 (Bamboo)

A genus of about 50 (or more) species, native of mainly temperate e. Asia. References: Stapleton & Barkworth in FNA (2007a); Duncan & Duncan [in prep.]=Z; Judziewicz et al. (2000)=Y. Key adapted from Z.

1 Internodes at the base of principal culms dissimilar in length, the lowermost internode 1-12 cm long, the next 3 internodes distinctly longer, with nodal junctions mostly straight across ..... ***Ph. aurea***
1 Internodes at the base of principal culms all similar in length, mostly 4-8 cm, with nodal junctions oblique.
  2 Groove on internode (above the branch) yellowish-green, the rest of the culm dull greenish ..... ***Ph. aureosulcata***
  2 Groove on internode (above the branch) the same color as the rest of the culm.
    3 Internodes of principal culms densely velvety; outer surface of culm sheaths with abundant erect brown hairs; lowest internode of principal culms ca. 5 cm long; culms pale green atfirst, becoming gray with accumulated waxy powder in age ..... ***Ph. heterocycla***
    3 Internodes of principal culms glabrous or slightly hairy; outer surface of culm sheaths lacking erect brown hairs; lowest internode of principal culms ca. 8.5-12 cm long; culms various (see below, but not as decribed in first lead).
      4 Largest culms to 15 cm in diameter and 25 m tall; upper culm sheaths with auricles; outer surface of culm sheaths usually with a green streak down the middle, flanked by streaks of purple and buff; culms medium to dark glossy green at first (some cultivars golden yellow or yellow streaked), remaining so in age ..... ***Ph. bambusoides***
      4 Largest culms to 3.2 (-4) cm in diameter and 10 m tall (rarely taller); upper culm sheaths with or without auricles; outer surface of culm sheaths variously streaked, spotted, or mottled with brown or red (but not as above); culms pale green to green at first, usually becoming purple spotted, gray, or yellow in age.
        5 Lowest internode of principal culms ca. 8.5 cm long; culm sheaths with auricles, usually sparsely pubescent with erect, pale hairs, usually pinkish-brown at maturity, marked with numerous brown spots near the tip; culms green at first, usually becoming speckled and then more-or-less completely darkened with purplish spots (remaining green in some cultivars) ..... ***Ph. nigra***
        5 Lowest internode of principal culms ca. 12 cm long; culm sheaths lacking auricles, glabrous, usually green to buff at maturity, striped and marginally bordered with red; culms pale green at first, becoming gray to yellowish in age ..... ***Ph. rubromarginata***

* ***Phyllostachys aurea*** Carrière ex A. & C. Rivière, Golden Bamboo, Fishpole Bamboo. Cp (FL?, NC, SC, VA), Pd (NC, SC, VA), Mt (VA): suburban woodlands; uncommon (rare in VA Mountains), native of China and Japan. Not known to flower in our area. This is the usual large bamboo cultivated and naturalizing in our area, forming dense stands, up to 15 m tall. [= RAB, FNA, HC, K, Y, Z]
* ***Phyllostachys aureosulcata*** McClure, Yellowgroove Bamboo. Cp (SC), Pd (VA), {GA}: cultivated as an ornamental, persistent or spreading from plantings; rare, native of China. [= K, WV, Y, Z]
* ***Phyllostachys bambusoides*** Siebold & Zuccarini, Giant Timber Bamboo. Cp, Pd, Mt (NC, SC): cultivated as an ornamental, persistent or spreading from plantings; rare, native of China. [= FNA, HC, K, Y, Z]
* ***Phyllostachys heterocycla*** (Carrière) S. Matsum, Moso Bamboo. Cp (SC): cultivated as an ornamental, persistent or spreading from plantings; rare, native of China. [= Y; ? *Ph. edulis* (Carrière) Houzeau de Lehaie – K; ? *Ph. pubescens* Mazel ex Houzeau de Lehaie – Z]
* ***Phyllostachys nigra*** (Loddiges) Munro, Black Bamboo. Pd (SC), Cp (VA): cultivated as an ornamental, persistent or spreading from plantings; rare, native of China and Japan. [= K, WV, Y, Z]
* ***Phyllostachys rubromarginata*** McClure. Pd (SC): cultivated as an ornamental, persistent or spreading from plantings; rare, native of China. [= K, Y, Z]

* ***Phyllostachys meyeri*** McClure is reported as introduced in FL, NC, and SC (Kartesz 1999). {investigate} [= K] {not yet keyed}

A number of other species are sometimes cultivated in our area, and may be encountered. Bamboos are seriously under-represented in herbaria, since they rarely flower and are impractical to press. All of the species above should be anticipated in other physiographic provinces and states than those listed.

Piptatherum Palisot de Beauvois 1812

A genus of ca. 30 species, mainly Eurasian. References: Barkworth in FNA (2007a).

1 Glumes 2.5-3.5 mm long; lemmas glabrous; [alien] ..... ***[Ph. miliaceum]***
1 Glumes 3-8 mm long; lemmas evenly pubescent; [native].
  2 Leaves primarily cauline, the basal leaves < 2 cm long or merely represented by sheaths; leaves 8-16 mm wide; florets 4.5-7.5 mm long .... ***P. racemosum***
  2 Leaves primarily basal, the basal leaves 4-45 cm long; leaves 0.5-1.8 mm wide; florets 2.2-4.5 mm long.
    3 Awns 5-15 mm long, persistent, 1-2× geniculate ..... ***P. canadense***
    3 Awns absent or < 2 mm long, caducous ..... ***P. pungens***

Piptatherum canadense (Poiret) Dorn, Mountain Ricegrass. Mt (WV): forests and woodlands; {abundance}. Newfoundland west to British Columbia, south to n. NY, MI, and WI; disjunct at Panther Knob, Pendleton County, WV. [= K; = *Oryzopsis canadensis* (Poiret) Torrey – C, F, G, HC, WV]

Piptatherum pungens (Torrey ex Sprengel) Dorn. Mt (WV): {habitat}; {abundance}. Labrador, Nunavut, and Yukon south to NJ, WV, IN, IL, IA, SD, and CO. = K; = *Oryzopsis pungens* (Torrey ex Sprengel) A.S. Hitchcock – C, F, G, HC]

Piptatherum racemosum Ricker ex A.S. Hitchcock, Blackseed Ricegrass. Mt (VA): calcareous woodlands and forests; common. Québec and Ontario west to ND, south to w. VA, e. TN (FNA), sc. KY, sc. MO, and e. NE. [= K; = *Oryzopsis racemosa* (Smith) Ricker ex A.S. Hitchcock – C, F, G, HC, W, WV]

* *Piptatherum miliaceum* (Linnaeus) Cosson, Smilo Grass. Reported as an introduced waif in MD (FNA; Kartesz 1999), NJ, and PA (Kartesz 1999). [= K; ? *Piptatherum miliaceum* ssp. *miliaceum* – FNA; = *Oryzopsis miliacea* (Linnaeus) Bentham & Hooker – HC]

Piptochaetium J. Presl 1830 (Needlegrass)

A genus of about 27 species, of temperate North and South America, and montane tropical South America (Cialdella & Giussani 2002). References: Cialdella & Giussani (2002).

1 Florets 7-13 mm long; awns 40-75 mm long; [widespread in our area] ..... ***P. avenaceum***
1 Florets 13.5-22 mm long; awns 62-120 mm long; [endemic to FL] ..... ***P. avenacioides***

Piptochaetium avenaceum (Linnaeus) Parodi, Eastern Needlegrass, Black Oatgrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): upland woodlands and forests, sometimes abundant or even dominant in xeric woodlands over granitic or mafic rocks in the Piedmont; common (uncommon in the Mountains). April-June. [= C, FNA, K; = *Stipa avenacea* Linnaeus – RAB, F, G, HC, S, W, WV]

Piptochaetium avenacioides (Nash) Valencia & Costas. Cp (FL): sandhills. Ne. FL (?) south to c. peninsular FL. [= FNA, K; = *Stipa avenacioides* Nash – HC; = *Stipa avenaceoides* Nash – S, orthographic variant]

Pleioblastus Nakai 1925

A genus of about 20 species, shrubs, native eof China and Japan.

* ***Pleioblastus simonii*** (Carrière) Nakai. Reported for GA (Kartesz 1999). {investigate} [= *Arundinaria simonii* (Carrière) A.& C. Rivière – K]

Poa Linnaeus 1753 (Bluegrass)

A genus of about 500 species, annuals and perennials, cosmopolitan. References: Soreng in FNA (2007a); Tucker (1996)=Z; Haines (2004)=Y; Soreng (1998).

1 Plants with well-developed rhizomes; perennial.
  2 Upper stems strongly flattened; [section *Tichopoa*] ..... ***P. compressa***
  2 Upper stems terete or nearly so.
    3 Lower nodes of the panicle with 1-3 branches; [section *Madropoa*] ..... ***P. cuspidata***
    3 Lower nodes of the panicle with 4 or more branches; [section *Poa*] ..... ***P. pratensis***
1 Plants lacking rhizomes; perennial or annual.
  4 Plants dioecious, the florests imperfect; lemmas and glumes scarious and silvery; [rare introduction in our area]; [section *Dioicopoa*] ..... ***P. arachnifera***
  4 Plants not dioecious, the florets perfect; lemmas and glumes not notably scarious and silvery; [collectively common and widespread in our area].
    5 Lemmas not webbed at the base.
      6 Annual; culms decumbent to ascending and 1-3 dm long; inflorescence 2-8 cm long, the ascending branches bearing crowded spikelets above the middle; lemmas 2.4-3.4 mm long; [section *Micrantherae*] ..... ***P. annua***
      6 Perennial; culms erect, 3-6 dm long; inflorescence 6-15 cm long, the widely spreading branches bearing a few spikelets near the end; lemmas 3.2-4.4 mm long; [section *Sylvestres*] ..... ***P. autumnalis***
    5 Lemmas webbed at the base.
      7 Spikelets (most or all) modified into purplish bulblets; culm bulbous-thickened at ground level; [section *Arenariae*] ..... ***P. bulbosa***
      7 Spikelets normal; culm not bulbous-thickened.
        8 Annual; [section *Homalopoa*] ..... ***P. chapmaniana***
        8 Perennial.
          9 Marginal veins of the lemma glabrous.
            10 Nodes of the panicle mostly with 4-8 branches; lemmas pubescent or scabrous on the keel.
              11 Sheaths glabrous; ligule 0.7-2.2 (-3.0) mm long; [section *Sylvestres*] ..... ***P. alsodes***
              11 Sheaths scabrous; ligule (2.5-) 3-7 mm long; [section *Pandemos*] ..... ***P. trivialis***
            10 Nodes of the panicles mostly with 2 branches; lemmas glabrous on the keel; [section *Sylvestres*].
              12 Anthers 0.6-0.9 (-1.0) mm long; lemmas broad-acute, obtuse or truncate at the apex, the keel and lateral margins of the lemma forming an apical angle of 42-82 degrees, firm at the tip, the scarious tip absent or up to 0.25 mm long ..... ***P. languida***
              12 Anthers 0.9-1.5 mm long; lemmas acute to acuminate at the apex, the keel and lateral margins of the lemma forming an apical angle of 10-47 degrees, pliable at the tip, the scarious tip prominent and 0.25-0.5 mm long ..... ***P. saltuensis***
          9 Marginal veins of the lemma pubescent, at least basally.
            13 Lower nodes of the panicles mostly with (1-) 2-3 branches.

14 Ligule truncate, 0-1 mm long; first glume 1.7-2.2 mm long, second glume 2.0-2.8 mm long; anthers 0.5-0.7 mm long; [section *Oreinos*] ..... ***P. paludigena***
14 Ligule rounded-ovate, 1-2 mm long; first glume 2.5-3.5 mm long, second glume 3.0-3.8 mm long; anthers 1.1-1.4 mm long; [section *Sylvestres*] ..... ***P. wolfii***
13 Lower nodes of the panicles mostly with (4-) 5 or more branches.
15 Lemmas 5-veined (intermediate veins well-developed); ligule ca. 1 mm long; [section *Sylvestres*] ..... ***P. sylvestris***
15 Lemmas 3-veined (intermediate veins obscure); ligule either (2-) 3-5 mm long or 0.2-1 (-1.5) mm long.
16 Ligule 0.2-1 (-1.5) mm long, truncate; culms 4-8 dm tall; anthers 1.2-1.6 mm long; [section *Stenopoa*] ..... ***P. nemoralis***
16 Ligule (2-) 3-5 mm long, ovate-triangular; culms 5-15 dm tall; anthers 0.8-1.2 mm long; [section *Pandemos*] ..... ***P. palustris***

Poa alsodes A. Gray, Woodland Bluegrass. Mt (NC, VA), Pd (NC, VA): rich forests; uncommon (rare in Piedmont). May-June. Nova Scotia west to SD, south to NC and IL; also in w. United States. [= RAB, C, F, FNA, G, HC, K, W, WV, Z]

* ***Poa annua*** Linnaeus, Speargrass, Six-weeks Grass, Annual Bluegrass. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common, native of Eurasia. April-May. [= RAB, C, F, FNA, G, GW, HC, K, W, WV, Z]

* ***Poa arachnifera*** Torrey, Texas Bluegrass. Pd (GA, NC, SC): disturbed areas; rare, native of sc. United States. April. [= RAB, FNA, HC, K]

Poa autumnalis Muhlenberg ex Elliott. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): moist or dry nutrient-rich forests; common (uncommon in VA Mountains, rare in FL). April-May. NJ west to MI, south to FL and TX. [= RAB, C, F, FNA, G, GW, HC, K, W, Z]

* ***Poa bulbosa*** Linnaeus *ssp.* ***vivipara***, Bulbous Bluegrass. Cp (NC, VA), Pd (GA, NC, VA): lawns; rare, native of Europe. April-May. [= FNA; < *P. bulbosa* – RAB, C, F, G, HC, K, WV, Z]

Poa chapmaniana Scribner. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): low fields, roadsides, disturbed areas; common (rare in FL and VA). April-May. DE west to IA, south to FL and LA. [= RAB, C, F, FNA, G, HC, K, W, WV, Z]

* ***Poa compressa*** Linnaeus, Canada Bluegrass. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): fields, roadsides, disturbed areas; common, native of Europe. May-August. [= RAB, C, F, FNA, G, HC, K, W, WV, Z]

Poa cuspidata Nuttall. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (GA, NC, VA): moist forests; common. March-April. NJ west to s. IN, south to sw. GA and c. AL. [= RAB, C, F, FNA, G, HC, K, W, WV, Z]

Poa languida Hitchcock, Drooping Bluegrass. Mt (VA): ultramafic outcrop woodlands, barrens, and glades; rare. April-May. VT and MA west to MN, south to PA, w. VA, KY, and IA. See comments under *P. saltuensis*. [= C, F, G, HC, W; = *P. saltuensis* Fernald & Wiegand ssp. *languida* (Hitchcock) A. Haines – FNA, Y; < *P. saltuensis* – K]

* ***Poa nemoralis*** Linnaeus, Wood Bluegrass. Mt (NC, VA), Pd (VA): sandy creek bottoms; rare, native of Europe. [= C, F, FNA, G, HC; ? *P. nemoralis* ssp. *nemoralis* – K]

Poa paludigena Fernald & Wiegand, Bog Bluegrass. Mt (NC, VA): mountain bogs, especially in deep shade under shrubs; rare. April-May. NY west to MN, south to PA, w. NC, and IL. This species withers and disintegrates shortly after flowering; its ephemeral habit may be responsible for its being overlooked in our area for many years. [= C, F, FNA, G, HC, K]

Poa palustris Linnaeus, Fowl Bluegrass, Fowl Meadow-grass. Mt (NC, SC, VA), Pd (VA): meadows, moist areas; rare. June-July. Circumboreal, south in North America to VA, w. NC, MO, and NM. Some populations, especially in our region, may represent introductions. [= RAB, C, F, FNA, G, HC, K, W, WV, Z]

* ***Poa pratensis*** Linnaeus *ssp.* ***pratensis***, Kentucky Bluegrass, Junegrass, Speargrass. Mt, Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): lawns, roadsides, disturbed areas; common, native of Europe. April-August. [= FNA, K; < *P. pratensis* – RAB, C, F, G, HC, W, WV, Z]

Poa saltuensis Fernald & Wiegand, Old-pasture Bluegrass. Mt (NC, VA): northern hardwood forests, ultramafic outcrop woodlands, barrens, and glades; rare. April-May. Newfoundland west to MN, south to PA, w. VA, and w. NC. The NC occurrences (on serpentinized olivine barrens) reported as *P. languida* are actually *P. saltuensis*. The taxonomic distinctions between *P. saltuensis* and *P. languida* have been controversial; Haines (2004) provides a detailed and valuable discussion. [= C, F, G, HC, W, WV; < *P. languida* – RAB, Z, misidentification; = *P. saltuensis* var. *saltuensis* – F; = *P. saltuensis* ssp. *saltuensis* – FNA, Y; < *P. saltuensis* – K (also see *P. languida*)]

Poa sylvestris A. Gray, Forest Bluegrass. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests; common (rare in FL). April-May. NY west to MN and SD, south to FL and TX. [= RAB, C, F, FNA, G, GW, HC, K, W, WV, Z]

* ***Poa trivialis*** Linnaeus *ssp.* ***trivialis***, Rough Bluegrass. Mt, Pd (NC, VA), Cp (VA), {GA}: moist forests, disturbed areas, bottomlands; common (rare in VA Coastal Plain), native of Europe. April-June. [= FNA; < *P. trivialis* – RAB, C, F, G, GW, HC, K, W, WV, Z]

Poa wolfii Scribner. Mt (NC): moist rich forests; rare. OH west to MN, south to c. TN, n. AR, and NE; disjunct eastward w. NC. The NC occurrence is based on material from Great Smoky Mountains National Forest (Haywood County) (K. Langdon, pers. comm.. 2006). The alleged VA occurrences are in error. [= C, F, G, HC, K, W, Z]

* ***Poa infirma*** Kunth. Cp (SC): disturbed areas; rare, native of South America. {investigate} [= FNA, K] {not yet keyed; synonymy incomplete}

Polypogon Desfontaines 1798

A genus of about 18 species, annuals and perennials, of tropical and warm temperate regions. References: Barkworth in FNA (2007a); Tucker (1996)=Z.

1 Inflorescence verticillate, the rachis visible between the verticils; glumes 1.6-2.3 mm long, without awns; spikelets disarticulating near base of pedicel; stoloniferous perennial ..... ***P. viridis***
1 Inflorescence dense, cylindrical, and spikelike; glumes 2-3 mm long, with prominent awns 3.5-7 mm long; spikelets disarticulating near apex of pedicel; annual.
  2 Glumes deeply lobed, the awn borne between the lobes; glume ciliate-fringed; lemma 0.4-0.7 mm long, awnless ..... ***P. maritimus*** *var.* ***maritimus***
  2 Glumes slightly notched at the tip, the awn borne from near the tip; glume not ciliate-margined; lemma 0.7-1.1 mm long, awned ..... ***P. monspeliensis***

* ***Polypogon maritimus*** Willdenow *var.* ***maritimus***, Meditteranean Beardgrass. Cp (GA, SC): brackish marshes; rare, native of Mediterranean Europe. *P. maritimus* Willdenow is reported as introduced to GA (Small 1933). [= FNA; < *P. maritimus* – HC, K, S, Z]
* ***Polypogon monspeliensis*** (Linnaeus) Desfontaines, Rabbitfoot Grass, Beardgrass, Annual Beardgrass. Cp (FL, GA, NC, SC, VA), Pd (GA): brackish marshes, disturbed areas; uncommon, native of s. Europe to w. Asia. May-July. [= RAB, C, F, FNA, G, GW, HC, K, S, Z]
* ***Polypogon viridis*** (Gouan) Breistr., Water Bent-grass. Cp (SC): introduced on ballast around old ports, probably not persistent; rare, native of the Old World. Distinguished from *Agrostis* in having the spikelet falling as a whole, disarticulating below the glumes. [= FNA, K, Z; = *Agrostis viridis* Gouan – C; > *Agrostis verticillata* Villars – F; > *Agrostis semiverticillata* (Forskål) C. Christensen – G, HC]

Pseudosasa Makino ex Nakai 1925 (Arrow Bamboo)

A genus of about 36 species, native of China, Japan, and Korea. References: Stapleton in FNA (2007a); Duncan & Duncan [in prep.]=Z; Judziewicz et al. (2000)=Y. Key adapted from Z.

* ***Pseudosasa japonica*** (Siebold & Zuccarini ex Steudel) Makino ex Nakai, Arrow Bamboo. Cp (FL, VA): cultivated as an ornamental, persistent or spreading from plantings; rare, native of Japan. [= FNA, HC, K, Y, Z; = *Sasa japonica* (Siebold & Zuccarini ex Steudel) Makino]

Puccinellia Parlatore 1848 (Alkali Grass, Goosegrass)

A genus of about 80-120 species, north temperate. References: Davis & Consaul in FNA (2007a).

1 Lemmas 3.0-4.5 mm long; spikelets 5-11-flowered ..... ***[P. maritima]***
1 Lemmas 1.5-2.5 mm long; spikelets 2-6-flowered.
  2 Inflorescence diffuse, the lower branches with spikelets restricted to the distal portions; lower inflorescence branches spreading horizontal to deflexed at maturity; lemma 1.5-2.1 mm long, the midnerve not reaching the apex ..... ***P. distans***
  2 Inflorescence compact, the lower branches bearing spikelets nearly to the base; lower inflorescence branches ascending at maturity; lemma 2.0-2.5 mm long, the midnerve reaching the apex, and often excurrent as a mucro ..... ***P. fasciculata***

* ***Puccinellia distans*** (Jacquin) Parlatore, European Alkali Grass, Goosegrass. Cp (VA): coastal sands; rare, native of Eurasia. [= *P. distans* – C, G, HC; > *P. distans var. distans* – F; > *P. distans* ssp. *distans* – K]
*? ***Puccinellia fasciculata*** (Torrey) Bicknell, Eastern Alkali Grass, Saltmarsh Goosegrass. Cp (VA): salt or brackish marshes; rare. Nova Scotia south to VA; Europe; and in sw. United States. The native or introduced status of this species in ne. North America is controversial. [= C, F, FNA, G, HC, K]

* *Puccinellia maritima* (Hudson) Parlatore, Seaside Alkali Grass, Seaside Speargrass. Salt marshes and ballast near ports. Introduced south to se. PA (Philadelphia), NJ (Camden), and DE, especially on ballast. [= C, F, FNA, G, HC; > *P. americana* Sorenson – K] {synonymy incomplete}

Reimarochloa A.S. Hitchcock 1909

A genus of about 4 species, of the New World tropics. References: Barkworth in FNA (2003a).

Reimarochloa oligostachya (Munro ex Bentham) A.S. Hitchcock. Cp (FL): moist hammocks, wet grasslands; rare. Ne. FL (Duval County) and s. AL south to s. FL; Cuba. [= HC, K]

Ripidium Trinius 1820 (Ravenna-grass)

References: Hodkinson et al. (2002).

* ***Ripidium ravennae*** (Linnaeus) Trinius, Ravenna-grass, Plume-grass. Cp (FL, GA): cultivated as an ornamental and rarely escaping or persisting; rare, native of s. Europe. In sw. GA, TN, and MD (Kartesz 1999), DC (Steury 2004a), FL (Wunderlin &

Hansen 2006). [= *Saccharum ravennae* (Linnaeus) Linnaeus – FNA, K; = *Erianthus ravennae* (Linnaeus) Palisot de Beauvois – F; > *Erianthus ravennae* var. *ravennae* – HC; > *Erianthus ravennae* var. *purpurascens* (Anderss.) Hackel – HC]

Rostraria Trinius 1820

A genus of about 10 species, native of the Mediterranean region and w. Asia. References: Standley in FNA (2007a).

* ***Rostraria cristata*** (Linnaeus) Tzvelev. Cp (FL, SC): waste areas near wool-combing mills, other disturbed areas; rare, introduced, native of Europe. It also occurs at scattered other sites in eastern United States, such as on ballast in se. PA (Rhoads & Klein 1993), and reported for MD, AL, and FL (Kartesz 1999). Not keyed. [= K; > *R. cristata* var. *cristata* – FNA; > *R. cristata* var. *glabriflora* (Trautvetter) Doğan – FNA; = *Lophochloa cristata* (Linnaeus) Hylander; = *Koeleria phleoides* (Villars) Persoon – HC; ? *Koeleria gerardii* (Villars) Shinners]

Rottboellia Linnaeus f. 1782 (Itch-grass)

A genus of about 5 species, native to tropical Asia and Africa. References: Wipff in FNA (2003a); Wipff & Rector (1993)=Z.

* ***Rottboellia cochinchinensis*** (Loureiro) Clayton, Itch-grass. Cp (FL, GA, NC, VA): disturbed ground; uncommon (rare north of FL), native of tropical Asia. August-October. This grass, considered a noxious weed, was found in at least 13 GA counties by 1985 (Duncan 1985), on a farm in Robeson County, NC in 1984, and in cornfields in Westmoreland County, VA in 2007. [= FNA, K, Z; = *Rottboellia exaltata* Linnaeus f. – HC; = *Manisuris exaltata* (Linnaeus f.) Kuntze – S]

Saccharum Linnaeus 1753 (Plume Grass)

A genus of uncertain circumscription at this time. Clayton & Renvoize (1986) pointed out that the "traditional division [of *Saccharum*] into awned (*Erianthus*) and awnless species seems wholly artificial;" Hodkinson et al. (2002) developed molecular evidence which suggests that our species are not congeneric with *Saccharum*, however. Further study is needed, but likely our native southeastern species will be merged into *Miscanthidium* Stapf, while the introduced *S. ravennae* will be placed in the genus *Ripidium* Trinius (Hodkinson et al. 2002). Sugarcane (*Saccharum officinarum* Linnaeus, *S. sinense* Roxburgh, *S. barberi* Jeswiet, *S. spontaneum* Linnaeus, and cultivars and hybrids derived from those four species) is cultivated further south, notably in FL and LA. References: Webster in FNA (2003a); Webster & Shaw (1995)=Z; Gandhi & Dutton (1993); Hodkinson et al. (2002). [also see *Ripidium*]

1 Lowermost inflorescence node densely hairy; callus hairs (ring of hairs beneath the spikelet) (7-) 9-25 mm long, equal to or longer than the spikelet; stem appressed-pubescent below the inflorescence, on the internodes as well as the nodes.
  2 Lemma awn flattened and spirally twisted at base; callus hairs 9-14 mm long, silvery or tinged with purple; leaves usually glabrous on the upper surface at maturity; [of moist to dry sites, rarely in wetlands] ..... ***S. alopecuroides***
  2 Lemma awn nearly terete, straight or slightly flexuous; callus hairs (7-) 15-20 (-25) mm long, tawny or brown; leaves usually pilose on the upper surface at maturity; [of moist to wet sites, rarely in uplands] ..... ***S. giganteum***
1 Lowermost inflorescence node glabrous; callus hairs (ring of hairs beneath the spikelet) 0-6.5 mm long, shorter than or equal to the spikelet (or absent in *S. brevibarbe*); stem glabrous below the inflorescence, except sometimes on the nodes.
  3 Callus hairs (ring of hairs beneath the spikelet) absent, or of few hairs 0-2 mm long (much shorter than the spikelet); panicle branches closely appressed, the panicle usually 1-3 cm broad; panicle branches glabrous ..... ***S. baldwinii***
  3 Callus hairs (ring of hairs beneath the spikelet) present, dense, 3-6.5 mm long (from about half as long to nearly as long as the spikelet); panicle branches ascending, the panicle usually 4-10 cm broad; panicle branches pubescent.
    4 Awn of the lemma of the upper floret terete at the base, and not spiraled; spikelets dark brown; spikelet pair dissimilar in size, the lemma of the upper floret 0.7-0.8× as long as the lemma of the lower floret; lemma of the lower floret typically 3-nerved ..... ***S. coarctatum***
    4 Awn of the lemma of the upper floret flattened at the base, either spiraled or not; spikelets straw-colored or purplish; spikelet pair homomorphic, the upper lemma 0.9-1.0× as long as the lower lemma; lemma of the lower floret not distinctly nerved.
      5 Awn of the lemma of the upper floret not basally spiraled, 10-18 mm long; lemma of the upper floret entire ..... ***S. brevibarbe var. brevibarbe***
      5 Awn of the lemma of the upper floret basally spiraled, 15-22 mm long; lemma of the upper floret bifid, the tooth on either side of the lemma 2.0-2.5 mm long ..... ***S. brevibarbe var. contortum***

Saccharum alopecuroides (Linnaeus) Nuttall, Silver Plume Grass. Pd (Ga, NC, SC, VA), Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): fields, roadsides, woodland borders; common (rare in Mountains). October. NJ west to IN, IL, MO, and OK, south to FL and TX. [= FNA; = *Saccharum alopecuroideum* (Linnaeus) Nuttall – Z, orthographic variant; = *Erianthus alopecuroides* (Linnaeus) Elliott – RAB, C, F, G, GW, HC, W, WV; = *Saccharum alopecuroidum* – K, orthographic variant; = *Erianthus divaricatus* (Linnaeus) A.S. Hitchcock – S; = ***Miscanthidium species 1***]

Saccharum baldwinii Sprengel, Narrow Plume Grass. Cp (FL, GA, NC, SC, VA): marshes, clay-based Carolina bays, ditches; common. July-October. E. VA south to FL, west to TX, AR, scattered northward inland to TN and MO. [= FNA, K, Z; = *Erianthus strictus* Elliott – RAB, C, F, G, GW, HC, S; = ***Miscanthidium species 2***]

Saccharum brevibarbe (Michaux) Persoon *var.* ***brevibarbe***, Short-bearded Plume Grass. Cp (NC): marshes, ditches; rare. September-October. MS, AL, and TN west to TX, AR, and OK; disjunct in e. NC. [= FNA, K, Z; < *Erianthus brevibarbis*

Michaux – RAB, C, G, GW, S (also see *S. coarctatum*); = *E. brevibarbis* – F; >< *Erianthus coarctatus* Fernald var. *coarctatus* – HC; >< *Erianthus coarctatus* var. *elliottianus* Fernald – HC; = ***Miscanthidium species 3***]

Saccharum brevibarbe (Michaux) Persoon *var.* ***contortum*** (Elliott) R. Webster, Bent-awn Plume Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): open woodlands and forests, woodland borders; common (rare in Mountains, rare in FL and VA). Late July-October. DE and MD south to panhandle FL, west to TX and AR, with scattered occurrences north to TN. [= FNA, K, Z; = *Erianthus contortus* Elliott – RAB, C, F, G, GW, HC, S, W; = *Saccharum contortum* (Elliott) Nuttall; = *Erianthus brevibarbis* Michaux var. *contortus* (Elliott) D.B. Ward; = ***Miscanthidium species 4***]

Saccharum coarctatum (Fernald) R.D. Webster, Brown Plume Grass. Cp (FL, GA, NC, SC, VA): marshes, ditches, clay-based Carolina bays, swamps; common (rare in VA). September-October. DE and MD south to FL, west to TX (Brown & Marcus 1998). [= FNA, K, Z; < *Erianthus brevibarbis* Michaux – RAB, C, G, GW, S; >< *Erianthus coarctatus* Fernald – F, HC; >< *Erianthus coarctatus* var. *coarctatus* – HC; >< *Erianthus coarctatus* var. *elliottianus* Fernald – HC; = ***Miscanthidium species 5***]

Saccharum giganteum (Walter) Persoon, Sugarcane Plume Grass, Giant Plume Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): marshes, ditches; common (rare in Mountains). September-October. NY south to FL, west to se. TX and AR; inland in TN and KY. [= FNA, K, Z; = *Erianthus giganteus* (Walter) Palisot de Beauvois – RAB, C, G, GW, HC, W; > *Erianthus giganteus* var. *giganteus* – F; > *Erianthus giganteus* var. *compactus* (Nash) Fernald – F; = *Erianthus saccharoides* Michaux – S; = ***Miscanthidium species 6***]

Sacciolepis Nash 1901 (Cupscale)

A genus of about 30 species, primarily in the tropics and subtropics. References: Wipff in FNA (2003a).

1 Annual, cespitose; spikelets 2.5-3.5 mm long; [rare alien] ..... ***S. indica***
1 Perennial, from creeping stolons; spikelets (3-) 4-5 mm long; [common native] ..... ***S. striata***

* ***Sacciolepis indica*** (Linnaeus) Chase, Indian Cupscale. Cp (FL, GA, NC, SC): low fields, ditches; uncommon (rare north of FL); native of India. October. [= RAB, FNA, GW, HC, K]

Sacciolepis striata (Linnaeus) Nash, American Cupscale. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): marshes, interdune swales, ditches, swamps; common (rare in Piedmont and Mountains). July-October. S. NJ south to FL, west to e. TX and OK, nearly limited to the Coastal Plain, but occasionally inland as in w. NC and TN; also native in the West Indies and n. South America. [= RAB, C, F, FNA, G, GW, HC, K, W]

Sasa Makino & Shibata 1901

* *Sasa palmata* E.G. Camus, Broadleaf Bamboo. Reported for TN (Kartesz 1999; USDA NRCS 2007). [= K]

Schedonorus Palisot de Beauvois 1812 (Meadow Fescue, Tall Fescue)

A genus of perennials, native of Eurasia. The correct generic placement of the introduced species *Schedonorus arundinaceus* (= *Festuca elatior; = Festuca arundinacea; = Lolium arundinaceum*) and *Sch. pratense* has been disputed. The traditional placement in *Festuca* has been defended by Aiken et al. (1997); Darbyshire (1993) transferred them to *Lolium;* and Soreng & Terrell (1998) place them in the genus *Schedonorus*. References: Darbyshire in FNA (2007a); Darbyshire (1993)=X; Aiken & Darbyshire (1990)=Y; Tucker (1996)=Z; Soreng & Terrell (1998)=V. Key based in part on C and Y.

1 Auricles ciliate (sometimes only very sparsely so – check several at 10-20× magnification); spikelets with 3-6 (-9) florets; old sheaths pale straw-colored, often remaining intact; internodes of the rachilla antrorsely scabrous ..... ***Sch. arundinaceus***
1 Auricles glabrous; spikelets with (2-) 4-10 (-12) florets; old sheaths brown, decaying to fibers; internodes of the rachilla glabrous (smooth) or nearly so ..... ***Sch. pratensis***

* ***Schedonorus arundinaceus*** (Schreber) Dumortier, Tall Fescue, Alta Fescue. Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, roadsides, pastures, disturbed areas; common (uncommon in FL), native of Eurasia. May-July. [= FNA, V; < *Festuca elatior* Linnaeus – RAB, F, S, W, WV, misapplied; = *Festuca arundinacea* Schreber – HC, Y; = *Festuca elatior* Linnaeus – C; = *Festuca elatior* var. *arundinacea* (Schreber) Wimmer – G; < *Festuca pratensis* Hudson – GW; = *Lolium arundinaceum* (Schreber) Darbyshire – K, X, Z; ? *Schedonorus phoenix* (Scopoli) Holub]

* ***Schedonorus pratensis*** (Hudson) Palisot de Beauvois, Meadow Fescue. Mt (VA): fields, roadsides, pastures, disturbed areas; rare, native of Eurasia. May-July. [= FNA, V; < *Festuca elatior* Linnaeus – F, S, W, WV, misapplied; = *Festuca pratensis* Hudson – C, Y; = *Festuca elatior* var. *pratensis* (Hudson) A. Gray – G; < *Festuca pratensis* Hudson – GW; = *Festuca elatior* – HC, misapplied; = *Lolium pratense* (Hudson) Darbyshire – K, X, Z]

Schizachne Hackel 1909 (False Melic)

A monotypic genus, circumboreal in Asia and North America. References: Cayouette & Darbyshire in FNA (2007a).

Schizachne purpurascens (Torrey) Swallen, Purple Oatgrass, False Melic. Mt (VA): moist, rocky northern hardwood and spruce forests; rare. Newfoundland west to AK, south to MD, w. VA, WV, KY, IL, NM, and Mexico; also in ne. Asia. May-July. [= F, FNA, G, HC, K, WV; > *S. purpurascens* var. *purpurascens* – C]

Schizachyrium Nees 1829 (Little Bluestem)

A genus of about 60 species, widespread in tropical, subtropical, and warm temperate regions of the World. References: Wipff (1996a)=Z; Gandhi (1989)=Y; Wipff in FNA (2003a). Key based in part on Wipff in FNA (2003a).

1 Leaf blades 0.5-1.5 mm wide, with a lighter-colored zone in the center of the upper surface; sessile spikelet ca. 4 mm long.....***Sch. tenerum***
1 Leaf blades >1.5 mm wide, lacking a distinct lighter zone on the upper surface; sessile spikelet 5-11 mm long.
  2 First glume of sessile spikelet pubescent.....***Sch. sanguineum var. hirtiflorum***
  2 First glume of sessile spikelet glabrous.
    3 Plants rhizomatous, with internodes 6 mm long or longer; sessile spikelet 5-7 mm long.....***Sch. scoparium var. stoloniferum***
    3 Plants tufted, rhizome internodes absent or < 3 mm long, the stem sometimes decumbent at the base and rooting at the lower nodes (appearing nearly rhizomatous); sessile spikelet 6-10 mm long.
      4 Leaf sheaths broad and strongly keeled, hairs of the raceme internodes 2.5-6 mm long; stems decumbent at base, rooting at the lower nodes
        5 Ligules 1.5-2 mm long; pedicellate spikelets 1.5-5 mm long; [of the Atlantic Coast].....***Sch. littorale***
        5 Ligules 0.5-1 mm long; pedicellate spikelets 4.5-8.5 mm long; [of the Gulf Coast].....***Sch. maritimum***
      4 Leaf sheaths rounded or weakly keeled; hairs of the raceme internodes 1-3 (-4) mm long; stems erect, not rooting at the lower nodes.
        6 Pedicellate spikelets of the proximal spikelet units on each rame staminate, 5-10 mm long, with a lemma, the pedicellate spikelets of the distal units usually smaller (1-4 mm long) and sterile; sheaths and blades densely tomentose to glabrate.....***Sch. scoparium var. divergens***
        6 Most pedicellate spikelets sterile, 1-6 mm long, without a lemma; sheaths and blades usually glabrous, occasionally pubescent.....***Sch. scoparium var. scoparium***

Schizachyrium littorale (Nash) Bicknell, Seaside Little Bluestem. Cp (FL?, GA, NC, VA): coastal dunes and maritime dry grasslands, often with *Uniola paniculata*, *Panicum amarum*, and other dune plants; uncommon. August-October. E. MA south to NC (or SC?), and inland on the shores of the Great Lakes. In NC, *Sch. littorale* is present and abundant on dunes of barrier islands from Shackleford Banks, Carteret County south to Brunswick County, near the SC border, and entirely absent from the Outer Banks (from Cape Lookout, Carteret County, north through Hyde County to Dare County). Reported for FL for ne. FL (Duval County) and Panhandle FL (Franklin County). [= FNA, GW, K; < *Andropogon scoparium* Michaux – RAB; = *Sch. scoparium* var. *littorale* (Nash) Gould – C, Z; = *Andropogon scoparius* Michaux var. *littoralis* (Nash) A.S. Hitchcock – F, G; = *Andropogon littoralis* Nash – HC, S; < *Sch. scoparium* (Michaux) Nash ssp. *littorale* (Nash) Gandhi & Smeins – Y]

Schizachyrium maritimum (Chapman) Nash. Cp (AL, FL, LA, MS): coastal dunes and grasslands; common. AL, FL west to e. LA. [= FNA, GW, K; = *Andropogon maritimus* Chapman – HC, S] {add to synonymy}

Schizachyrium sanguineum (Retzius) Alston *var.* ***hirtiflorum*** (Nees) Hatch, Hairy Crimson Bluestem. Cp (AL, FL, GA): pine flatwoods, sandhills, disturbed sandy sites; rare. Sw. GA and FL west to AZ and south through Central America to South America; West Indies. [= FNA, K; = *Andropogon hirtiflorus* (Nees) Kunth – HC, S; ? *Sch. sanguineum* var. *brevipedicellatum* (Beal) Hatch]

Schizachyrium scoparium (Michaux) Nash *var.* ***scoparium***, Common Little Bluestem. Cp (FL, GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Ip (KY): in a wide range of moist to dry habitats; common. (June-) August-October. New Brunswick west to Alberta, south to FL and Mexico. One of the most ubiquitous plants in the modern landscape of our area, occurring throughout in the majority of habitats. This species is extremely variable, some of the variability correlated with habitat and geography; the recognition of infraspecific taxa is warranted. [= C, FNA, Z; < *Andropogon scoparius* Michaux – RAB (also see *Sch. littorale*); = *Sch. scoparium* – GW, WV; > *Andropogon scoparius* var. *scoparius* – F, G, HC; > *Andropogon praematurus* Fernald – F, G; > *Andropogon scoparius* var. *polycladus* Scribner & Ball – F; > *Andropogon scoparius* var. *frequens* F.T. Hubbard – F; = *Sch. scoparium* ssp. *scoparium* – K, Y; < *Andropogon scoparius* – S, W]

Schizachyrium scoparium (Michaux) Nash *var.* ***stoloniferum*** (Nash) J. Wipff, Creeping Little Bluestem. Cp (AL, FL, GA, MS, SC): fall-line sandhills in the inner Coastal Plain, perhaps in other dry habitats, the habitat and range in our area requiring further study; uncommon? August-October. SC and GA south to FL and west to MS. See Wipff (1996a) for additional discussion. [= FNA, K, Z; = *Sch. stoloniferum* Nash – GW; = *Andropogon stolonifer* (Nash) A.S. Hitchcock – HC, S; < *Sch. scoparium* ssp. *littorale* (Nash) Gandhi & Smeins – Y]

Schizachyrium tenerum Nees, Slender Bluestem. Cp (AL, FL, GA, LA, MS): longleaf pine savannas, sandhills, and flatwoods; uncommon. Ne. FL, s. GA, and FL Panhandle west to e. TX. [= FNA, K; = *Andropogon tener* (Nees) Kunth – HC, S]

Schizachyrium niveum (Swallen) Gould, Pinescrub Bluestem, is reported for Lowndes Co. in sc. GA (Kral 1973), but the report has been discounted by later authors (Wipff in FNA 2003a). Not keyed. [= FNA, K; = *Andropogon niveus* Swallen – HC, S]

Schizachyrium scoparium (Michaux) Nash *var.* ***divergens*** (Hackel) Gould, Pinehill Bluestem. Cp (FL): {habitat}; abundance. East to c. TN, AL, KY (?). [= FNA, K; = *Andropogon scoparius* Michaux var. *divergens* Hackel; = *Andropogon divergens* – HC; < *Andropogon scoparius* – S]

Sclerochloa Palisot de Beauvois 1812 (Hard Grass)

A genus of 2 species, annuals, native of s. Europe and w. Asia. References: Brandenburg in FNA (2007a); Tucker (1996)=Z; Brandenburg, Estes, & Thieret (1991).

* ***Sclerochloa dura*** (Linnaeus) Palisot de Beauvois, Hard Grass, Fairground Grass. Mt (VA), {GA}: athletic fields, lawns; rare, native of Mediterranean Europe. Known from a single site in VA, and doubtfully persisting (VBA 2007). Also reported from GA, MD, MS, and TN (Kartesz 1999). [= C, HC, K, Z]

Secale Linnaeus 1753 (Rye)

A genus of 3 species, native to western w. Asia and the Mediterranean. References: Barkworth in FNA (2007a); Tucker (1996)=Z.

* ***Secale cereale*** Linnaeus, Rye. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): fields; commonly cultivated, uncommonly persistent or volunteering after cultivation, native of Eurasia. May-June. An important crop, cultivated for at least 8000 years. The lemmas have awns 2-6 cm long. [= RAB, C, F, FNA, G, HC, K, Z]

Setaria Palisot de Beauvois 1807 (Foxtail Grass)

A genus of about 110-140 species, of tropical and warm temperate regions. Webster (1995) has merged *Paspalidium* into *Setaria*. References: Webster (1993)=Z; Webster (1995)=Y; Crins (1991)=X; Webster (1988); Rominger in FNA (2003a); Allen in FNA (2003a). Key adapted from FNA. [also see *Pennisetum*]

1 None of the spikelets subtended by a stiff bristle.
  2 Spikelets 2.2-2.4 mm long; glumes and sterile lemma not papery ..... ***S. geminata** var. **geminata***
  2 Spikelets 2.8-3.0 mm long; glumes and sterile lemma papery ..... ***S. geminata** var. **paludivaga***
1 Terminal spikelet on each branch subtended by a single bristle (other spikelets also sometimes so subtended)
  3 Most spikelets other than the terminal lacking a subtending bristle; leaves plicate; [rare aliens].
    4 Annual; leaves 10-25 mm wide ..... ***S. barbata***
    4 Perennial; leaves 20-80 mm wide ..... ***S. palmifolia***
  3 All spikelets subtended by 1 or more bristles; leaves flat; [aliens and natives, collectively widespread and common].
    5 Bristles 4-12 below each spikelet.
      6 Annual, with fibrous roots ..... ***S. pumila** ssp. **pumila***
      6 Perennial, noticeably rhizomatous.
        7 Panicle 3-8 (10) cm long; plant from knotty rhizomes; [native, common (sometimes weedy)] ..... ***S. parviflora***
        7 Panicle 5-25 cm long; plant from thick rhizomes; [alien, rare] ..... ***S. sphacelata***
    5 Bristles 1-3 (rarely 6) below each spikelet.
      8 Bristles retrorsely scabrous.
        9 Leaves strigose on the lower surface; sheath margins glabrous; panicles 2-6 cm long ..... ***S. adhaerans***
        9 Leaves scabrous on the lower surface; sheath margins ciliate; panicles 5-15 cm long ..... ***S. verticillata***
      8 Bristles antrorsely scabrous
        10 Perennial ..... ***S. macrosperma***
        10 Annual.
          11 Upper lemmas smooth and shiny (occasionally with obscure rugosity)
            12 Culms to 1 m tall; spikelets ca. 3 mm long; [alien, of ruderal sites] ..... ***S. italica***
            12 Culms to 6 m tall; spikelets ca. 2 mm long; [native, of marshes] ..... ***S. magna***
          11 Upper lemmas distinctly tramsversely rugose, dull.
            13 Upper lemmas coarsely rugose; leaves 4-7 mm wide; [native] ..... ***S. corrugata***
            13 Upper lemmas finely rugose; leaves 4-25 mm wide; [aliens, generally of ruderal sites].
              14 Panicles verticillate; rachises visible, scabrous ..... ***S. verticilliformis***
              14 Panicles densely spiciform; rachises not visible, villous.
                15 Leaves softly pilose on the upper surface; panicles arching and drooping from the base; spikelets 2.5-3.0 mm long ..... ***S. faberi***
                15 Leaves scabrous on the upper surface; panicles nodding only at the tip; spikelets 1.8-2.2 mm long.
                16 Panicles 10-20 cm long; culms 10-25 dm tall; leaves 10-25 mm wide ..... ***S. viridis** var. **major***
                16 Panicles 3-8 cm long; culms 2-10 dm tall; leaves 4-12 mm wide ..... ***S. viridis** var. **viridis***

* ***Setaria barbata*** (Lamarck) Kunth, Mary-grass. Cp (FL, MS): on ballast at Apalachicola (Franklin County, FL), other disturbed areas; rare, native of Africa. [= FNA, HC, K]

Setaria corrugata (Elliott) J.A. Schultes. Cp (FL, GA, NC, SC): pinelands, disturbed areas; common. From ne. NC south to s. FL, west to e. TX; Cuba; Dominican Republic. [= RAB, FNA, HC, K, Z; = *Chaetochloa corrugata* (Elliott) Lamson-Scribner – S]

* ***Setaria faberi*** R.A.W. Herrmann, Nodding Foxtail Grass, Giant Foxtail-grass. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): disturbed areas; common (uncommon south of VA), native of China. [= RAB, C, FNA, G, K, W; = *S. faberii* – F, HC, WV, Z, orthographic variant]

Setaria geminata (Forsskål) Veldkamp *var.* ***geminata***. Cp (AL, FL): in shallow water of swamps; uncommon. Pantropical and –subtropical. [= Y; < *Paspalidium geminatum* – FNA, GW, X; = *Panicum geminatum* Forsskål – HC, S; = *Paspalidium geminatum* (Forsskål) Stapf var. *geminatum* – K]

Setaria geminata (Forsskål) Veldkamp *var.* ***paludivaga*** (A.S. Hitchcock & Chase) R.D. Webster, Alligator Grass, Paspalidium. Cp (FL, GA, SC): in shallow water; rare. December. S. SC south to FL, west to TX; also in Central and South America. This taxon is sometimes considered an introduction from the Old World, but its occurrence in undisturbed wetlands remote from extensive human activity suggests that it is native. [= Y; = *Panicum paludivagum* A.S. Hitchcock & Chase – RAB, HC, S; < *Paspalidium geminatum* – FNA, GW, X; = *Paspalidium geminatum* (Forsskål) Stapf var. *paludivagum* (A.S. Hitchcock & Chase) Gould – K; = *Paspalidium paludivagum* (A.S. Hitchcock & Chase) Parodi]

* ***Setaria italica*** (Linnaeus) Palisot de Beauvois, Foxtail-millet, Italian-millet. Pd (GA, NC, SC, VA), Cp (VA), Mt (VA): disturbed areas, rare (uncommon in VA Piedmont), native of Eurasia. Probably derived via cultivation from *S. viridis*, and cultivated as a food crop in China since at least 6000 BP and later in Europe (Hancock 2004). [= RAB, C, F, FNA, G, HC, K, W, WV, Z; = *Chaetochloa italica* (Linnaeus) Lamson-Scribner – S]

Setaria macrosperma (Lamson-Scribner & Merrill) K. Schumann, Coral Bristlegrass. Cp (FL, GA, SC): hammocks and maritime forests, also disturbed areas; rare. SC south to FL; Bahamas, Mexico. [= RAB, FNA, HC, K, Z; = *Chaetochloa macrosperma* Lamson-Scribner & Merrill – S]

Setaria magna Grisebach, Saltmarsh Foxtail-grass, Giant Foxtail-grass. Cp (FL, GA, NC, SC, VA), Pd* (GA*): interdune swales, near-coastal marshes; uncommon. NJ south to s. FL, west to e. TX; disjunct inland in GA, AR, LA, TX, and NM; West Indies, Bermuda, Costa Rica. [= RAB, C, F, FNA, G, HC, K, Z; = *Chaetochloa magna* (Grisebach) Lamson-Scribner – S]

* ***Setaria palmifolia*** (J. König) Stapf, Palmgrass. Cp (FL, LA): disturbed areas; rare, native of Asia. [= FNA, HC, K]

Setaria parviflora (Poiret) Kerguélen, Knotroot Bristlegrass, Perennial Foxtail-grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): marshes, ditches, moist disturbed areas; common. MA to IA south to s. FL and s. TX, south through Mexico to Central America; CA and NV; West Indies. Gandhi & Barkworth (2003) provide a detailed discussion of the reasons for the nomenclatural change. [= FNA, K, Z; = *S. geniculata* Palisot de Beauvois – RAB, C, F, G, HC, W, WV; = *Chaetochloa geniculata* (Palisot de Beauvois) Millspaugh & Chase – S]

* ***Setaria pumila*** (Poiret) Roemer & Schultes *ssp.* ***pumila***, Yellow Foxtail. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): disturbed areas, lawns, fields; common (rare in FL), native of Europe. [= FNA; = *Setaria glauca* (Linnaeus) Palisot de Beauvois – RAB, C, F, G, W, WV, misapplied; >< *Setaria lutescens* (Weigel) Hubb. – HC, misapplied; >< *S. pumila* ssp. *pallidifusca* – K, treatment apparently garbled; = *Chaetochloa lutescens* (Weigel) Stuntz – S]

* ***Setaria sphacelata*** (Schumacher) Stapf & C.E. Hubbard, African Bristlegrass. Cp (AL, FL, MS): disturbed areas; rare, native of Africa. [= FNA, K]

* ***Setaria verticillata*** (Linnaeus) Palisot de Beauvois, Hooked Bristlegrass. Mt (VA): disturbed areas; uncommon, native of Europe. [= FNA, G, K; = *S. verticillata* var. *verticillata* – C, F, HC; = *Chaetochloa verticillata* (Linnaeus) Lamson-Scribner – S; < *S. verticillata* – Z]

* ***Setaria viridis*** (Linnaeus) Palisot de Beauvois *var.* ***viridis***, Green Bristlegrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): fields, disturbed areas; common, native of Eurasia. [= C, FNA, K, Z; < *S. viridis* – RAB, HC, W, WV; > *S. viridis* var. *viridis* – F, G; > *S. viridis* var. *weinmannii* (Roemer & J.A. Schultes) Bólbás – F; > *S. viridis* var. *breviseta* (Doell) A.S. Hitchcock – G; = *Chaetochloa viridis* (Linnaeus) Lamson-Scribner – S]

Setaria adhaerans (Forsskål) Chiovenda. Cp (AL): disturbed areas; rare. Distributed widely throughout the tropics and subtropics, in North America from s. AL west to CA (perhaps only adventive in portions of that distribution). [= FNA, K, Z] {synonymy incomplete}

* *Setaria verticilliformis* Dumortier. Reported for NJ, PA, MD, and AL (FNA 2003a, Kartesz 1999). [= FNA, K; = *S. verticillata* (Linnaeus) Palisot de Beauvois var. *ambigua* (Guss.) Parlatore – C, F, HC; = *S. viridis* (Linnaeus) Palisot de Beauvois var. *ambigua* (Guss.) Coss. & Durieu – G; = *Chaetochloa ambigua* Guss. – S; < *S. verticillata* – Z]

* *Setaria viridis* (Linnaeus) Palisot de Beauvois var. *major* (Gaudin) Pospichal, Giant Green Foxtail. Reported as introduced in TN, MD, and PA (Kartesz 1999). [= C, FNA, G, K, Z; < *S. viridis* – RAB, HC]

Sorghastrum Nash 1901 (Indiangrass)

A genus of about 18-20 species, of tropical and subtropical America and Africa, rarely extending into temperate areas. References: Hall (1982)=Z; Dávila Aranda & Hatch in FNA (2003a). Key adapted from Z.

1 Awns 10-22 (-30) mm long, once-geniculate; plants rhizomatous; surfaces of the glumes tan to slightly brown basally; ligule 2-10 mm long, prominently auricled.....***S. nutans***
1 Awns 16-46 mm long, twice-geniculate; plants cespitose; surfaces of the glumes brown; ligule 1-5 mm long, truncate.
  2 Axis of the panicle straight, erect, the branchlets appressed to ascending, the spikelets drooping-secund; spikelets 0.8-1.2 mm wide .....***S. secundum***
  2 Axis of the panicle arching, usually strongly so, the branchlets ascending to spreading, the spikelets not drooping-secund; spikelets 1.1-1.8 mm wide.
    3 Axis of the panicle straight, with the branches distributed no more than 180 degrees around the axis (as viewed from above).....***S. apalachicolense***
    3 Axis of the panicle arching, with the branchlets distributed through 360 degrees around the axis (as viewed from above) .....***S. elliottii***

Sorghastrum apalachicolense D.W. Hall, Apalachicola Indiangrass, Open Indiangrass. Cp (FL): flatwoods and sandhills; rare. July-August. Panhandle FL west to s. MS (Sorrie & Leonard 1999). It may well occur as well in GA. [= K, Z; < *S. elliottii* – FNA]

Sorghastrum elliottii (C. Mohr) Nash, Slender Indiangrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): woodlands and forests, river-scour areas, including oak-hickory forests and woodlands over mafic rocks; uncommon. September-October. MD south to FL and west to TX, inland to TN, AR, and OK, mainly on the Coastal Plain, but extending inland to other physiographic provinces. [= RAB, C, F, G, HC, K, S, W, Z; < *S. elliottii* – FNA (also see *S. apalachicolense*)]

Sorghastrum nutans (Linnaeus) Nash, Yellow Indiangrass. Mt (GA, KY, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, GA, KY, NC, SC, VA), Ip (KY): xeric and mesic woodlands and forests of a wide variety, powerline rights-of-way, roadbanks; common (uncommon in Mountains south of VA). September-October. ME and Québec west to s. Manitoba, south to c. peninsular FL, TX, UT, AZ, and Mexico. Along with *Andropogon gerardii*, *Schizachyrium scoparium*, and *Panicum virgatum*, *Sorghastrum nutans* is one of the dominant grasses of the tall-grass prairie. It is also common in a variety of open habitats (natural and altered) in the forested landscape of eastern North America. [= RAB, C, F, FNA, G, HC, K, S, W, WV, Z; = *S. avenaceum* (Michaux) Nash]

Sorghastrum secundum (Elliott) Nash, Lopsided Indiangrass. Cp (FL, GA, SC): sandhills; common (uncommon north of FL). September-October. S. SC south to s. FL and west to s. AL (Sorrie & Leonard 1999). [= RAB, FNA, HC, K, S, Z]

Sorghum Moench 1794 (Sorghum, Milo, Johnson Grass)

A genus of about 25 species, of tropical and subtropical Old World (1 species in Mexico). References: Barkworth in FNA (2003a); de Wet (1978)=Z.

1 Rhizomatous perennial; leaves 1-2 cm wide..... ***S. halepense***
1 Fibrous-rooted annual; leaves (2-) 3-5 cm wide.
  2 Inflorescence dense, compact; plants 0.5-1.3 m tall..... ***S. bicolor var. bicolor***
  2 Inflorescence open, with spreading branches; plants 1.0-3.0 m tall..... ***S. bicolor var. drummondii***

* ***Sorghum bicolor*** (Linnaeus) Moench *var.* ***bicolor***, Sorghum, Milo, Broomcorn, Sorgo. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): cultivated, rarely persistent; common in cultivation, rare as an escape. October. [= C; < *Sorghum vulgare* Persoon – RAB; < *Sorgum vulgare* – F, orthographic variant; = *S. vulgare* var. *vulgare* – HC; = *S. bicolor* ssp. *bicolor* – FNA, K; < *Holcus sorghum* Linnaeus – S]

* ***Sorghum bicolor*** (Linnaeus) Moench *var.* ***drummondii*** (Nees ex Steudel) Mohlenbrock, Shattercane. Cp, Pd (GA, NC, SC, VA): cultivated, rarely persistent; common in cultivation, rare as an escape. October. This is the taller variety with open inflorescences, usually sporadically present in sorghum fields. [= C; < *Sorghum vulgare* Persoon – RAB; < *Sorgum vulgare* – F, orthographic variant; = *Sorghum bicolor* ssp. ×*drummondii* (Nees ex Steudel) de Wet – FNA; = *Sorghum vulgare* Persoon var. *drummondii* (Nees ex Steudel) Hackel ex Chiovenda – HC; = *Sorghum bicolor* ssp. *drummondii* (Nees ex Steudel) de Wet & Harlan – K; < *Holcus sorghum* Linnaeus – S]

* ***Sorghum halepense*** (Linnaeus) Persoon, Johnson Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): roadsides, fields, waste places; common, native of Eurasia. A serious weed, difficult to eradicate. [= RAB, C, FNA, GW, HC, K, W, WV; = *Sorgum halepense* – F, G, orthographic variant; = *Holcus halepensis* Linnaeus – S]

Spartina Schreber 1789 (Cordgrass)

A genus of ca. 15 species, of temperate America, Europe, and Africa. References: Barkworth in FNA (2003a).

1 Leaves with smooth or slightly scabrous margins; spikelets glabrous or nearly so; [of salt to brackish coastal marshes]..... ***S. alterniflora***
1 Leaves with strongly scabrous margins; spikelets scabrous, at least on the keel; [of brackish to fresh marshes, or inland or upland].
  2 Plants strongly cespitose, forming large clumps with numerous basal leaves and culms; leaves involute; culms 0.5-2 m tall; [of s. SC southward].
    3 Spikes 3-16 per inflorescence, appressed to ascending; leaves 3-7 mm wide, involute or somewhat flat toward the bases..... ***S. bakeri***
    3 Spikes (6-) 15-75 per inflorescence, tightly appressed; leaves 1.5-4.5 mm wide, strongly involute..... ***S. spartinae***
  2 Plants with elongate rhizomes, forming large clonal patches, the culms arising singly; leaves involute or flat; culms either 0.5-3.5 m tall; [collectively widespread in our area].
    4 Spikes 1-9 per inflorescence; culms 0.5-1 m tall; leaves 0.5-4 (-7) mm wide, usually involute when fresh.
      5 Spikelets 7-10 mm long; second glume acute to obtuse (rarely acuminate); spikes (2-) 4-9 per inflorescence; second highest leaf blade on the stem (1-) avg. 2 (-5) dm long; plants to 15 dm tall; culms to 6 mm in diameter at base..... ***S. patens var. monogyna***
      5 Spikelets 9-13 mm long; second glume acuminate; spikes 1-4 per inflorescence; second highest leaf blade on the stem (0.5-) avg. 1 (-2) dm long; plants to 8 dm tall; culms to 3 mm in diameter at base..... ***S. patens var. patens***
    4 Spikes 5-70 per inflorescence; culms 1-3.5 m tall; leaves 5-20 mm wide, usually flat when fresh.
      6 Second glume acute, not awned; first glume averaging ca. 1/2 as long as the lemma; spikes (6-) 20-50 (-more) per inflorescence; [of fresh to brackish coastal marshes]..... ***S. cynosuroides***
      6 Second glume with an awn 3-10 mm long; first glume averaging ca. 7/8 as long as the lemma; spikes (5-) 7-27 per inflorescence; [of fresh marshes, either inland or coastal]..... ***S. pectinata***

Spartina alterniflora Loiseleur, Saltmarsh Cordgrass, Smooth Cordgrass. Cp (AL, FL, GA, LA, MS, NC, SC, VA): salt marshes; common. August-October. Newfoundland south to FL, west to TX; e. South America; introduced in n. Europe. *S. alterniflora* is the dominant plant (often essentially a monoculture) of intratidal salt marshes in our area. [= RAB, C, FNA, GW, K; > *S. alterniflora* var. *alterniflora* – F, G, HC, S; > *S. alterniflora* var. *glabra* (Muhlenberg ex Bigelow) Fernald – F, G, HC, S; > *S. alterniflora* var. *pilosa* (Merrill) Fernald – F, G, HC]

Spartina bakeri Merrill, Sand Cordgrass. Cp (FL, GA, SC): brackish marshes, marsh edges, wet coastal hammocks, under *Sabal palmetto*, *Quercus virginiana*, and *Juniperus virginiana* var. *silicicola*; rare. June. Se. SC south to s. FL, west to panhandle FL. Distinctive among our species in its densely clumped growth form. [= FNA, GW, HC, K, S]

Spartina cynosuroides (Linnaeus) Roth, Giant Cordgrass. Cp (AL, FL, GA, LA, MS, NC, SC, VA): brackish and freshwater tidal marshes, especially along margins of tidal creeks; common. June-September. MA south to FL, west to e. TX. [= RAB, C, FNA, G, GW, HC, K, S; > *S. cynosuroides* var. *cynosuroides* – F]

Spartina patens (Aiton) Muhlenberg *var.* ***monogyna*** (M.A. Curtis) Fernald, Large Saltmeadow Cordgrass. Cp (AL, FL, GA, LA, MS, NC, SC, VA): sandy shores, overwash flats; common. June-September. MA south to FL, west to TX. Whether var. *monogyna* is worthy of recognition is a matter of debate; there appear to morphological differences correlated with geography and, according to some authors, habitat, but positive identification to variety is sometimes difficult. [= F, G, HC; < *S. patens* – RAB, C, FNA, GW, K, S]

Spartina patens (Aiton) Muhlenberg *var.* ***patens***, Small Saltmeadow Cordgrass, Salt Hay, Marsh-hay Cordgrass. Cp (NC, VA): dunes, sand flats, upper edges of marshes, maritime wet grasslands; common. June-September. Newfoundland south to NC, and perhaps further. [= F, G, HC; < *S. patens* – RAB, C, FNA, GW, K, S]

Spartina pectinata Link, Prairie Cordgrass, Slough Grass. Mt (KY, NC, VA), Cp (KY, NC, VA), Ip (KY), {DC, DE, MD, TN, WV}: spray cliffs below waterfalls, rocky or sandy flood-scoured riverside grasslands, tidal freshwater (oligohaline) marshes, calcareous oak flatwoods and prairies; rare. July-September. Newfoundland west to WA, south to ne. NC, sw. NC, AR, TX, and NM. [= RAB, C, F, FNA, G, GW, HC, K, W, WV; > *S. pectinata* var. *pectinata* – F; > *S. pectinata* var. *suttiei* (Farwell) Fernald – F; = *S. michauxiana* A.S. Hitchcock – S]

Spartina spartinae (Trinius) Merr. ex A.S. Hitchcock, Gulf Cordgrass. Cp (Al, FL, LA, MS): brackish marshes and inland saline situations; common. AL and FL west to TX. [= FNA, GW, HC, K, S]

Sphenopholis Scribner 1906 (Wedgegrass)

A genus of 6 species, North American. References: Daniel in FNA (2007a); Tucker (1996)=Z. Key based in part on C.

1 Spikelets 5-9.5 mm long; second lemma with an awn 3.5-7 mm long..... ***S. pensylvanica***
1 Spikelets 1.5-5 mm long; second lemma awnless, or with an awn up to 3.5 mm long.
  2 Lower leaf blades mostly (10-) 15-45 cm long, usually involute, < 2 mm wide..... ***S. filiformis***
  2 Lower leaf blades mostly < 10 cm long, flat, 2-8 mm wide.
    3 First glume ⅓-⅔ as wide as the second glume; second glume strongly scabrous..... ***S. nitida***
    3 First glume less tha ⅓ as wide as the second glume; second glume smooth to slightly scabrous.
      4 First lemma with an awn up to 3.5 mm long..... ***S. ×pallens***
      4 First lemma unawned.
        5 Panicle open; second glume 3-6× as long as wide, acute at the tip; lowermost rachilla internode 0.8-1.0 mm long..... ***S. intermedia***
        5 Panicle densely cylindrical; second glume 2-3× as long as wide, rounded or truncate at the tip; lowermost rachilla internode 0.5-0.7 mm long..... ***S. obtusata***

Sphenopholis filiformis (Chapman) Scribner. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): pine savannas, sandy woodlands; common (uncommon north of FL, rare in VA). April-May. Se. VA south to c. FL, west to e. TX. [= RAB, C, F, FNA, K, S, Z]

Sphenopholis intermedia (Rydberg) Rydberg, Slender Wedgegrass. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist nutrient-rich forests; rare. May-June. Newfoundland west to c. AK, south to Panhandle FL, c. TX, and AZ. Perhaps better treated at the varietal level. [= RAB, F, FNA, K, S, WV; = *S. obtusata* (Michaux) Scribner var. *major* (Torrey) K.S. Erdman – C, Z; < *S. intermedia* – G (also see *S. ×pallens*); < *S. obtusata* – GW, W]

Sphenopholis nitida (Biehler) Scribner. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): moist forests, bottomlands; common (uncommon in FL). April-May. MA west to IL, south to FL and TX. [= RAB, C, F, FNA, K, W, S, WV, Z; > *S. nitida* var. *glabra* (Nash) Scribner – G; > *S. nitida* var. *nitida* – G]

Sphenopholis obtusata (Michaux) Scribner, Prairie Wedgegrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): forests, roadsides, disturbed areas; common (uncommon in Mountains). April-May. ME west to MN and British Columbia, south to s. FL, TX, c. Mexico, and s. CA. [= RAB, FNA, G, K, S, WV; = *S. obtusata* var. *obtusata* – C, Z; > *S. obtusata* var. *obtusata* – F; > *S. obtusata* var. *pubescens* (Lamson-Scribner & Merrill) Lamson-Scribner – F; < *S. obtusata* – GW, W (also see *S. intermedia*)]

Sphenopholis ×pallens (Biehler) Scribner (pro sp.) [*S. obtusata* × *pensylvanica*]. Cp (NC, SC, VA): ditches, wet forests; rare. Seemingly not always with its parents. May. [= C, K; = *S. pallens* – RAB, F, S; < *S. intermedia* (Rydberg) Rydberg – G]

Sphenopholis pensylvanica (Linnaeus) A.S. Hitchcock, Swamp-oats. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): bogs, ditches, wet forests; uncommon. April-June. MA west to OH and se. MO, south to n. FL and LA. [= C, FNA, K, Z; = *Trisetum pensylvanicum* (Linnaeus) Palisot de Beauvois ex Roemer & J.A. Schultes – RAB, F, G, S, WV; = *S. pennsylvanica* – GW, orthographic variant]

Sporobolus R. Brown 1810 (Dropseed)

A genus of about 160 species, perennials and annuals, of tropical, subtropical, and warm-temperate parts of the New World and Old World. References: Riggins (1977)=Z; Weakley & Peterson (1998)=Y; Peterson, Hatch, & Weakley in FNA (2003a).

1 Inflorescence an open panicle, > 2 cm broad, the branches ascending to spreading.
  2 Branches of the panicle verticillate, whorled; spikelets 2.5-4 mm long ..... ***S. junceus***
  2 Branches of the panicle alternate (some occasionally rather randomly subopposite or opposite, but never regularly whorled); spikelets either 4-6.5 mm long, or 1.5-2.5 (2.7) mm long.
    3 Spikelets 1.5-2.5 (-2.7) mm long.
      4 Panicle branches bare of spikelets in the lower ¼-⅓ of their length ..... ***S. cryptandrus***
      4 Panicle branches bearing spikelets to the base ..... ***S. domingensis***
    3 Spikelets 4-6.5 mm long.
      5 First glume scaberulous, acuminate or awn-like; spikelets dark gray; base of plant relatively fibrous; grain spherical; [of rocky barrens of the Mountains of NC and VA] ..... ***S. heterolepis***
      5 First glume glabrous, acute to acuminate; spikelets purplish (fading tan); base of plant smooth and hard, made up of the indurated leaf bases; grain oblong (when present, usually abortive); [of pine savannas and seeps of the Coastal Plain of NC, SC, and southward].
        6 Leaves terete or subterete (wiry), oval in cross-section, sometimes irregularly channelled for portions of their lengths (never with any portion above the sheath flat), < 1 mm wide, tending to senesce and turning tan in autumn, the margins generally smooth; culms (including the inflorescence) (2-) 4-7 (-10) dm tall; culms (from base to first inflorescence branch) 1.5-5 dm tall; first glume averaging about 0.7× as long as the second glume (though variable, ranging from 0.5-0.75×) ..... ***S. teretifolius***
        6 Leaves flat (folded when dry), plane or V-shaped in cross-section, with free margins their entire length, 1.2-2 (-2.7) mm wide, tending to remain green into the winter (at least until December), the margins scabrous (except in *S. curtissii*); culms (including the inflorescence) 3-22 dm tall; culms (from base to first inflorescence branch) (4-) 6-10 dm tall; first glume averaging 0.75-1× as long as the second glume (though variable, collectively ranging from about 0.6-1.2×).
          7 First glume averaging 0.95-1.1× as long as the second glume (though variable, ranging from 0.8-1.3×); pedicels mostly 1-3 mm long (a few sometimes as long as 10 mm long), appressed; culms (including the inflorescence) 3-7 dm tall; inflorescence branches stiffly ascending; leaves 0.5-1.5 mm wide (or to 2.0 mm wide when unburned), mostly 1.5-4 dm long (rarely to 5 dm long), smooth on the margins; [of e. SC southward] ..... ***S. curtissii***
          7 First glume averaging 0.6-0.9× as long as the second glume (though variable, ranging from 0.6-0.95×); pedicels mostly 4-15 mm long, spreading; culms (including the inflorescence) (3-) 7-16 (-22) dm tall; inflorescence branches initially ascending, later loosely ascending to spreading; leaves 1.2-10.0 mm wide, mostly (3-) 4-8 dm long, upwardly scabrous on the margins; [of e. NC southward].
            8 Leaves (2.0-) 3-10 mm wide, pale bluish-green (often with some yellowish leaves as well); first glume averaging 0.75-0.9× as long as the second glume (though variable, ranging from 0.6-0.95×); culms (including the inflorescence) usually 12-22 dm tall; inflorescence usually 3.5-5 dm long; [of se. SC southward] ..... ***S. floridanus***
            8 Leaves 1.2-2.0 (-3.0) mm wide, dark green; first glume averaging 0.6-0.8× as long as the second glume (though variable, ranging from 0.6-0.8×); culms (including the inflorescence) usually 6-12 (-18) dm tall; inflorescence usually 2-3.5 dm long; [of e. NC south to e. GA] ..... ***S. pinetorum***
1 Inflorescence a contracted, spike-like panicle, < 2 cm broad, the branches appressed.
  9 Plant a geniculate annual; most inflorescences enclosed by sheaths (or most or all exserted); inflorescence 2-5 cm long.
    10 Spikelets (1.3-) 1.6-2.8 mm long; grain falling free of the lemma and palea; lemma glabrous ..... ***S. neglectus***
    10 Spikelets 2.3-5 mm long; grain falling enclosed in the lemma and palea; lemma strigose (use 10× or more) or glabrous.
      11 Lemma and palea shorter than the glumes; palea usually shorter than the lemma; lemma glabrous or strigose with hairs < 0.2 mm long; spikelets 2.3 -3.3 (-3.8) mm long; floret (lemma, palea and enclosed grain) 1.6-3.3 (-3.8)× as long as wide ..... ***S. ozarkanus***
      11 Lemma and palea longer than the glumes; palea usually longer than the lemma; lemma strigose with hairs > 0.2 mm long; spikelets 2.8-5 mm long; floret (lemma, palea and enclosed grain) 2.2-5.7 (-7.5)× as long as wide ..... ***S. vaginiflorus***
  9 Plant a rhizomatous or tufted perennial; most inflorescences exserted to partly enclosed; inflorescence 5-15 cm long.
    12 Plant creeping extensively by slender rhizomes; leaf blades cauline, distichous, to 12 cm long ..... ***S. virginicus***
    12 Plant loosely tufted, from short rhizomes; leaf blades basal or cauline, not distichous, 10-100 cm long.
      13 Spikelets 1.5-2.2 mm long; first glume 0.5-0.8 mm long; leaves primarily basal.
        14 Panicle branches appressed, 0.5-2 cm long in the middle of the inflorescence; second glume acute, > ½ as long as the spikelet ..... ***S. indicus***
        14 Panicle branches ascending, 2-8 cm long in the middle of the inflorescence; second glume truncate or broadly obtuse, < ½ as long as the spikelet ..... ***S. pyramidalis***
      13 Spikelets 4-8 mm long; first glume 2-5 mm long; leaves cauline and basal.
        15 Lemma pubescent, usually conspicuously shorter than the palea; pericarp loose when moist ..... ***S. clandestinus***
        15 Lemma glabrous, about as long as the palea; pericarp gelatinous when moist.
          16 Culms (1.4-) 2.0-5.0 mm thick; terminal sheath (1.3-) 1.5-6.0 mm wide; panicles with 12-35 primary branches, crowded, dense ..... ***S. compositus var. compositus***
          16 Culms 1.0-2.0 (-2.5) mm thick; terminal sheath 0.8-2.0 (-2.5) mm wide; panicles with 8-18 primary branches, lax, loosely flowered ..... ***S. compositus var. drummondii***

Sporobolus clandestinus (Biehler) A.S. Hitchcock, Rough Dropseed. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA); Mt (VA), Ip (KY): glades, barrens, and thin soil of woodlands, also in dry sands; uncommon. September-October. This species is widespread in e. United States. Wipff & Jones (1995) recommend reducing this taxon to a variety under *S. compositus*, because of its morphologic similarity. While *S. clandestinus* and *S. compositus* are undoubtedly closely related, I prefer to retain the two as species. [= RAB, C, FNA, F, G, HC, K, S, W, Z; = *S. compositus* (Poiret) Merrill var. *clandestinus* (Biehler) J. Wipff & S.D. Jones]

Sporobolus compositus (Poiret) Merrill *var.* ***compositus***, Tall Dropseed. Ip (KY), Pd (NC?, VA), Mt (VA), Cp (KY, VA): diabase glades and barrens, limestone glades and barrens, disturbed areas over diabase or calcareous rocks; uncommon (rare in NC and VA). September-November. This species and variety are reported for NC in a recent revision of the *S. asper* group (Riggins 1977); little is known about the occurrence of this species in NC. The general range is centered in the Plains, but extending east into ne. United States. The name *S. compositus* has nomenclatural priority over the more familiar *S. asper* (Kartesz & Gandhi 1995). [= FNA, K; = *S. asper* (Michaux) Kunth var. *asper* – C, G, HC, Z; = *S. asper* – F, S, WV]

Sporobolus compositus (Poiret) Merrill *var.* ***drummondii*** (Trinius) Kartesz & Gandhi. Ip* (KY*){AL, GA?, MS, TN}: roadsides, disturbed areas; rare. East to the Ridge and Valley province of e. TN (Chester et al. 1993), occurring over limestone, and allegedly to GA (Kartesz 1999). It could very likely occur in sw. VA, as it is in Hawkins County, TN, immediately adjacent to VA (Chester et al. 1993). [= FNA, K; = *S. asper* (Michaux) Kunth var. *drummondii* (Trinius) Vasey – C, Z; = *S. drummondii* (Trinius) Vasey – F, S; = *S. asper* var. *hookeri* (Trinius) Vasey – G, HC, misapplied]

Sporobolus cryptandrus (Torrey) A. Gray, Sand Dropseed. Cp (KY, NC*?): floodplains, shores, disturbed areas; rare, native west of the Appalachians, introduced eastward. C. and w. North America. This species is reported for NC by HC, F, and S. [= C, FNA, G, K, HC, S, WV, Z; > *S. cryptandrus* var. *cryptandrus* – F]

Sporobolus curtissii (Vasey ex Beal) Small ex Scribner, Curtiss's Dropseed. Cp (FL, GA, SC): moist, gummy-clay flatwoods; uncommon (rare north of GA). September-November. E. SC south to c. FL. First positively documented for our area in 1993. Earlier attributions of *S. curtissii* to NC and SC were apparently based on misapplication or confusion with *S. teretifolius* and/or *Sporobolus pinetorum*. *S. curtissii* differs from other "bunchgrass" *Sporobolus* of our area in having the spikelets short-pedicelled and appressed against the panicle branches (as opposed to long-pedicelled and spreading in *S. teretifolius* and *Sporobolus pinetorum*). [= FNA, HC, K, S, Y]

*? ***Sporobolus domingensis*** (Trinius) Kunth, Coral Dropseed. Cp (GA): coastal sands?; rare, uncertain whether native or introduced. Se. GA south to s. FL; West Indies, Mexico. The e. GA record (Glynn County) is at Univ. of Georgia (Sorrie, pers. comm.). [= FNA, HC, K, S]

Sporobolus floridanus Chapman, Florida Dropseed. Cp (FL, GA, SC): wet savannas; uncommon (rare north of GA). June-September. Se. SC south to ne. FL, west to Panhandle FL. First positively documented for our area in 1995. Earlier attributions of *S. floridanus* to NC and SC were apparently based on misapplication or confusion with *Sporobolus pinetorum*. [= FNA, K, Y; < *S. floridanus* – GW, HC, S (also see *S. pinetorum*); the inclusion of *S. floridanus* in RAB was based on a misidentification of *S. pinetorum*]

Sporobolus heterolepis (A. Gray) A. Gray, Prairie Dropseed. Mt (GA, NC, VA), Ip (KY): barrens, glades, and prairies over mafic, ultramafic, and calcareous rocks (olivine, serpentine, limestone); rare. August-September. The primary distribution of *S. heterolepis* is in the Plains, with outliers east to nw. GA (Jones & Coile 1988), c. TN (Estes & Beck 2005), w. NC, w. VA, se. PA, ne. United States, and adjacent Canada. [= RAB, C, F, FNA, G, HC, K, W, Y]

Sporobolus indicus (Linnaeus) R. Brown, Smut Grass, Blackseed. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Ip (KY): roadsides, lawns, disturbed situations; common (rare in KY, rare in VA Mountains). Pantropical and subtroprical, its original distribution obscured by its weedy capabilities and sometimes considered introduced in whole or in part. July-October. [= C, FNA, GW, W; > *S. poiretii* (Roemer & J.A. Schultes) A.S. Hitchcock – RAB, F, G, HC; > *S. indicus* – HC, S; > *S. berteroanus* (Trinius) A.S. Hitchcock & Chase – S; = *S. indicus* var. *indicus* – K]

Sporobolus junceus (Palisot de Beauvois) Kunth, Sandhills Dropseed. Cp (FL, GA, NC, SC), Pd (GA, NC, SC, VA): sandhills, other dry, open areas; common (uncommon in Piedmont, rare in VA). September-October. Se. VA south to FL and west to se. TX. [= RAB, C, F, FNA, G, HC, K, Y; = *S. gracilis* (Trinius) Merrill – S]

Sporobolus neglectus Nash, Barrens Dropseed. Ip (KY), Mt (VA): dry rocky barrens and outcrops, over calcareous rocks (such as limestone or dolomite); uncommon (rare in VA). August-September. ME west to ND, south to NJ, w. VA, TN, LA, and TX; apparently disjunct in WA and AZ. *S. ozarkanus, S. neglectus,* and *S. vaginiflorus* form a still very poorly understood complex. [= C, F, FNA, G, HC, K, S, W]

Sporobolus ozarkanus Fernald, Ozark Dropseed. Ip (KY), Pd (NC), Mt (VA): limestone glades, diabase glades; rare. September-October. KY west to KS, south to e. TN, AR, and TX; disjunct in c. NC. In Granville County, NC, it is associated (on glades of diabase, a mafic rock) with other taxa with affinities to midwestern glades and prairies: *Oligoneuron rigidum, Oligoneuron album, Baptisia australis var. aberrans, Symphyotrichum depauperatum, Silphium terebinthinaceum, Parthenium auriculatum, Ruellia humilis*, and others. *S. ozarkanus, S. neglectus,* and *S. vaginiflorus* form a still very poorly understood complex. [= C, F, G, HC, K; = *S. vaginiflorus* (Torrey ex A. Gray) Wood var. *ozarkanus* (Fernald) Shinners – FNA, K]

Sporobolus pinetorum Weakley & P.M. Peterson, Carolina Dropseed, Savanna Dropseed. Cp (GA, NC, SC): wet savannas, savanna-pocosin ecotones, sandhill-pocosin ecotones, and extending upslope into mesic flatwoods or loamy or clayey shelves in the fall-line sandhills; uncommon (rare in GA and SC). June-September (and into December in response to growing-season fire). The identity of this taxon has been obscure; it is now clear that it is a previously unrecognized species, endemic to NC, SC, and adjacent e. GA. RAB included it in their concept of *S. teretifolius*, though it does not key well (keying imperfectly to either *S. floridanus* or *S. heterolepis*); in S and HC, it will key to *S. floridanus*, but the leaves are much narrower. Additionally, *S. floridanus* is a taller and coarser plant, the culms often averaging about 1.5 meters in height and 2-3 mm in diameter basally (vs. 1 meter high and 1 mm in diameter for *Sporobolus pinetorum*). In wet savannas of Columbus County, NC, *S. species 1* occurs with true *S. teretifolius* (the two codominant over many hectares!), and the two taxa are manifestly distinct. The leaves of *S. pinetorum* are not terete; after lengthy drought in the field (or dry on an herbarium sheet), the leaves become tightly folded to involute and can appear wiry. Like many Southeastern pineland grasses, *S. pinetorum* flowers only following fire. In vegetative condition it may be distinguished from *Aristida stricta and A. beyrichiana*, with which it often grows, by the leaf pubescence (*S. pinetorum* with scaberulous margins, best felt by running a finger along the margin near the base, from apex toward base, *A. stricta* and *A. beyrichiana* not scaberulous, and with a sparse line of pilose hairs running more or less the length of the leaf in *A. stricta* and sometimes in *A. beyrichiana*) and base (much more indurated and polished in *Sporobolus* than in *Aristida*). [= FNA, K, Y; >< *S. teretifolius* – RAB, misapplied; > *S. floridanus* – RAB, misapplied; < *S. floridanus* Chapman – HC, S]

Sporobolus pyramidalis Palisot de Beauvois, West Indian Dropseed. Cp (FL): pine flatwoods, beaches; rare. FL Panhandle (Wakulla County), FL peninsula; West Indies. The original distribution disputed, possible introduced. [< *S. jacquemontii* Kunth – FNA; = *S. indicus* var. *pyramidalis* (Palisot de Beauvois) Veldkamp – K; ? *S. berteroanus* (Trinius) A.S. Hitchcock & Chase – S]

Sporobolus teretifolius R.M. Harper, Wireleaf Dropseed. Cp (AL, GA, NC, SC): wet savannas, pitcherplant bogs; rare. July-September (and later in response to growing-season fire). Very similar vegetatively to *Aristida stricta*, *S. teretifolius* can be distinguished by its tuft of hairs at the base of the otherwise glabrous blade (as opposed to line of pilose hairs the length of the blade in *A. stricta*). This very rare species is known only from se. NC, ne. SC, s. GA, and se. AL (Houston County). Many of the counties reported for this species in RAB actually are based on misidentified specimens of *S. pinetorum*. In a few very wet savannas of Columbus and Brunswick counties, NC, *S. teretifolius* is dominant or codominant over many hectares. Like many savanna grasses, *S. teretifolius* generally flowers only following fire. [= FNA, HC, K, S, Y; < *S. teretifolius* – RAB (also see *S. pinetorum*)]

Sporobolus vaginiflorus (Torrey ex A. Gray) Wood, Poverty Dropseed. Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Cp (FL, KY, VA), Ip (KY): glades, barrens, open disturbed sites; uncommon (rare in KY Mountains). September-October. The species occurs nearly throughout e. United States. *S. ozarkanus, S. neglectus,* and *S. vaginiflorus* form a still very poorly understood complex. [= RAB, C, G, HC, W, WV; = *S. vaginiflorus* var. *vaginiflorus* – F, FNA, K; = *S. vaginaeflorus* – S, orthographic variant]

Sporobolus virginicus (Linnaeus) Kunth, Seashore Dropseed, Coastal Dropseed. Cp (FL, GA, NC, SC): salt marshes, tidal mud flats, and low dunes in the outer Coastal Plain; common (rare north of FL). September-October. Se. NC along the coast to TX, in the West Indies and into n. South America (its alleged occurrence in se. VA is apparently incorrect). *Sporobolus virginicus* is similar in aspect and growth form to *Distichlis spicata*, with which it occurs in tidal flats. *Sporobolus virginicus* is more delicate, and typically has long hairs on either side of the collar of the sheath; *Distichlis spicata* is generally a coarser plant, and lacks long hairs around the collar of the sheath. [= RAB, C, F, FNA, G, GW, HC, K, S]

* ***Sporobolus airoides*** (Torrey) Torrey, Alkali Sacaton. Cp (SC): waste areas near wool-combing mills; rare, intoduced from w. North America, not known to be established or persistent. [= FNA, HC, K] {not keyed}

* ***Sporobolus fimbriatus*** (Trinius) Nees. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, intoduced from Africa. [= FNA, HC, K] {not keyed}

* ***Sporobolus flexuosus*** (Thurb. ex Vasey) Rydberg. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, intoduced from sw. United States and n. Mexico. [= FNA, HC, K] {not keyed}

* ***Sporobolus tenuissimus*** (Martius ex Schrank) Kuntze. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of the tropical Old World and New World. [= FNA, K] {not keyed}

* ***Sporobolus wrightii*** Munro ex Scribner, Giant Sacaton. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, intoduced from sw. United States. [= FNA, HC, K] {not keyed}

Steinchisma Rafinesque 1830 (Gaping Panic Grass)

A genus of about 6 species, perennial herbs, of s. North America, Central America, and South America. See discussion following *Panicum* regarding generic concepts. References: Zuloaga et al. (1998)=Z; Freckmann & Lelong in FNA (2003a).

Steinchisma hians (Elliott) Nash, Gaping Panic Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA): stream, pond, and lake shores, low woods, cypress-gum ponds, floodplains, marshes, ditches, seepage slopes; common (uncommon in Coastal Plain, rare in Mountains). May-October. Se. VA south to FL, west to TX and OK, and south through Mexico and Central America to Colombia; also in s. South America. The large, thickened, pale sterile palea of this species is unique among panicoids of our region; it is one of several characters that has led to the segregation of *Steinchisma* as a genus, or as a subgenus of *Panicum*. The enlargement of the sterile palea causes the spikelet to spread open, or "gape." [= FNA, K, Z; = *Panicum hians* Elliott – RAB, C, F, G, GW, HC, S, W]

Stenotaphrum Trinius 1820 (St. Augustine Grass)

A genus of about 7 species, tropical and subtropical. References: Allred in FNA (2003a); Sauer (1972)=Z.

Stenotaphrum secundatum (Walter) Kuntze, St. Augustine Grass, Carpet Grass. Cp (FL, GA, NC, SC, VA*): brackish marshes, roadsides, lawns; common. July-October. A pioneer species of beaches and shores, *S. secundatum* was known from the Carolinas prior to 1800. It has been interpreted as native or introduced in our area; its original range is probably now impossible to determine. Sauer (1972) maps it as widespread along the coasts of s. North America, Central America, South America, the West Indies, Africa, Australia, and sw. Pacific Islands. In our area it is certainly now more frequently encountered as a lawn or roadside grass than in anything that could be construed as a natural habitat. The other 6 species in the genus are Asian, or on islands of the sw. Pacific or Indian Oceans. [= RAB, FNA, HC, K, S, WH, Z]

Thinopyrum (Prat) Á. Löve 1980

A genus of about 10 species, perennials, native of w. Asia and the Mediterranean region. References: Barkworth in FNA (2007a); Tucker (1996)=Z; Barkworth (1997)=Y.

1 Plants rhizomatous; lemmas 7.5-10 mm long; lateral veins slightly shorter than and less prominent than the midvein ..... ***Th. intermedium***
1 Plants cespitose; lemmas 9-12 mm long; lateral veins of the glumes about as long as and as prominent as the midvein ..... ***Th. ponticum***

* ***Thinopyrum intermedium*** (Host) Barkworth & D.R. Dewey. Pd (GA): waif in railroad yards; rare, native of Europe and w. Asia. Tucker (1996) states that the record is as a waif in railroad yards. [= K, Z; > *Th. intermedium* spp. *intermedium* – FNA; = *Elytrigia intermedia* (Host) Nevski; = *Agropyron intermedium* (Host) Palisot de Beauvois – HC] {add to synonymy}
* ***Thinopyrum ponticum*** (Podpěra) Barkworth & D.R. Dewey, Tall Wheatgrass. Cp (SC): waste areas near wool-combing mills; rare, native of Europe and w. Asia, not known to be established or persistent. [= FNA, K; ? *Agropyron elongatum* (Host) Palisot de Beauvois] {add to synonymy}

Torreyochloa G.L. Church 1949 (Pale Mannagrass)

A genus of 4 species, with a classic Tertiary moist temperate disjunct pattern; *Torreyochloa* is distributed in e. North America and e. Asia. References: Davis in FNA (2007a); Davis (1991)=Y; Tucker (1996)=Z.

1 Leaf blades 1-3 mm wide; anthers 0.2-0.5 mm long ..... ***[T. pallida** var. **fernaldii]***
1 Leaf blades 4-8 mm wide; anthers ca. 1 mm long ..... ***T. pallida** var. **pallida***

Torreyochloa pallida (Torrey) Church *var.* ***pallida***, Pale Mannagrass. Mt (GA, NC, VA), Cp (NC, VA), Pd (SC, VA): bogs, mucky wetlands such as old beaver-ponds, pools in cypress swamps, drawdown shores of natural ponds; rare. June-July. The species as a whole is widespread in e. North America. Var. *pallida* ranges from Nova Scotia west to MN, south to e. VA, se. NC (Columbus County), nw. NC (Avery County), and nw. GA (Jones & Coile 1988). Var. *pauciflora* (J. Presl) J.J. Davis is distributed in w. North America. Intermediates occur between the varieties. [= FNA, K, Y, Z; < *Glyceria pallida* (Torrey) Trinius – RAB, GW, HC, W; < *Puccinellia pallida* (Torrey) Clausen – C; = *G. pallida* – F, WV; = *G. pallida* var. *pallida* – G; = *Panicularia pallida* (Torrey) Kuntze – S]

Torreyochloa pallida (Torrey) Church var. *fernaldii* (A.S. Hitchcock) Dore ex Koyama & Koyama, Newfoundland west to MN, south to WV and TN. [= FNA, K, Y, Z; < *Glyceria pallida* (Torrey) Trinius – RAB, GW, HC, W; < *Puccinellia pallida* (Torrey) Clausen – C; = *G. fernaldii* (A.S. Hitchcock) St. John – F, WV; = *G. pallida* var. *fernaldii* A.S. Hitchcock – G]

Tragus Haller 1768 (Burgrass)

A genus of 7 species, annuals and perennials, of tropical and subtropical Eurasia and Africa. References: Wipff in FNA (2007a).

* ***Tragus racemosus*** (Linnaeus) Allioni, Stalked Burgrass, Texas Burgrass. Mt (VA), Cp (NC): roadsides, disturbed areas, on ballast near old seaports; rare, native of Mediterranean Europe and w. Asia. [= HC, C, F, FNA, G, K; = *Nazia racemosa* (Linnaeus) Kuntze – S]

* *Tragus australianus* S.T. Blake, Australian Burgrass. Cp (SC): waste areas around wool-combing mills; rare, perhaps only a waif, native of Australia. [= FNA, K] {not keyed}
* *Tragus berteronianus* J.A. Schultes, Spiked Burgrass. Cp (SC): waste areas around wool-combing mills; rare, perhaps only a waif, native of Africa and Asia. Also reported from chrome ore piles at Newport News, VA. [= FNA, K] {not keyed}
* *Tragus heptaneuron* W.D. Clayton. Cp (SC): waste areas around wool-combing mills; rare, perhaps only a waif, native of tropical Africa. [= FNA, K] {not keyed}

Tridens Roemer & J.A. Schultes 1817 (Triodia, Redtop, Tridens, Fluffgrass)

A genus of about 14 species, native to the Western Hemisphere. References: Valdés-Reyna in FNA (2003a).

1 Panicle dense and spike-like, > 4× as long as wide, the branches ascending to appressed.
  2 Plants from elongate rhizomes; lemma 4-5 mm long; spikelet 7-9 mm long ..... ***T. carolinianus***
  2 Plants cespitose; lemma 2.5-3 mm long; spikelet 4-6 mm long ..... ***T. strictus***
1 Panicle open and spreading, < 4× as long as wide, the branches well-developed and spreading-ascending to reflexed.
  3 Spikelets 4-5 mm long, 2.5-3.5 mm wide ..... ***T. ambiguus***
  3 Spikelets 6-8 mm long, 1.5-2.2 mm wide.
    4 Primary pulvini densely pubescent, the hairs encircling the base of the panicle branch; secondary pulvini pubescent; spikelets mostly on pedicels 3-20 mm long; main branches of the inflorescence stiffly spreading ..... ***T. chapmanii***
    4 Primary pulvini glabrous to sparsely pubescent, tufted only in the axil (the upper surface of the panicle branch); secondary pulvini glabrous; spikelets on pedicels mostly < 3 mm long; main branches of the inflorescence spreading, ascending or drooping ..... ***T. flavus***

Tridens ambiguus (Elliott) J.A. Schultes, Pineland Triodia, Flatwoods Fluffgrass. Cp (FL, GA, NC, SC): wet savannas, clay-based Carolina bays; uncommon (rare north of GA). August-October. S. NC south to FL, west to e. TX. [= RAB, FNA, GW, HC, K; = *Triodia elliottii* Bush – S]

Tridens carolinianus (Steudel) Henrard, Carolina Triodia, Carolina Fluffgrass. Cp (FL, GA, NC, SC): mesic swales in sandhills; uncommon (rare north of FL). August-October. S. NC south to FL, west to LA. [= RAB, FNA, HC, K; = *Triodia drummondii* Scribner & Kearney – S]

Tridens chapmanii (Small) Chase, Chapman's Triodia. Cp (FL, GA, NC, SC, VA): loamy sands of disturbed longleaf pine woodlands, roadsides; rare. August-October. NJ south to FL, west to TX and OK. [= HC; = *Tridens flavus* (Linnaeus) A.S.

Hitchcock var. *chapmanii* (Small) Shinners – RAB, C, FNA, K; = *Triodia chapmanii* (Small) Bush – F, G; < *Triodia flava* (Linnaeus) Smyth – S]

Tridens flavus (Linnaeus) A.S. Hitchcock, Redtop, Tall Redtop, Purpletop Tridens, Greasy Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): roadsides, disturbed areas, glades; common. July-October. NH west to NE, south to FL and TX. [= HC; = *Tridens flavus* var. *flavus* – RAB, C, FNA, K; = *Triodia flava* (Linnaeus) Smyth – F, G, WV; < *Triodia flava* (Linnaeus) Smyth – S (also see *Tridens chapmanii*); < *Tridens flavus* – W]

Tridens strictus (Nuttall) Nash, Spike Triodia, Longspike Fluffgrass, Longspike Tridens. Cp (FL, GA, NC, SC, VA), Pd (GA, SC, VA): sandhills, moist pine savannas, roadsides; rare. August-October. S. VA south to AL, west to TX, north in the interior to IL and KS. It is possible that this grass is introduced only north and east of GA (thus in our entire area). Rhoads & Klein (1993) report an old specimen from w. PA. [= RAB, FNA, GW, HC, K; = *Triodia stricta* (Nuttall) Bentham ex Vasey – F, G, S]

Triplasis Palisot de Beauvois 1812 (Sandgrass)

A genus of 2 species, of eastern and central North America south through Mexico to Costa Rica. References: Hatch in FNA (2003a).

Identification notes: The foliage of both of our species has a sour taste.

1 Lemma awn 4.5-8 mm long; culm internodes appressed pilose or puberulent; perennial ..... ***T. americana***
1 Lemma awn 0.5-1.5 mm long; culm internodes glabrous to minutely scaberulous; annual (or rarely perennial) ..... ***T. purpurea*** *var.* ***purpurea***

Triplasis americana Palisot de Beauvois, Southern Sandgrass. Cp (FL, GA, NC, SC): open sandy areas; common. August-October. A Southeastern Coastal Plain endemic: NC south to s. FL, west to e. LA. [= RAB, FNA, HC, K, S]

Triplasis purpurea (Walter) Chapman *var.* ***purpurea***, Purple Sandgrass. Cp (FL, GA, NC, SC, VA): dunes, maritime dry grasslands, open sandy areas; common. September-October. NH south to s. FL, and west to TX, along the coast; also around the Great Lakes, and in central United States. Var. *caribensis* R.W. Pohl is in the New World tropics. [= FNA; < *T. purpurea* – RAB, C, F, G, HC, K; > *T. intermedia* Nash – S; > *T. purpurea* – S]

Tripsacum Linnaeus 1759 (Gamma Grass)

A genus of about 12 species, tropical and subtropical American. References: Barkworth in FNA (2003a); DeWet, Harlan, & Brink (1982)=Z.

Tripsacum dactyloides (Linnaeus) Linnaeus *var.* ***dactyloides***, Gamma Grass. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): roadsides, moist areas, disturbed areas, moist riverbanks; common (uncommon in VA). Late May-November. *T. dactyloides* is widespread in e. North America north to MA, MI, IA, and NE, ranging south into tropical Central and South America; var. *dactyloides* is North American. This important species of moist and wetland areas in the Great Plains is generally seen in disturbed habitats in our area; its original habitats in our area (if indeed it was native in the flora area) are poorly understood. [= FNA, Z; < *T. dactyloides* – RAB, C, G, HC, K, S, W, WV; > *T. dactyloides* var. *dactyloides* – F; > *T. dactyloides* var. *occidentale* Cutler & Anderson – F]

Trisetum Persoon 1805 (Oat-grass)

A genus of about 75-85 species, north and south temperate. References: Rumely in FNA (2007a); Randall & Hilu (1986)=Z; Tucker (1996)=Y. [also see *Sphenopholis*]

Trisetum spicatum (Linnaeus) K. Richter, Alpine Oat-grass, Spike Trisetum. Mt (NC, VA): mountain cliffs at high elevations on metabasalt; rare. June-August. A circumboreal species, widespread and common in arctic and alpine areas, south in e. North America to New England, NY, and, rarely, PA, and disjunct to Hawksbill Mountain, Page County, VA (where extant) and Roan Mountain, Mitchell County, NC (where not seen since the nineteenth century). The species is also known from the West Indies, Mexico, and s. South America. *T. spicatum*, as broadly treated here, following Randall & Hilu (1986), is polymorphic and consists of several ploidies. [= C, FNA, HC, K, S, Y, Z; > *T. spicatum* var. *molle* (Michaux) Beal – RAB, F, G; > *T. triflorum* (Bigelow) Löve & Löve ssp. *molle* (Michaux) Löve & Löve – W; > *T. spicatum* var. *maidenii* (Gandoger) Fernald – F]

Triticum Linnaeus 1753 (Wheat)

A genus of about 25 species (the taxonomy complicated by extensive and ancient cultivation), native of w. and c. Asia. References: Morrison in FNA (2007a); Tucker (1996)=Z; Zohary & Hopf (1994).

* ***Triticum aestivum*** Linnaeus, Bread Wheat. Cp, Pd, Mt (GA, NC, SC, VA): fields; frequently cultivated, rarely persistent or volunteering following cultivation, native of Eurasia. May-June. One of the most important crops in the world. The lemmas can either be awnless or with long awns (to 8 cm long). [= RAB, C, F, FNA, G, HC, K, Z]

Uniola Linnaeus 1753 (Sea Oats)

A genus of 2 species. The only other species of the genus ranges from Baja California south along the Pacific Ocean to Ecuador; other species previously treated in *Uniola* have been shown to be only distantly related and are now treated as *Chasmanthium*. References: Yates in FNA (2003a); Yates (1966a, 1966b)=Z. [also see *Chasmanthium*]

Uniola paniculata Linnaeus, Sea Oats. Cp (FL, GA, NC, SC, VA): abundant on unforested primary and secondary dunes on barrier islands, and on dry to mesic sand flats and interdune swales; common (rare in VA). June-November. Se. VA south to FL and west to TX and Mexico; West Indies. This is the most important sand-binding grass on ocean dunes from NC south, playing a critical role in primary succession on dunes. It is against the law in NC to pick or destroy *Uniola paniculata*. [= RAB, C, F, FNA, G, HC, K, S, Z]

Urochloa Palisot de Beauvois 1812 (Para-grass, Signal-grass)

A genus of about 100 species, pantropical and subtropical. References: Crins (1991)=Z; Webster (1988)=Y; Wipff & Thompson in FNA (2003a). Key adapted in part from GW. [also see *Megathyrsus*]

1 Spikelets suffused with purple, borne in pairs (or threes) in each row ..... ***U. mutica***
1 Spikelets green, borne singly in each row.
  2 Upper half of second glume and first lemma with evident transverse veins connecting the longitudinal veins; spikelets 3.5-4.7 mm long ..... ***U. platyphylla***
  2 Upper half of second glume and first lemma without evident transverse veins, or with very obscure cross-veins; spikelets either 2-4 mm or 5-6 mm long.
    3 Spikelets 2-4 mm long ..... ***U. ramosa***
    3 Spikelets 5-6 mm long ..... ***U. texana***

* ***Urochloa mutica*** (Forskål) Nguyen, Para-grass. Cp (SC): margin of pond; rare, native of Africa. August. [= FNA, K, Z; ? *Panicum purpurascens* Raddi – RAB, HC; ? *B. purpurascens* (Raddi) Henrard – GW; = *Brachiaria mutica* (Forskål) Stapf]
* ***Urochloa platyphylla*** (Munro ex Wright) R. Webster, Broadleaf Signal-grass. Cp (FL, GA, NC, SC, VA), Pd (GA, SC, NC, VA), Mt (VA): disturbed wet or seasonally moist areas; rare, apparently native of South America. E. NC south to FL, west to TX, north in the interior to AR, OK, and se. MO; also in MD (Terrell & Reveal 1996). [= FNA, K, Y, Z; = *Brachiaria platyphylla* (Munro ex Wright) Nash – RAB, GW, HC; ? *B. extensa* Chase – S]
* ***Urochloa ramosa*** (Linnaeus) Nguyen, Browntop Millet, Dixie Signalgrass. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): disturbed areas; rare, native of tropical Africa and Asia. This species has apparently been widely planted for wildlife food and erosion control in southeastern states. [= FNA, K, Z; = *Panicum ramosum* Linnaeus – HC; = *Brachiaria ramosa* (Linnaeus) Stapf]
* ***Urochloa texana*** (Buckley) R. Webster, Texas Millet, Texas Signalgrass. Cp (FL, GA, NC, SC, VA), Pd (GA, SC): disturbed areas, fields, gardens; uncommon (rare in VA), native of TX. First reported for South Carolina by Hill & Horn (1997). [= K, Y, Z; = *Panicum texanum* Buckley – RAB, C, HC, S; = *Brachiaria texana* (Buckley) S.T. Blake]

* ***Urochloa adspersa*** (Trinius) R. Webster. Cp (FL): moist, sunny, disturbed areas; rare, apparently native of s. FL, the West Indies, and Argentina. Reported from AL, FL peninsula and Panhandle (FNA), and chrome ore piles in Newport News, VA (Reed 1964). [= FNA, K] {not keyed; add to synonymy}
Urochloa fusca (Swartz) B.F. Hansen & Wunderlin *var.* ***reticulata*** (Torrey) B.F. Hansen & Wunderlin, east to GA (Kartesz 1999). [< *Urochloa fusca* – FNA; ? *Urochloa fasciculata* (Sw.) R. Webster – K; ? *Panicum fasciculatum* Swartz – HC] {not yet keyed; synonymy incomplete}
* ***Urochloa plantaginea*** (Link) R. Webster. Cp (GA): Reported for s. GA by Jones & Coile (1988), as *Brachiaria plantaginea*. [= FNA, K, Y, Z; = *Brachiaria plantaginea* (Link) A.S. Hitchcock] {not yet keyed; synonymy incomplete}
Urochloa reptans (Linnaeus) Stapf. Cp (GA): [= FNA, K] {not yet keyed; synonymy incomplete}
* *Urochloa villosa* (Lamarck) Nguyen, Hairy Signalgrass. Reported from chrome ore piles in Newport News, VA (Reed 1964); native of tropical Asia and Africa. [= FNA, K] {not keyed; add to synonymy}

Vulpia C.C. Gmelin 1805 (Annual Fescue)

A genus of about 30 species, north and south temperate. References: Lonard in FNA (2007a); Tucker (1996)=Z. Key based in part on C.

1 First glume < ½ as long as the second glume ..... ***V. myuros***
1 First glume > ½ as long as the second glume.
  2 Lemma pubescent; lowest lemma 2.5-3.5 mm long; grains 1.5-2 mm long ..... ***V. sciurea***
  2 Lemma glabrous or scabrous; lowest lemma 2.7-7 mm long; grains 1.7-3.3 mm long.

3 First glume 1.7-4.5 mm long; lemma awns 3-12 mm long; spikelets with 4-7 loosely imbricate florets; rachilla internodes mostly 0.9-1.1 mm long ..... ***V. bromoides***
3 First glume 3.5-5 mm long; lemma awns 0.3-6 (-9) mm long; spikelets with 5-11 (-more) closely imbricate florets; rachilla internodes mostly 0.5-0.7 mm long.
4 Spikelets 4-5.5 mm long; awn of the lowest lemma 2.5-6 (-9) mm long ..... ***V. octoflora*** *var.* ***glauca***
4 Spikelets 5.5-10 mm long; awn of the lowest lemma 0.3-3 mm long ..... ***V. octoflora*** *var.* ***octoflora***

* ***Vulpia bromoides*** (Linnaeus) S.F. Gray, European Squirreltail Fescue, Brome Fescue. Cp (FL, VA): sandy disturbed areas; rare, native of Eurasia. [= C, FNA, K, Z; = *Festuca dertonensis* (Allioni) Ascherson & Graebner – G, HC]
* ***Vulpia myuros*** (Linnaeus) K.C. Gmelin, Rat-tail Fescue. Cp (FL, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): roadsides, fields, disturbed areas; common (rare in FL), native of Eurasia. May-June. [= C, F, FNA, K, Z; = *Festuca myuros* Linnaeus – RAB, G, HC, S, W, WV]

Vulpia octoflora (Walter) Rydberg *var.* ***glauca*** (Nuttall) Fernald, Northern Six-weeks Fescue. {Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common.} April-June. S. ME west to British Columbia, south to GA, AR, TX, and CA. [= C, FNA, K; < *Festuca octoflora* Walter – RAB, GW, S, W, WV; = *Vulpia octoflora* var. *tenella* (Willdenow) Fernald – F; = *Festuca octoflora* Walter var. *tenella* (Willdenow) Fernald – G, HC; < *Vulpia octoflora* – Z]

Vulpia octoflora (Walter) Rydberg *var.* ***octoflora***, Southern Six-weeks Fescue. {Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): fields, roadsides, disturbed areas; common.} April-June. S. NJ south to FL, west to TX, north in the interior to MO and OK. [= C, F, FNA, K; < *Festuca octoflora* Walter – RAB, GW, S, W, WV; > *Festuca octoflora* var. *aristulata* Torrey ex L.H. Dewey – G; = *Festuca octoflora* var. *octoflora* – HC; < *Vulpia octoflora* – Z]

Vulpia sciurea (Nuttall) Henrard, Squirreltail Fescue. Cp (FL, GA, NC, SC, VA), Pd (GA): sandy roadsides, fields, disturbed areas; common (uncommon in VA). April-May. S. NJ south to n. peninsular FL, west to TX, and north in the interior to MO. [= FNA, Z; = *Vulpia elliotea* (Rafinesque) Fernald – C, F, K; = *Festuca sciurea* Nuttall – RAB, G, HC, S]

Zea Linnaeus 1753 (Corn, Maize)

A genus of about 5 species, native of Mexico and Central America. References: Iltis in FNA (2003a).

1 Pistillate spikelets (kernels) borne on a spongy rachis (cob) in rows ..... ***Z. mays*** *spp.* ***mays***
1 Pistillate spikelets embedded in a hardened rachis.
2 Annual ..... ***[Z. mays*** *ssp.* ***mexicana]***
2 Perennial from creeping rhizomes ..... ***Z. perennis***

* ***Zea mays*** Linnaeus *ssp.* ***mays***, Corn, Maize. Cp, Pd, Mt (GA, NC, SC, VA): very commonly cultivated, rarely volunteering in old fields or around trashpiles; common in cultivation, rare as a short-lived escape. June-October. *Zea* is one of the most important cultivated plants in the world, originating in Mexico, probably from *Zea mays* ssp. *parviglumis* Iltis & Doebley. It was initially cultivated in sw. Mexico (before 8000 BP), spreading to the sw. United States before 5000 BP, and to the e. United States by 2000 years BP. At the time of European contact, *Zea mays* ssp. *mays* was an important staple crop from s. Canada south to s, South America (Hancock 2004). [= FNA, K; < *Z. mays* – RAB, F, HC, S]
* ***Zea perennis*** (A.S. Hitchcock) Reeves & Manglesdorf, Mexican Teosinte. Cp (SC): disturbed areas; rare, apparently established at least formerly. *Z. perennis* was considered by HC to be "established on James Island, S.C." [= K; = *Euchlaena perennis* A.S. Hitchcock – HC]

* *Zea mays* (Schrader) Kuntze ssp. *mexicana* (Schrader) H.H. Iltis, Chalco Teosinte, Nobogame Teosinte. Reported for AL (Kartesz 1999) and FL (Hansen & Wunderlin 2006). HC state that this taxon is "occasionally cultivated in the Southern States for green forage" and is similar to *Z. perennis*, except in being, like *Z. mays* ssp. *mays*, a coarse annual. It is considered to be an ancestor of *Zea mays*. [= FNA; = *Z. mexicana* (Schrader) Kuntze – K; = *Euchlaena mexicana* Schrader – HC, S]

Zizania Linnaeus 1753 (Wild-rice)

A genus of 4 species (and 6 taxa) of northern and eastern North America. References: Terrell in FNA (2007a); Terrell et al. (1997)=Y; Tucker (1988)=Z; Judziewicz et al. (2000)=X. Key based on Terrell in FNA (2007a).

1 Lemmas of the pistillate spikelets flexible and chartaceous, dull, bearing short scattered hairs, these not or only slightly more dense toward the tip ..... ***Z. aquatica*** *var.* ***aquatica***
1 Lemmas of the pistillate spikelets stiff and coriaceous, lustrous, glabrousor with lines of short hairs, the tips usually more hairy ..... ***[Z. palustris*** *var.* ***palustris]***

Zizania aquatica Linnaeus *var.* ***aquatica***, Southern Wild-rice. Cp (FL, GA, NC, SC, VA): freshwater marshes, usually tidal; common (uncommon in NC). May-October. Var. *aquatica* ranges from ME west to WI, south to FL and LA; var. *brevis* Fassett is restricted to the St. Lawrence River in Québec. *Zizania* was formerly an important food for Amerindians; it is now gathered as a specialty grain, commanding high prices. [= C, F, FNA, G, HC, K, X, Y, Z; < *Z. aquatica* – RAB, GW, S, WV]

* *Zizania palustris* Linnaeus var. *palustris*, Northern Wild-rice. Reported for a single county in WV, where apparently introduced. [= FNA; = *Z. aquatica* Linnaeus var. *angustifolia* Hitchcock – F, HC] {add synonymy}

Zizaniopsis Döll & Ascherson 1871 (Giant Cutgrass)

A genus of about 5 species, of tropical and subtropical America. References: Terrell in FNA (2007a); Tucker (1988)=Z; Judziewicz et al. (2000)=Y.

Identification notes: Superficially similar to *Zizania* in its habitat and large size, *Zizaniopsis* may be distinguished by its very different inflorescence and by its stout horizontal rhizomes (*Zizania* is annual or perennial, but not rhizomatous).

Zizaniopsis miliacea (Michaux) Döll & Ascherson, Giant Cutgrass, Southern Wild-rice, Water-millet. Cp: brackish and freshwater marshes; common. May-July. MD south to FL, west to TX, north in the interior to MO, and disjunct in w. Mexico. The other species of the genus are South American. [= RAB, C, F, FNA, G, GW, HC, K, S, Y, Z; = *Zizania miliacea* Michaux]

Zoysia Willdenow 1801 (Zoysia, Temple-grass)

A genus of about 11 species, perennials, of tropical, subtropical, and temperate Asia. References: Anderson in FNA (2003a). Key closely following FNA.

1 Leaves < 0.5 mm wide; racemes with 3-12 spikelets; peduncles included to extending < 1 cm beyond the sheaths of the flag leaves ..... ***Z. pacifica***
1 Leaves 0.5-5 mm wide; racemes with 10-50 spikelets; peduncles extending (0.3-) 1-6.5 cm beyond the shetahs of the flag leaves.
  2 Pedicels 1.6-3.5 mm long; spikelets ovate, 1.1.4 mm wide; culm internodes 2-10 mm long; blades ascending..... ***Z. japonica***
  2 Pedicels 0.6-1.6 mm long; spikelets lanceolate, 0.6-1.0 mm wide; culm internodes 5-40 mm long, all plants with at least some internodes > 14 mm long; blades spreading at nearly 90 degree angles..... ***Z. matrella***

* ***Zoysia japonica*** Steudel, Japanese Lawngrass, Korean Lawngrass, Zoysia. Cp (AL, LA): used as a lawngrass, persisting or spreading; rare, native of Japan. Reported for VA (Kartesz 1999). [= C, FNA, HC, K]
* ***Zoysia matrella*** (Linnaeus) Merrill, Zoysia, Manila Temple-grass. Cp (AL, FL), Pd (GA): used as a lawngrass, persisting or spreading; rare, native of the Philippines. [= K; = *Z. matrella* – FNA, HC; = *Z. matrella* var. *matrella* – K]
* ***Zoysia pacifica*** (Goudswaard) M. Hotta & Kuroki, Mascarene-grass, Korean Velvetgrass. Cp (LA): used as a lawngrass, persisting or spreading; rare, native of {}. [= FNA; ? *Z. tenuifolia* Willdenow – HC; > *Z. tenuifolia* Willdenow – K; > *Z. matrella* var. *pacifica* Goudswaard – K]

PONTEDERIACEAE Kunth 1816 (Pickerelweed Family)

A family of about 9 genera and 33 species, primarily of the tropics, but with some temperate representatives. References: Rosatti (1987a); Cook in Kubitzki (1998b); Horn in FNA (2002a).

1 Plant floating (or stranded by dropping water levels), the petioles expanded into air-filled floats; perianth lobes 3-4 cm long..... ***Eichhornia***
1 Plant rooted, the petioles not adapted as floats; perianth lobes 0.4-1.0 cm long.
  2 Leaves lanceolate to ovate, 1.5-10× as long as wide, the base cordate, truncate, or cuneate; flowers 2-lipped; corolla blue, marked with yellow; stamens 6 (3 each of 2 different lengths) ..... ***Pontederia***
  2 Leaves either reniform, 0.5-1.5× as long as wide, the base cordate, or narrowly linear, 20-50× as long as wide, the base attenuate; flowers radially symmetrical; corolla white, pale blue, or yellow; stamens 3 ..... ***Heteranthera***

Eichhornia Kunth 1842 (Water Hyacinth)

A genus of 7-8 species, native of tropical America and Africa, but now introduced widely in warm regions. References: Cook in Kubitzki (1998b); Horn in FNA (2002a).

* ***Eichhornia crassipes*** (Martius) Solms-Laub, Water Hyacinth. Cp (GA, NC, SC, VA), Pd (GA, NC): ponds, ditches, sluggish water; uncommon, native of South America. June-September. *E. crassipes* is "generally considered the world's most serious aquatic weed" (Rosatti 1987). Originally native to tropical South America, *E. crassipes* is now a widespread naturalized weed throughout the tropics and subtropics. In the northern part our area, water hyacinth is rare, probably not long persisting. Further south, it can be an aggressive aquatic weed. [= RAB, C, F, FNA, G, GW, K; = *Piaropus crassipes* (Martius) Rafinesque – S]

Heteranthera Ruiz & Pavón 1794 (Mud-plantain)

A genus of 10-12 species, of tropical and temperate America and tropical Africa. References: Cook in Kubitzki (1998b); Horn (1998)=Z; Horn in FNA (2002a). Key based in part on FNA.

1 Leaves narrowly linear, 20-50× as long as wide, the base attenuate; flowers solitary, the corolla yellow; stamens and anthers all alike.....

.....*H. dubia*

1 Leaves reniform, 0.5-1.5× as long as wide, the base cordate; flowers 1-several, the corolla white or pale blue; stamens and anthers dimorphic.
  2 Spathe with 2-several flowers; perianth tube 3-12 mm long.
    3 Anthers and filaments with dark purple hairs; internode below the spathe < 1 cm long; spike with (3-) 7-16 flowers, typically elongating well out of the spathe ..... ***H. multiflora***
    3 Anthers and filaments with white hairs; internode below the spathe > 1 cm long; spike with 2-8 flowers, typically mostly included within the spathe..... ***H. reniformis***
  2 Spathe with solitary flower; perianth tube 11-45 mm long.
    4 Vegetative stems elongating only in water deeper than 5 cm; blades of petiolate leaves oblong to ovate, the base truncate to cuneate; perianth tube 15-45 mm long ..... ***[H. limosa]***
    4 Vegetative stems commonly elongating; blades of petiolate leaves round to oblong, the base cordate to truncate; perianth tube 11-29 mm long..... ***[H. rotundifolia]***

Heteranthera dubia (Jacquin) MacMillan, Water Stargrass. Mt (NC, VA), Pd (VA), Cp (VA): streams, rivers; uncommon (rare in NC). Late July-September. Québec west to WA, south to Cuba and Central America, but rare or absent in much of the se. United States. The attribution of this species to SC is in error (as by Kartesz 1999), based on a misidentified specimen (C. Horn, pers. comm.). [= RAB, F, FNA, GW, K, W; = *Zosterella dubia* (Jacquin) Small – C, G, S]

Heteranthera multiflora (Grisebach) Horn. Cp (NC, VA): in shallow, stagnant water in floodplains, or emersed on mud; rare (NC Watch List). June-October. IL west to NE, south to MS; also on the Atlantic Coastal Plain from NJ south through PA to ne. NC; also in South America (Brazil, Paraguay, Argentina, and Venezuela). [= C, FNA, K, Z]

Heteranthera reniformis Ruíz & Pavón. Cp (NC, VA), Pd (GA, NC, SC, VA): in shallow, stagnant water in floodplains, or emersed on mud; uncommon (SC Rare). June-October. CT west to NE, south to FL and TX and into South America. First reported for South Carolina by Hill & Horn (1997). [= RAB, C, F, FNA, G, GW, K, S, W, Z]

Heteranthera limosa (Swartz) Willdenow occurs east to TN, KY, and FL (Kartesz 1999); it is attributed to VA in Small (1933), but the documentation is not known. [= FNA, C, F, G, K, S, Z]

Heteranthera rotundifolia (Kunth) Grisebach. Ponds. Midwestern, as a rare disjunct east to c. KY (Larue County) (Medley 1993). [= FNA, C, K, Z]

Pontederia Linnaeus 1753 (Pickerelweed)

A genus of 3-6 species, from North America to South America. References: Lowden (1973)=Z; Cook in Kubitzki (1998b); Horn in FNA (2002a).

1 Floral tube villous when young, essentially glabrous to sparsely glandular in maturity; leaves primarily ovate to triangular-lanceolate, 2.2-21 cm wide, the base generally cordate or truncate (rarely cuneate)..... ***P. cordata var. cordata***
1 Floral tube persistently pubescent with short glandular hairs; leaves lanceolate, 0.4-8.3 cm wide, the base generally cuneate to truncate..... .....***P. cordata var. lancifolia***

Pontederia cordata Linnaeus *var.* ***cordata***, Heartleaf Pickerelweed. Cp, Pd (GA, NC, SC, VA), Mt (NC): marshes, pond-shores, lake-shores; common, uncommon in Piedmont, rare in Mountains. May-October. Nova Scotia west to MN, south to FL and TX; Belize; s. Brazil, Argentina, Paraguay, and Uruguay. The recognition of infraspecific taxa in *Pontederia cordata* is controversial and requires additional study. *P. cordata* exhibits tristyly, an interesting breeding system. Each plant has one of 3 types of flowers: (a) a short style, 3 medium and 3 long stamens, (b) a medium style, 3 short and 3 long stamens, or (c) a long style, 3 short and 3 medium stamens. [= GW, Z; < *P. cordata* – RAB, C, FNA, K, W; = *P. cordata* – F, G, S]

Pontederia cordata Linnaeus *var.* ***lancifolia*** (Muhlenberg ex Elliott) Torrey, Lanceleaf Pickerelweed. Cp (GA, NC, SC): marshes, pond-shores, lake-shores; rare. May-October. S. MA (alleged to occur as far north as ME, but these reports may be entirely based on misidentifications of var. *cordata*) to s. FL, west to e. TX, mostly on the Coastal Plain, with a few records around the Great Lakes; Cuba; s. Brazil, Argentina, Paraguay, and Uruguay. A third variety of *P. cordata*, var. *ovalis* (Martens in Roemer & Schultes) Solms in A.P. de Candolle, is restricted to South America. [= GW, Z; < *P. cordata* – RAB, C, FNA, K, W; = *P. lanceolata* Nuttall – F, G, S]

POTAMOGETONACEAE Dumortier 1829 (Pondweed Family)

A family of 6-7 genera and about 100 species (if circumscribed, as here, to include Zannichelliaceae), aquatic herbs, nearly cosmopolitan. Here circumscribed following recent molecular studies to include *Zannichellia* (Lindqvist et al. 2006; Angiosperm Phylogeny Group 2003). References: Haynes & Hellquist in FNA (2000); Haynes (1978); Les & Haynes (1996); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b); Wiegleb & Kaplan (1998)=Z; Lindqvist et al. (2006). [including *ZANNICHELLIACEAE]*

1 Leaves opposite ..... ***Zannichellia***
1 Leaves alternate.
  2 Stipules not adnate, or adnate to the blade < ½ the length of the stipule; peduncle stiff, the flowering spike elevated above the water's surface; submersed leaves translucent, flat, flexible; floating leaves present or absent..... ***Potamogeton***
  2 Stipules adnate to the blade for at least 2/3 the length of the stipule; peduncle flexible, the flowering spike submersed; submersed leaves opaque, channeled, stiff; floating leaves absent.....***Stuckenia***

Potamogeton Linnaeus 1753 (Pondweed)

A genus of about 80 species, aquatic herbs, nearly cosmopolitan. References: Haynes & Hellquist in FNA (2000); Haynes & Hellquist (1996); Wiegleb & Kaplan (1998). Treatment adapted from Haynes & Hellquist in FNA (2000). [also see *Stuckenia*]

1 Stipular sheaths of submersed leaves adnate with leaf blade base, the tip usually projecting as a ligule ..... **Key A**
1 Stipular sheaths of submersed leaves free from the leaf blade base, or with only a few adnate, the ligule not obvious.
  2 Submersed leaves broadly linear-oblong to lanceolate to elliptic or nearly orbicular, 10-58 mm wide (occasional stranded forms lack submersed leaves) ..... **Key B**
  2 Submersed leaves linear, thread-like or ribbon-like, 0.1-10 mm wide ..... **Key C**

Key A

1 Leaves stiffish, conspicuously 2-ranked, auriculate-lobed to rounded at the junction with the stipule, with 20-60 fine veins ..... ***P. robbinsii***
1 Leaves lax, not conspicuously 2-ranked, lacking basal lobes, with fewer than 20 veins.
  2 Tips of submersed leaves obtuse to acute; floating leaves rounded at apex.
    3 Tips of submersed leaves acute; fruit 1-2 mm wide, the lateral keel with acute tips, beak minute ..... ***P. diversifolius***
    3 Tips of submersed leaves obtuse; fruit 1.3-2.4 mm wide, the lateral keel with blunt tips, beak lacking ..... ***P. spirillus***
  2 Tips of submersed leaves acute to long-tapering; floating leaves acute at apex.
    4 Submersed leaves 0.1-0.6 mm wide, without obvious lacunae; floating leaves 3-7 veined ..... ***P. bicupulatus***
    4 Submersed leaves 0.2-1 (-2) mm wide, with abundant lacunae; floating leaves 9-23 veined ..... ***P. tennesseensis***

Key B

1 Leaf margins conspicuously serrate; stem flattened; fruit beak 2-3 mm long; turions commonly formed, hard ..... ***P. crispus***
1 Leaf margins entire; stem terete; fruit beak < 1 mm long; turions rarely formed.
  2 Submersed leaves clasping the stem; floating leaves absent.
    3 Rhizomes spotted rusty-red; leaf tips cucullate, splitting when pressed; stipules usually persistent and conspicuous ..... ***[P. praelongus]***
    3 Rhizomes unspotted; leaf tips flat, not splitting when pressed; stipules deciduous or deteriorating into fibers.
      4 Leaves orbicular to ovate, often lanceolate in soft water, 1-6 cm long, with 3-25 delicate veins; stipules deteriorating and deciduous, absent on lower portions of stem ..... ***P. perfoliatus***
      4 Leaves ovate-lanceolate to narrowly lanceolate, 1.6-13 cm long, with 3-35 coarse veins; stipules disintegrating to persistent fibers, even on lower portions of stem ..... ***[P. richardsonii]***
  2 Submersed leaves petioled or sessile, not clasping the stem; floating leaves absent or present.
    5 Submersed leaves 19-49 veined, distinctly arcuate ..... ***P. amplifolius***
    5 Submersed leaves with fewer than 29 veins, not arcuate.
      6 Stems conspicuously black-spotted; submersed leaves crisped along the margin; floating leaves 15-21 veined ..... ***P. pulcher***
      6 Stems inconspicuously spotted or lacking spots; submersed leaves flat along the margin; floating leaves 7-29 veined.
        7 Submersed leaves with petioles 1-13 cm long.
          8 Larger submersed leaves acute at the apex with a sharp awl-like tip; fruit gray-green to olive-green, with well-developed lateral ridges ..... ***P. illinoensis***
          8 Larger submersed leaves acute at the apex but lacking a sharp awl-like tip; fruit red to reddish-brown, with muricate lateral ridges ..... ***P. nodosus***
        7 Submersed leaves sessile.
          9 Stipules blunt; submersed leaves 7 veined; fruit plump, stalked, tawny-olive ..... ***[P. alpinus]***
          9 Stipules acute; submersed leaves 3-19 veined; fruit laterally compressed, not stalked, reddish-brown, gray-green, or olive-green.
            10 Fruit reddish-brown, with obsolete or rounded keel; submersed leaves with (3-) 5-9 veins ..... ***P. gramineus***
            10 Fruit gray-green or olive-green, with well-developed keel; submersed leaves with 7-19 veins ..... ***P. illinoensis***

Key C

1 Fruit with a prominent keel 0.2-1.2 mm broad; floating leaves often present; lacunae prominent in submersed leaves.
  2 Submersed leaves 3-13 veined; stipules of submersed leaves not adnate to the leaf base; floating leaves rounded at apex ..... ***P. epihydrus***
  2 Submersed leaves 1-3 (-7) veined; stipules of at least some submersed leaves adnate to the leaf base; floating leaves acute at apex ..... ***P. tenneseensis***
1 Fruit with a keel < 0.2 mm broad; floating leaves absent or present; lacunae present in some species, but generally not prominent.
  3 Floating leaves present, at least in some plants of the population.
    4 Floating leaves 0.3-1.6 cm long; peduncle 0.6-1.5 cm long; fruit < 2.5 mm long ..... ***[P. vaseyi]***
    4 Floating leaves 1.5-12 cm long; peduncle 2.5-3.5 mm long; fruit 2.5-5 mm long.
      5 Petiole junction with leaf distinctly pale in color; floating leaves ovate, oblong-ovate, cordate at base, rarely tapering ..... ***P. natans***
      5 Petiole junction with leaf lacking pale color; floating leaves elliptical, ovate-elliptical, or oblong-ellliptical.
        6 Floating leaves 7-12 mm wide, tapering at both ends; fruit apparently not produced ..... ***[P. floridanus]***
        6 Floating leaves 10-20 (-30) mm wide, obtuse, round or tapering at the base; fruit often produced ..... ***P. oakesianus***
  3 Floating leaves absent from all plants in the population.
    7 Rhizomes obvious; peduncle 5-25 cm long; leaves thread-like, 0.1-0.5 mm wide ..... ***P. confervoides***
    7 Rhizomes absent or not apparent; peduncle 0.3-7 cm long, often curved; leaves usually not thread-like, 0.1-5 mm wide.
      8 Nodal glands absent.

9 Leaves 15-35 veined, > 2 mm wide; stem conspicuously flattened; peduncles terminal, usually straight ..... ***P. zosteriformis***
9 Leaves 3-5 veined, usually < 2 mm wide; stem terete; peduncles usually axillary, recurved.
10 Leaves acute, 3 (-5) veined, 0.3-1.5 (-2.3) mm wide; fruits 1-keeled, 1.4-2.3 (-2.7) mm long ..... ***P. foliosus var. foliosus***
10 Leaves usually bristle-tipped, occasionally apiculate to blunt, 3 veined, 1-2.2 (-4) mm wide; fruits 3-keeled, 2.3-4 mm long..... ***P. hillii***
8 Nodal glands present.
11 Stipules fibrous, often whitish.
12 Leaf apex acute or apiculate; leaves 5-7 (-9) veined; turions with inner leaves at a right angle to outer leaves..... ***[P. friesii]***
12 Leaf apex usually bristle-tipped, acute or rarely obtuse to apiculate; leaves 3-5 (-7) veined; turions flattened with inner and outer leaves in same plane ..... ***P. strictifolius***
11 Stipules not fibrous, usually delicate, green, brown, or white.
13 Leaf apex bristle-tipped (rarely apiculate); peduncles recurved, axillary or axillary and terminal, 0.5-6.6 cm long..... ***P. hillii***
13 Leaf apex blunt, acute, or apiculate, but not bristle-tipped; peduncles straight, terminal, 0.5-6.6 cm long.
14 Mature fruit obovate, sides concave, beak mostly forward; peduncle filiform to cylindrical, usually 1-3 per plant; inflorescence usually interrupted; leaves with up to 2 rows of lacunae along midrib, apex acute, rarely apiculate; stipules mostly connate ..... ***P. pusillus var. pusillus***
14 Mature fruit mostly widest at middle, or ovate, sides rounded, beak mostly central; peduncle cylindrical, usually > 3 per plant; inflorescence continuous; leaves with 1-5 rows of lacunae along midrib, apex acute to obtuse; stipules mostly convolute ..... ***P. pusillus var. tenuissimus***

Potamogeton amplifolius Tuckerman, Bigleaf Pondweed. Cp (NC, VA), Pd (VA), Mt (GA, VA): ponds, lakes, sluggish streams; rare (GA Special Concern, VA Rare). June-September. Newfoundland west to British Columbia, south to e. NC, nw. GA (Jones & Coile 1988), n. AL, OK, and CA. [= RAB, C, F, FNA, G, K, S, W, WV, Z]

Potamogeton bicupulatus Fernald. Mt (VA): quiet waters; rare. July-September. ME west to WI, south to VA (Augusta County) and se. TN. [= FNA, F, K, Z; = *P. diversifolius* Rafinesque var. *trichophyllus* Morong – C, GW]

Potamogeton confervoides Reichenbach, Alga Pondweed, Conferva Pondweed, Tuckerman's Pondweed. Cp (NC, SC): acidic blackwater pools and streams; rare (NC Rare). April-September. Newfoundland west to Ontario, south to NJ and PA; disjunct in sc. NC and nc. SC (fall-line sandhills). [= RAB, C, F, FNA, G, K, Z]

* ***Potamogeton crispus*** Linnaeus, Curled Pondweed, Curly Pondweed. Cp, Pd (GA, NC, VA), Mt (NC, VA): uncommon. May-September. ME, MN, s. Saskatchewan and s. British Columbia, south to NC, Panhandle FL, TX, AZ, and CA. [= RAB, C, F, FNA, G, GW, K, W, WV, Z]

Potamogeton diversifolius Rafinesque, Common Snailseed Pondweed. Cp, Pd, Mt (GA, NC, SC, VA): pools, ponds, and lakes; common. June-September. MA and NY west to MN, MT, and OR, south to FL, TX, and CA. [= RAB, FNA, G, K, S, W, WV, Z; = *P. diversifolius* var. *diversifolius* – C, GW; > *P. diversifolius* – F; > *P. capillaceus* Poiret var. *capillaceus* – F; > *P. capillaceus* Poiret var. *atripes* Fernald – F]

Potamogeton epihydrus Rafinesque, Ribbonleaf Pondweed. Mt, Pd (NC, VA), Cp (NC, SC, VA): uncommon. June-September. Newfoundland west to AK, south to GA, s. MS (Sorrie & Leonard 1999), LA, CO, and CA. [= RAB, C, FNA, K, S, W, WV; > *P. epihydrus* var. *epihydrus* – F, G; > *P. epihydrus* var. *nuttallii* (Chamisso & Schlechtendahl) Fernald – F, G; < *P. epihydrus* – Z (also see *P. tennesseensis*)]

Potamogeton foliosus Rafinesque *var. **foliosus***, Leafy Pondweed. Mt (GA, NC, VA), Pd (SC, VA), Cp (NC, SC, VA): uncommon. May-October. Newfoundland west to AK, south to SC, w. FL, TX, and Mexico. [= C; < *P. foliosus* – RAB, G, GW, S, W, Z; > *P. foliosus* var. *foliosus* – F, WV; > *P. foliosus* var. *macellus* Fernald – F, WV; = *P. foliosus* ssp. *foliosus* – FNA, K; > *P. curtissii* Morong – S; > *P. foliosus* – S]

Potamogeton gramineus Linnaeus, Variable Pondweed. Cp (VA): estuarine waters; rare. Greenland and AK, south to sc. PA (Rhoads & Klein 1993), NJ, WV (Kartesz 1999), n. VA, MI, WI, CO, UT, and CA. Reported for VA (Fairfax County); specimen identification needing confirmation. [= C, FNA, G, K, WV, Z; > *P. gramineus* var. *maximus* Morong – F]

Potamogeton hillii Morong, Hill's Pondweed. Mt (VA): spring-fed oxbow pond, rare (VA Rare). VT, MA, Ontario, and WI south to PA, VA, and OH. [= C, FNA, G, K, Z; > *P. hillii* – F; > *P. porteri* Fernald – F]

Potamogeton illinoensis Morong, Illinois Pondweed. Cp (GA, NC, SC, VA), Mt (GA, VA), Pd (VA): calcareous waters of streams, lakes, and ponds; rare. May-September. Québec west to Nortwest Territories and s. British Columbia, south to FL, TX, Mexico, and CA. [= RAB, C, F, FNA, G, GW, K, W, WV, Z; > *P. angustifolius* Berchtold & K. Presl – S; > *P. heterophyllus* Schreber – S; > *P. lucens* Linnaeus – S, misapplied]

Potamogeton natans Linnaeus, Floating Pondweed. Mt (NC): lakes and slow streams; rare. June-September. Newfoundland west to AK, south to e. WV, w. NC, KS, NM, AZ, and CA. [= RAB, C, F, FNA, G, K, S, W; < *P. natans* – Z (also see *P. floridanus*)]

Potamogeton nodosus Poiret, Longleaf Pondweed, American Pondweed. Cp (GA, NC, VA), Mt (NC, VA), Pd (VA), {SC}: ponds, streams; uncommon. May-September. ME and Québec west to British Columbia, south to FL, TX, Mexico, and CA. [= RAB, C, F, FNA, G, GW, K, W, WV, Z; ? *P. fluitans* Roth – S; *P. oblongifolium* Forster, proposed for nomenclatural rejection (Reveal et al. 2003)]

Potamogeton oakesianus J.W. Robbins, Oakes Pondweed. Cp, Mt (VA): lakes and streams; rare (VA Rare). Newfoundland west to MN, south to VA and n. IL; apparently disjunct in MT, and British Columbia, and possibly in s. AL (Sorrie, pers. comm.). [= C, F, FNA, G, K, W, Z]

Potamogeton perfoliatus Linnaeus, Perfoliate Pondweed, Redhead Grass. Cp (NC, VA): rare (VA Watch List). June-October. Newfoundland, Labrador west to MI, south to ne. NC, and n. OH; apparently disjunct in w. FL, s. AL, and se. LA, and in SD. [= FNA, G, K, S, Z; > *P. perfoliatus* var. *bupleuroides* (Fernald) Farwell – RAB, F, GW; *P. bupleuroides* Fernald]

Potamogeton pulcher Tuckerman, Spotted Pondweed. Cp, Pd, Mt (GA, NC, SC, VA): ponds, pools, ditches, streams; common. June-September. Nova Scotia west to WI, south to FL and e. TX. [= RAB, C, F, FNA, G, GW, K, S, W, WV, Z; = *P. rotundifolium* Forster, proposed for nomenclatural rejection (Reveal et al. 2003)]

Potamogeton pusillus Linnaeus *var.* ***pusillus***. Cp (GA, NC, SC, VA), Pd, Mt (NC, SC, VA): acid and alkaline waters; uncommon? May-September. Nova Scotia west to AK, south to Mexico. [< *P. berchtoldii* Fieber – RAB; > *P. pusillus* var. *pusillus* – F; > *P. pusillus* var. *minor* (Bivona-Bernardi) Fernald & Schubert – F; = *P. pusillus* ssp. *pusillus* – FNA, K; < *P. pusillus* var. *pusillus* – C; < *P. pusillus* – G, GW, S, Z; = *P. pusillus* – WV]

Potamogeton pusillus Linnaeus *var.* ***tenuissimus*** F.K. Mertens & W.D.J. Koch, Slender Pondweed. Cp, Pd, Mt (NC, SC, VA), {GA}: millponds, other quiet waters; rare? (GA Special Concern). May-September. Newfoundland west to AK, south to w. FL, TX, NM, and CA. Reported from SC by Gaddy & Rayner (1980). [= W; < *P. berchtoldii* Fieber – RAB; < *P. pusillus* var. *pusillus* – C; > *P. berchtoldii* var. *acuminatus* Fieber – F; > *P. berchtoldii* var. *berchtoldii* – F; > *P. berchtoldii* var. *lacunatus* (Hagström) Fernald – F; > *P. berchtoldii* var. *acuminatus* Fieber – F; > *P. berchtoldii* var. *polyphyllus* (Morong) Fernald – F; > *P. berchtoldii* var. *tenuissimus* (Mertens & Koch) Fernald – F; < *P. pusillus* – G, GW, S, Z; = *P. pusillus* ssp. *tenuissimus* (Mertens & Koch) R.R. Haynes & C.B. Hellquist – FNA, K; = *P. berchtoldi* – WV]

Potamogeton robbinsii Oakes, Fern Pondweed. Pd (VA): muddy waters; rare (VA Rare). August-September. Nova Scotia and Prince Edward Island west to Keewatin and AK, south to n. VA, n. IL, s. MN, CO, UT, and CA; disjunct in s. AL. [= C, F, FNA, G, K, Z]

Potamogeton spirillus Tuckerman, Northern Snailseed Pondweed. Cp (VA): quiet waters; rare (VA Rare). July-November. Newfoundland west to Manitoba, south to e. VA, n. OH, n. IA, and se. NE. [= C, F, FNA, G, K, WV, Z]

Potamogeton strictifolius A. Bennett, Straightleaf Pondweed. Mt (VA): calcareous waters; rare (VA Rare). July-September. Newfoundland west to Yukon, south to w. VA, n. IL, WY, and n. UT. [= C, FNA, G, K, W, Z; > *P. strictifolius* var. *strictifolius* – F; > *P. strictifolius* var. *rutiloides* Fernald – F; > *P. longiligulatus* Fernald – F]

Potamogeton tennesseensis Fernald, Tennessee Pondweed. Mt (VA), {NC?}: quiet or flowing water; rare (VA Rare). Late May-September. PA and OH south to w. VA, and se. TN. [= F, FNA, K, W, WV; < *P. epihydrus* – Z, in part]

Potamogeton zosteriformis Fernald, Flatstem Pondweed. Cp, Mt (VA): quiet waters; rare (VA Rare). July-September. Newfoundland west to AK, south to n. VA, n. IL, KS, UT, and CA. [= C, F, FNA, G, K, WV, Z]

Potamogeton alpinus Balbis, Red Pondweed, south to e. PA (Rhoads & Klein 1993). [= FNA, G, K, Z; > *P. alpinus* var. *tenuifolius* (Rafinesque) Ogden – C, F; > *P. tenuifolius* Rafinesque]

Potamogeton floridanus Small, Florida Pondweed, is apparently endemic to blackwater rivers of the Panhandle of FL. Considering the under-collection of *Potamogeton*, it should be sought elsewhere. [= FNA, S; < *P. natans* – Z]

Potamogeton friesii Ruprecht, Fries's Pondweed, south to c. PA (Rhoads & Klein 1993). (VA Watch List) [= C, F, FNA, G, K, Z]

Potamogeton obtusifolius Mertens & Koch, south to MD, NJ, and PA. [= C, F, FNA, G, K] {not yet keyed; synonymy incomplete}

Potamogeton praelongus Wulfen, Whitestem Pondweed, south to MD and nw. PA (Rhoads & Klein 1993). [= C, F, FNA, G, K, Z]

Potamogeton richardsonii (Bennett) Rydberg, Richardson Pondweed, south to DE, MD, and PA. [= C, F, FNA, G, K, Z]

Potamogeton vaseyi J.W. Robbins, Vasey Pondweed, south to se. and sc. PA (Rhoads & Klein 1993). [= C, F, FNA, G, K, Z]

Stuckenia C. Börner 1912 (Sago-pondweed)

A genus of about 10 species, nearly cosmopolitan. This genus should be called *Stuckenia*, which has priority over *Coleogeton*. Lindqvist et al. (2006) provide molecular support for recognition of *Stuckenia* as a genus. References: Haynes & Hellquist in FNA (2000); Les & Haynes (1996)=Z; Haynes, Les, & Král (1998)=Y; Wiegleb & Kaplan (1998)=X; Lindqvist et al. (2006).

1 Leaves minutely acute (use 10× magnification); achenes usually 3-4.5 mm long, with the style persistent as a very short beak .....***S. pectinata***
1 Leaves minutely rounded or retuse (use 10× magnification); achenes usually 2-3 mm long, with the sessile stigma persistent as a bump..... .....***[S. filiformis ssp. alpina]***

Stuckenia pectinata (Linnaeus) C. Börner, Sago-pondweed. Cp (NC, SC, VA), Mt, Pd (VA), {GA}: calcareous or brackish waters of ponds, lakes, estuaries, sounds; uncommon. June-September. The species is irregularly cosmopolitan. [= FNA, K, Y; = *Potamogeton pectinatus* Linnaeus – RAB, C, F, G, GW, S, W, WV, X; = *Coleogeton pectinatus* (Linnaeus) D.H. Les & R.R. Haynes – Z]

Stuckenia filiformis (Persoon) C. Börner ssp. *alpina* (Blytt) R.R. Haynes, D.H. Les, & M. Král, Threadleaf Pondweed, approaches our area in se. and sc. PA. [= FNA, K, Y; = *Potamogeton filiformis* Persoon var. *alpinus* (Blytt) Ascherson & Graebner; > *Potamogeton filiformis* Persoon var. *borealis* (Rafinesque) H. St. John – C, F, G; < *Potamogeton filiformis* – X; = *Coleogeton filiformis* (Persoon) D.H. Les & R.R. Haynes ssp. *alpinus* (Blytt) D.H. Les & R.R. Haynes – Z]

Zannichellia Linnaeus 1753 (Horned Pondweed)

A genus of about 5 species, aquatic herbs, nearly cosmopolitan. References: Haynes & Hellquist in FNA (2000); Haynes & Holm-Nielsen (1987)=Z.

Identification notes: *Zannichellia* is sometimes confused with other aquatics, such as *Ruppia* and narrow-leaved *Potamogeton*. *Potamogeton* has at least some leaves alternate; *Zannichellia* and *Ruppia* are opposite-leaved. *Zannichellia* lacks the abruptly broadened sheath of *Najas*. Also, the seeds are flattened in *Zannichellia*, and toothed down one side; *Najas* has a cylindric or elliptic fruit. *Zannichellia* has longer leaves (3-10 cm long) than *Najas* (< 4 cm long).

Zannichellia palustris Linnaeus, Horned Pondweed. Cp (NC, VA), Mt (VA), {GA}: fresh or brackish water; common. February-October. The species occurs throughout much of the world. [= RAB, C, FNA, G, GW, K, S, W, WV, Z; > *Z. palustris* var. *major* (Hartman) W.D.J. Koch – F; > *Z. palustris* var. *palustris* – F]

RUPPIACEAE Horaninow ex Hutchinson 1934 (Wigeon-grass Family)

A family of a single genus and 1-10 species. References: Haynes (1978)=Z; Haynes in FNA (2000); Haynes, Holm-Nielsen, & Les in Kubitzki (1998b).

Ruppia Linnaeus (Wigeon-grass)

A genus of 1-10 species, nearly cosmopolitan. References: Haynes (1978)=Z; Haynes in FNA (2000); Haynes, Holm-Nielsen, & Les in Kubitzki (1998b).

Identification notes: Separable from superficially similar species of *Potamogeton* by the stipules adnate their entire length (vs. separate at least at the tip in *Potamogeton*).

Ruppia maritima Linnaeus, Wigeon-grass, Ditch-grass. Cp (GA, NC, SC, VA): brackish estuaries, rivers, marsh pools; common. July-October. Nearly cosmopolitan. [= RAB, C, FNA, GW, K, S, Z; > *R. maritima* var. *maritima* – F, G; > *R. maritima* var. *longipes* Hagström – F; > *R. maritima* var. *rostrata* Agardh – F, G]

RUSCACEAE M. Roemer 1840 (Ruscus Family)

As here circumscribed, a family of about 28 genera and 500 species, of North America, Central America, Europe, and Asia. The Convallariaceae has been supported by molecular studies (Judd 2003, Bogler & Simpson 1995). Molecular studies show that *Nolina* is much more closely related to *Convallaria*, *Polygonatum*, etc. than to the Agavaceae (*Yucca* and *Manfreda* in our flora), with which it has often been associated. References: Bogler & Simpson (1995); Bogler in Kubitzki (1998a); Yeo in Kubitzki (1998a); Conran & Tamura in Kubitzki (1998a); Yamashita & Tamura (2000).

1 Plant with an upright stem with alternate leaves.
  2 Shrub; "leaves" (actually phylloclades) coriaceous, evergreen, glossy; [exotic, rarely naturalized]; [tribe *Rusceae*] ..... ***Danae***
  2 Herb; leaves herbaceous, deciduous, dull or slightly glossy; [native]; [tribe *Polygonatae*].
    3 Inflorescence terminal, a raceme or panicle; tepals separate ..... ***Maianthemum***
    3 Inflorescence of 1-several axillary flowers; tepals fused ..... ***Polygonatum***
1 Plant tufted, the leaves essentially basal (although the sheathing bases form a 'false' stem in *Convallaria*).
  4 Leaves 2-3, narrowly elliptic; tepals fused, white or greenish; [tribe *Convallarieae*] ..... ***Convallaria***
  4 Leaves many, linear; tepals separate (or fused basally), white or violet.
    5 Fruit dehiscent, quickly exposing berry-like seeds with a fleshy seed coat; inflorescence spikelike, to 3 dm tall; [aliens, scarcely naturalized from horticultural plantings]; [tribe *Ophiopogoneae*] ..... ***Liriope***
    5 Fruit indehiscent, dry and capsular; inflorescence a panicle or raceme, to 15 dm tall; [natives, of longleaf pine woodlands of SC, GA, and FL]; [tribe *Nolineae*] ..... ***Nolina***

Convallaria Linnaeus 1753 (Lily-of-the-Valley)

A genus of 3 species, of north temperate n. Eurasia and e. North America. References: Utech in FNA (2002a); Judd (2003)=Z; Conran & Tamura in Kubitzki (1998a).

1 Leaf blades averaging 10-15 cm long, 3-5 cm wide; rhizomes short-creeping, the "individual" plants spaced closely (typically 5-10 cm apart); flowering scape > ½ as long as the leaves; longer bracts of the inflorescence 4-10 mm long; [introduced, persistent around old home sites and other plantings] ..... ***C. majalis***
1 Leaf blades averaging 15-35 cm long, 5-13 cm wide; rhizomes absent or long-creeping, the individual plants spaced widely (usually at least 15 cm apart); flowering scape < ½ as long as the leaves; longer bracts of the inflorescence 8-20 mm long; [native, of forests of the Mountains and upper Piedmont] ..... ***C. majuscula***

* ***Convallaria majalis*** Linnaeus, European Lily-of-the-Valley. Pd, Cp, Mt (NC, VA): persistent after cultivation; rare, native of Eurasia. April-May; July-August. [= F, K, W; = *C. majalis* var. *majalis* – RAB, FNA; < *C. majalis* – C, G, S, Z (also see *C. majuscula*)]

Convallaria majuscula Greene, American Lily-of-the-Valley. Mt (GA, NC, SC, VA), Pd (NC, VA): mountain forests, particularly in rocky woodlands or forests on or near ridgetops under northern red oak at about 1000 to 1500 m elevation, sometimes at lower elevations (down to at least 700 m) and under *Quercus montana*; uncommon, rare in Piedmont (SC Rare). April-June; August. Endemic to the Southern Appalachians: WV and VA through NC and TN to ne. GA (Jones & Coile 1988) and nw. SC. Cronquist's (1991) statement that Southern Appalachian plants "may reflect an early escape of a different phase of the species from cultivation" can be discounted; there is no doubt that *C. majuscula* is both native and taxonomically distinct, at a

varietal level at least. Utech in FNA (2002a) states that our plants are more closely related to the Asian taxon, variously treated as *C. keiskei* Miquel or *C. majalis* var. *keiskei* (Miquel) Makino, than to the European *C. majalis* s.s. As best as can be determined, Rafinesque's name *Convallaria montana* does not apply to this species. [= K; = *C. majalis* Linnaeus var. *montana* (Rafinesque) Ahles – RAB, FNA, apparently misapplied; < *C. majalis* – C, G, S, Z; = *C. montana* Rafinesque – F, W, apparently misapplied]

Danae Medikus (Alexandrian Laurel, Danaë)

A monotypic genus, a shrub, of sw. Asia.

* ***Danae racemosa*** (Linnaeus) Moench, Alexandrian Laurel. Pd (NC): suburban forests; rare, uncoomon in cultivation, arrely escaping to suburban forests, native of sw. Asia. The "leaves" are actually odd structures called phylloclades, and represent modified stems.

Liriope Loureiro 1790 (Liriope, Lilyturf)

A genus of 8 species, herbs, of e. and se. Asia. References: Conran & Tamura in Kubitzki (1998a); Judd (2003)=Z.

* ***Liriope muscari*** (Dcne.) Bailey, Liriope, Big Blue Lilyturf. Pd, Mt (NC), {SC}: planted and persistent; commonly cultivated, rarely persistent. [= K, Z] {not yet keyed}

* *Liriope spicatum* Loureiro, Creeping Lilyturf. Reported for AL, FL, MD (Kartesz 1999). [= K; *L. spicata* Loureiro – Z, orthographic variant] {not yet keyed}

Maianthemum G.H. Weber ex Wiggers 1780 (Mayflower, Solomon's-plume)

A genus of about 28 species, herbs, of n. Europe, e. Asia, North America, and Central America. The inclusion of the traditional *Smilacina* in *Maianthemum* will cause considerable consternation; LaFrankie's (1986) reasoning, however, seems very strong, and has been additionally supported by more recent evidence (Conran & Tamura in Kubitzki 1998a). The only consistent difference between the two previously accepted genera is whether the flowers are dimerous (*Maianthemum*) or trimerous (*Smilacina*). LaFrankie cites research that shows that the dimerous flowers of *Maianthemum* (*sensu stricto*) are the result of reduction from trimerous flowers, as indicated by vestigial vascular traces. Consideration of the many close similarities, particularly as compared to similar genera such as *Prosartes*, *Polygonatum*, *Streptopus*, and *Clintonia*, may convince the skeptical (see LaFrankie 1986 and Therman 1956). As an example, the fruits of *M. canadense* and *M. racemosum* are closely similar in form, coloration, and size; much more similar than the fruits of our 2 species of *Prosartes*. References: LaFrankie (1986)=Z; Judd (2003)=Y; LaFrankie in FNA (2002a); Conran & Tamura in Kubitzki (1998a).

1 Flowers in a terminal panicle ..... ***M. racemosum*** *ssp.* ***racemosum***
1 Flowers in a simple raceme.
  2 Perianth segments 4 (flowers 2-merous); leaves (1-) 2 (-3) ..... ***M. canadense***
  2 Perianth segments 6 (flowers 3-merous); leaves 6 or more ..... ***M. stellatum***

Maianthemum canadense Desfontaines, Canada Mayflower, False Lily-of-the-valley. Mt (GA, NC, VA), Pd (VA): moist forests, especially at high elevations; common. Mid May-early July; August-September. Labrador and Newfoundland west to Mackenzie, south to MD, NC, n. GA (Jones & Coile 1988), KY and SD. Two varieties have been described, but their recognition is not strongly supported. Var. *canadense*, with leaves glabrous beneath, the margins entire or minutely crenulate, cross-veins of the leaf well-developed, is widepread in the distribution of the species. Var. *interius* Fernald has the leaves pubescent beneath, the leaf margins distinctly ciliate, and cross-veins obscure; it is not known from our area, but extends east and south as far as MA, NY, and OH. Further study of these varieties is needed. Weller (1970) reports equivocal results on the recognition of varieties, based on a study in n. MI. [= RAB, FNA, K, W, Y, Z; > *Maianthemum canadense* Desfontaines var. *canadense* – C, F, G; = *Unifolium canadense* (Desfontaines) Greene – S]

Maianthemum racemosum (Linnaeus) Link *ssp.* ***racemosum***, Eastern Solomon's-plume, False Solomon's-seal. Mt, Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): forests; common (rare in FL). Mid April-June; August-October. The species ranges from Nova Scotia west to British Columbia, south to GA, FL Panhandle, and AZ. A variety of chromosome races are known (2n = 36, 72, 144). The eastern ssp. *racemosum* is tetraploid; ssp. *amplexicaule* (Nuttall) LaFrankie is diploid and more western; these are perhaps more appropriately treated as species. Under the generic name *Smilacina*, two varieties had been described for our area, *Smilacina racemosa* var. *racemosa* and *S. racemosa* var. *cylindrata* Fernald, the former larger in nearly all respects and more northern than the latter, smaller, and more southern form (see F for details). If these varieties are determined to have merit (further research is needed), the appropriate transfer to *Maianthemum* will need to be made. [= FNA, K, Y, Z; < *Smilacina racemosa* (Linnaeus) Desfontaines – RAB, C, G, W; > *S. racemosa* var. *racemosa* – F; > *S. racemosa* var. *cylindrata* Fernald – F; > *Vagnera racemosa* (Linnaeus) Morong – S; > *Vagnera australis* Rydberg – S; < *M. racemosum* – WH]

Maianthemum stellatum (Linnaeus) Link, Starry Solomon's-plume. Mt, Pd (VA): alluvial forests; rare (VA Rare). April-June; August-October. Newfoundland west to British Columbia, south to NJ, w. VA, e. TN, IN, MO, and CA. [= FNA, K, Y, Z; = *Smilacina stellata* (Linnaeus) Desfontaines – C, F, G, W]

Nolina Michaux 1803 (Beargrass)

A genus of about 30 species, rosette shrubs and trees, of s. United States and Mexico. References: Hess in FNA (2002a); Judd (2003)=Z; Bogler in Kubitzki (1998a).

1 Leaves 3-4 (-5) mm wide; fruit 4-4.5 mm long, strongly asymmetrical; [of moist flatwoods of the FL Coastal Plain].....***N. atopocarpa***
1 Leaves 4-10 mm wide, glaucous; fruit 6.5-8 mm long, symmetrical; [of dry to dry-mesic sandhills of the GA and SC Coastal Plain] ..... ***N. georgiana***

Nolina atopocarpa Bartlett, Florida Beargrass. Cp (FL): pine flatwoods and savannas; rare. Endemic to panhandle FL (Liberty and Franklin counties) and e. peninsular FL (St. Johns and Brevard counties). [= FNA, K, S, WH, Z]

Nolina georgiana Michaux, Georgia Beargrass, Sandhills Lily. Cp (GA, SC): sandhills, sometimes locally common on slightly less xeric lower sandhill slopes; rare (SC Rare). Late May-June; late June-August. Nc. SC south to sc. GA. This species has been attributed to FL (Small 1933), but is not included in either Clewell (1985) or Wunderlin (1982, 1998). [= RAB, FNA, K, S, Z]

Polygonatum P. Miller 1754 (Solomon's-seal)

A genus of about 57 species, of temperate Eurasia and North America (most diverse in e. Asia). The *P. biflorum* complex is in need of further study. References: Ownbey (1944)=Z; Judd (2003)=Y; Utech in FNA (2002a); Eigsti (1942); Therman (1950, 1953); Kawano & Iltis (1963); Conran & Tamura in Kubitzki (1998a).

1 Leaves pubescent on the veins beneath; flowers 7-13 mm long .....***P. pubescens***
1 Leaves glabrous; flowers 12-21 mm long.
  2 Stem slender, 1.5-5 mm in diameter; plants to 9 dm tall; lower axillary peduncles terete or nearly so, with (1-) 2-3 (-5) flowers; lowest peduncle in the axil of the (1st-) 3rd (-5th) axil; larger leaves 5.5-15 cm long, 1.2-6 cm wide; lower leaves clasping to 90 (-180) degrees .... ***P. biflorum*** *var.* ***biflorum***
  2 Stem robust, 5-13 mm thick below the leaves; plants to 20 dm tall; lower axillary peduncles strongly flattened, with (2-) 3-6 (-15) flowers; lowest peduncle in the axil of the (3rd-) 4th-5th (-8th) leaf; larger leaves 9-25 cm long, 3.5-13 cm wide; lower leaves clasping to 300 degrees .....***P. biflorum*** *var.* ***commutatum***

Polygonatum biflorum (Walter) Elliott *var.* ***biflorum***, Small Solomon's-seal. Mt, Pd, Cp (GA, NC, SC, VA): moist to dry forests; common. April-June; August-October. CT, NY, and s. Ontario west to MI, NE, and IN, south to n. FL and s. AL. In addition to the two varieties recognized for our area, *P. biflorum* includes several additional varieties: var. *hebetifolium* R.R. Gates of panhandle FL (Apalachicola River area), var. *melleum* (Farwell) R. Ownbey of MI and Ontario, and var. *necopinum* R. Ownbey from the Black Hills of SD. The complex needs additional study. See var. *commutatum* for discussion of its distinction from var. *biflorum*. [= Z; < *P. biflorum* – RAB, C, FNA, W, Y; = *P. biflorum* – F, G, in the narrow sense; < *P. biflorum* var. *commutatum* (J.A. & J.H. Schultes) Morong – K; < *P. commutatum* (J.A. & J.H. Schultes) A. Dietrich – S]

Polygonatum biflorum (Walter) Elliott *var.* ***commutatum*** (J.A. & J.H. Schultes) Morong, Large Solomon's-seal, King Solomon's-seal. Mt (GA, NC, SC?, VA), Pd (NC, VA): moist forests, roadbanks; common. May-June; September-October. NH west to s. Manitoba, south to SC, GA, LA, and TX. There has been a wide divergence of opinion regarding the merits (and practicality) of distinguishing this taxon from typical *P. biflorum*, and the characters considered most reliable; the two taxa may differ in chromosome number and geographical distribution; they are not, however, always readily distinguished morphologically. I prefer to recognize this taxon as a variety. See references for additional discussion. [< *P. biflorum* – RAB, C, FNA, W, Y; = *P. canaliculatum* (Muhlenberg ex Willdenow) Pursh – F, G, misapplied; < *P. biflorum* var. *commutatum* (J.A. & J.H. Schultes) Morong – K; < *P. commutatum* (J.A. & J.H. Schultes) A. Dietrich – S; = *P. commutatum* – Z]

Polygonatum pubescens (Willdenow) Pursh. Mt (GA, NC, SC?, VA): moist forests, especially cove forests; common. Late April-June; August-October. S. Québec west to s. Manitoba, south to nw. SC, WV, KY, IN, WI, and IA. [= RAB, C, F, FNA, G, K, W, Y, Z; = *P. biflorum* – S, misapplied]

SCHEUCHZERIACEAE F. Rudolphi 1830 (Scheuchzeria Family)

A monotypic family, circumboreal in arctic and cold temperate regions. References: Nienaber in FNA (2000); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

Scheuchzeria Linnaeus (Scheuchzeria, Pod-grass)

A monotypic genus, circumboreal in arctic and cold temperate regions. References: Nienaber in FNA (2000); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

Scheuchzeria palustris Linnaeus var. *americana* Fernald, Pod-grass. Mt (VA): *Sphagnum* bogs; rare. Labrador and AK south to s. NJ, e. WV (Cranberry Glades, Pocahontas County), sc. PA (Rhoads & Klein 1993), IN, IL, IA, WY, and CA. [= F; < *Sch. palustris* – C, FNA, G, WV; = *Sch. palustris* ssp. *americana* (Fernald) Hultén – K; = *Sch. americana* (Fernald) G.N. Jones]

SMILACACEAE Ventenat 1799 (Greenbrier Family)

A family of 3-12 genera and about 375 species, widespread in tropical, subtropical, and temperate regions. References: Holmes in FNA (2002a); Judd (1998); Conran in Kubitzki (1998a).

Smilax Linnaeus 1753 (Greenbrier, Carrionflower, Smilax)

A genus of about 300 species, woody vines and herbs, subcosmopolitan in temperate and tropical regions. Our deciduous species are a monophyletic group within *Smilax*, with a classic eastern North American - east Asian disjunction, and are treated as section Nemexia or subgenus Luiste (Wilbur 2004, Fu et al. 2005). *Smilax* berries and shoots provide important food sources for many wildlife species, including black bears (*Ursus americanus*). References: Mangaly (1968)=Z; Judd (1998)=Y; Holmes in FNA (2002a); Wilbur (2004); Fu et al. (2005); Duncan (1967); Godfrey (1988). Key for the woody species based in part on Godfrey (1988).

1 Stem herbaceous, lacking prickles; ovules 2 per carpel; peduncles usually > 4 cm long; [section *Nemexia*].
  2 Plants erect, 0.2-1.0 m tall, even when well-developed with < 20 leaves [note that immature or depauperate individuals (nonflowering) of *S. pseudochina, S. herbacea, S. lasioneura*, and *S. pulverulenta* often have this aspect]; tendrils absent or rudimentary; peduncles usually few (usually 1-4), the lowest often from bract axils.
    3 Leaves glabrous and glaucous beneath, thick in texture, base cordate, tip acute or acuminate; lowest peduncle from a leaf axil (very rarely from bract axils), upper peduncles from leaf axils; leaves 5-7, clustered together near the summit of the stem ..... ***S. biltmoreana***
    3 Leaves pubescent and green (or glaucous) beneath, usually thin in texture, base cordate, truncate, or rounded, tip acuminate, acute, or obtuse; lowest peduncles from axils of bracts below the lowest leaves, upper peduncles also often from bracts (the uppermost often from leaf axils); leaves either clustered together near the summit of the stem or well distributed.
      4 Leaves relatively many, (7-) 10-13 (-20), often well distributed in the upper half of the stem, notably reduced in size from lower to upper, mostly with the base cordate and the tip acuminate; berry 3-5 seeded ..... ***S. ecirrata***
      4 Leaves few, usually 4-8, usually clustered together near the summit of the stem (rarely well distributed), about the same size, mostly with the base ovate (to subcordate), the tip acute to obtuse; berry 2-3 seeded ..... ***S. hugeri***
  2 Plants vine-like, climbing or sprawling, to 3 m tall, when well-developed with > 30 leaves; tendrils present and numerous; peduncles usually many, from leaf axils.
    5 Leaf bases hastate, the leaf margins straight or concave in outline; longest fruiting pedicels < 2× as long as the fruit; anthers equaling or longer than the filaments; perianth 1.5-2.5 mm long; leaves glabrous and glaucous beneath ..... ***S. pseudochina***
    5 Leaf bases cordate, the leaf margins convex in outline; longest fruiting pedicels 2× or more as long as the fruit; anthers shorter than the filaments; perianth 3.5-6 mm long; leaves either puberulent beneath (at least along the veins), or glabrous and glaucous beneath.
      6 Leaves glabrous and glaucous on the lower surface; fruit dark blue and glaucous; peduncles 5-8× as long as the subtending petioles... ..... ***S. herbacea***
      6 Leaves puberulent on the lower surface, at least on the veins; fruit dark blue and glaucous or black and not glaucous; peduncles 1-10× as long as the subtending petioles.
        7 Leaves bright green and shiny beneath; fruit black, not glaucous; peduncles 1-2 (-3)× as long as the subtending petioles .... ***S. pulverulenta***
        7 Leaves pale green and dull below; fruit dark blue, glaucous; peduncles (3-) 5-10× as long as the subtending petioles .... ***S. lasioneura***
1 Stem woody, usually with prickles; ovules 1 per carpel; peduncles usually < 3 cm long; [section *China*].
  8 Stems and petioles tomentose, lacking prickles; leaves densely tomentose beneath; berries red; plant trailing or ascending, rarely > 0.5 m tall (with determinate growth) ..... ***S. pumila***
  8 Stems and petioles stellate-scurfy or glabrous, generally with prickles; leaves glabrous or papillate beneath; berries red, black, or dark blue; plant climbing, ascending, or trailing, mature plants generally well over 0.5 m tall (with indeterminate growth).
    9 Lower surfaces of leaves strongly glaucous ..... ***S. glauca***
    9 Lower surfaces of leaves green (rarely very slightly glaucous).
      10 Prickles of the stem abundant, thin and needle-like, shiny brown or black ..... ***S. hispida***
      10 Prickles of the stem fewer, broad-based and awl-like or catclaw-like, green, brown, or black.
        11 Midvein (as seen on the lower surface) much more pronounced than the principal lateral veins, which are scarcely raised; leaves evergreen, thick, coriaceous ..... ***S. laurifolia***
        11 Midvein (as seen ion the lower surface) little if any more pronounced than the principal lateral veins; leaves evergreen or deciduous, thin, subcoriaceous.
          12 Leaves mostly lanceolate, the base cuneate, the tip acute to acuminate; berries dull red ..... ***S. smallii***
          12 Leaves mostly ovate, oblong, pandurate, or hastate, the base cordate, truncate, rounded, or cuneate, the tip rounded to acute; berries various in color.
            13 Margin of the leaf blade prominently thickened with a marginal vein (this appearing as a thickening, a visible vein, or an apparent revolute margin); berries with 1-3 seeds.
              14 Inflorescence peduncle (stalk of the umbel) as long as or shorter than the subtending leaf petiole; stems and prickles glabrous; leaves evergreen; berries usually with 2-3 seeds; [generally of xeric or less commonly mesic sands] .... ***S. auriculata***
              14 Inflorescence peduncle (stalk of the umbel) > 1.5×as long as the subtending leaf petiole; stems (especially the lower) and prickles brownish stellate-scurfy; leaves semi-evergreen to evergreen; berries usually with 1 seed; [of a wide variety of habitats] ..... ***S. bona-nox***

13 Margin of the leaf blade thin, sometimes revolute; berries with (1-) 2-4 seeds.
15 Berries blue-black; perianth green; leaves semi-evergreen to evergreen, margins of mature leaves generally not revolute, the margins of the leaves and the petioles often with minute, flattish, toothlike projections; berries with (1-) 2-3 seeds; [of a wide variety of upland and wetland habitats]..... ***S. rotundifolia***
15 Berries bright red; perianth brownish-yellow; leaves deciduous, margins of mature leaves usually revolute, the margins of the leaves and the petioles lacking minute, flattish, toothlike projections; berries with 2-4 seeds; [of swamp forests, bogs, often where submersed for at least part of the year]..... ***S. walteri***

Smilax auriculata Walter, Dune Greenbrier. Cp (GA, NC, SC): dunes on barrier islands, dry sandy openings in maritime forests or sandhills near the coast; common. May-July; October-November (and persisting). E. NC (Dare County) south to s. FL and west to LA; Bahama Islands. [= RAB, FNA, GW, K, S, Y]

Smilax biltmoreana (Small) J.B.S. Norton ex Pennell, Biltmore Carrionflower. Mt, Pd (GA, NC, SC), Cp (GA): dry forests (such as dry pine ridges and chestnut oak forests) and moist forests; rare (NC Rare). April-May; August-October. The species is apparently limited to to NC, SC, and GA, primarily in the Blue Ridge Escarpment region, with disjunct occurrences in panhandle FL, s. AL, and sc. KY. [= FNA, K, W, Y, Z; = *Smilax ecirrata* (Engelmann ex Kunth) S. Watson var. *biltmoreana* (Small) Ahles – RAB; < *S. ecirrhata* – G, in part (concept interpreted from stated geographic range); = *Nemexia biltmoreana* Small – S]

Smilax bona-nox Linnaeus, Catbrier, Tramp's-trouble. Cp, Pd, Mt (GA, NC, SC, VA): in a wide variety of upland and wetland habitats; common. Late April-May; September-November. MD and MO south to c. FL and TX, and also in Mexico. [= RAB, C, FNA, G, GW, K, S, W, Y; > *S. bona-nox* var. *hastata* (Willdenow) Alphonse de Candolle – F; > *S. bona-nox* var. *exauriculata* Fernald – F; > *S. bona-nox* var. *hederifolia* (Beyrich) Fernald – F; > *S. bona-nox* var. *bona-nox* – F]

Smilax ecirrata (Engelmann ex Kunth) S. Watson. Mt (VA): forests; rare (VA Rare). Mid May-early June; August-September. N. OH MI, WI, and s. MN south to w. VA, TN, s. IL, MO, and e. OK. [= K, Y, Z; = *S. ecirrhata* – C, F, FNA, orthographic variant; < *S. ecirrhata* – G, broader sense (apparently also including in statement of range *S. hugeri* and/or *S. biltmoreana*); = *Nemexia ecirrhata* (Engelmann ex Kunth) Small – S]

Smilax glauca Walter, Whiteleaf Greenbrier, Wild Sarsaparilla. Mt, Pd, Cp (GA, NC, SC, VA): in a wide variety of upland and wetland habitats; common. Late April-early June; September-November (and persisting). NJ, c. PA, OH, IN, MO, and KA south to c. FL and TX, and also in Mexico. [= RAB, C, FNA, GW, S, W, Y; > *S. glauca* var. *glauca* – F, G, K; > *S. glauca* var. *leurophylla* Blake – F, G, K]

Smilax herbacea Linnaeus, Common Carrionflower. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (GA, VA): moist deciduous forests; common. May-June; August-October. Centered in the Appalachian Mountains, from Québec and ME west to OH, south to AL, GA, and TN. Young, non-flowering plants closely resemble *S. biltmoreana*. [= F, FNA, K, W, Y, Z; = *S. herbacea* var. *herbacea* – RAB, C, G; = *Nemexia herbacea* (Linnaeus) Small – S]

Smilax hispida Rafinesque, Bristly Greenbrier, Hellfetter. Mt, Pd, Cp (GA, NC, SC, VA): moist to wet forests; common. CT, NY, MN, and NE south to c. FL and TX. Wilbur (2003) discusses the complicated nomenclatural problems involving this plant and concludes that *S. hispida* Raf. is the correct name. [= *Smilax tamnoides* Linnaeus – FNA, GW, K, W, Y, misapplied; = *S. hispida* Muhlenberg – RAB, C, G, S; > *S. tamnoides* var. *hispida* (Muhlenberg) Fernald – F; > *S. tamnoides* var. *tamnoides* – F; > *S. hispida* var. *australis* Small – S; > *S. hispida* var. *hispida* – S]

Smilax hugeri (Small) J.B.S. Norton ex Pennell, Huger's Carrionflower. Mt (GA, NC, SC), Pd (GA, NC, SC), Cp (GA, SC): moist deciduous forests; rare (NC Watch List). March-April; August-October. S. NC and e. TN south through SC, GA, and AL to panhandle FL. [= FNA, K, W, Y, Z; = *S. ecirrata* (Engelmann ex Kunth) S. Watson var. *hugeri* (Small) Ahles – RAB; = *Nemexia hugeri* Small – S]

Smilax lasioneura Hooker, Midwestern Carrionflower. Mt (NC, SC, VA?), Pd (NC), {GA}: moist deciduous forests, bluff forests, pine-oak hickory submesic forests, perhaps only or primarily over mafic rocks; rare (GA Rare, NC Rare). April-May; August-September. Ontario and MT south to w. VA (?), w. NC, n. FL, OK, and CO. Material from VA is ambiguous. [= F, FNA, K; = *S. herbacea* var. *lasioneura* (Hooker) Alphonse de Candolle – C, G; = *Nemexia lasioneuron* (Hooker) Rydberg – S; = *S. lasioneuron* – Y, orthographic variant]

Smilax laurifolia Linnaeus, Blaspheme-vine, Bamboo-vine. Cp, Pd, Mt (GA, NC, SC, VA): pocosins, swamp forests, mountain bogs in sw. NC; common (rare in Piedmont and Mountains). July-August; September-October of the second year (and persisting). Primarily a Southeastern Coastal Plain species: NJ south to s. FL, west to w. TN, AR, and e. TX, and also in the Bahama Islands and Cuba. [= RAB, C, F, FNA, G, GW, K, S, W, Y]

Smilax pseudochina Linnaeus, Coastal Carrionflower. Cp (GA, NC, SC, VA): pocosins, swamp forests, edges of pine savannas; uncommon. May; August-October. An Atlantic Coastal Plain endemic: NJ, se. PA, and DE south to e. GA. [= C, FNA, K, Y; = *S. tamnifolia* Michaux – RAB, G; = *S. pseudo-china* – F, W, Z, orthographic variant; > *Nemexia tamnifolia* (Michaux) Small – S; > *Nemexia leptanthera* (Pennell) Small – S]

Smilax pulverulenta Michaux. Mt (GA, NC, SC, VA), Pd, Cp (NC, SC, VA): moist deciduous forests: common. May-June; August-October. Se. NY, se. and sc. PA, IN, MO, and e. KS south to NC, TN, and AR. [= F, FNA, K, W, Y, Z; = *S. herbacea* var. *pulverulenta* (Michaux) A. Gray – RAB, C, G; = *Nemexia pulverulenta* (Michaux) Small – S]

Smilax pumila Walter, Sarsaparilla-vine, Dwarf Smilax. Cp (GA, SC): mesic to dryish hammocks and bluffs, northward primarily in maritime-influenced mainland forest, with *Magnolia grandiflora* and *Tilia americana* var. *caroliniana*; rare (NC Watch List). October-November; January-April (and persisting). Ne. SC (within a few hundred meters of Brunswick County, NC) to FL and west to TX. It occurs on Colkins Neck, along the NC-SC border, in maritime-influenced forests with southern affinities, now largely destroyed by golf-course development. This unusual *Smilax* is sometimes cultivated as an ornamental ground-cover. [= RAB, FNA, K, S, Y]

Smilax rotundifolia Linnaeus, Common Greenbrier, Bullbrier, Horsebrier. Mt, Pd, Cp (GA, NC, SC, VA): in a wide variety of upland and wetland habitats; common. April-May; September-November (and persisting). Nova Scotia and s. Ontario

south to n. FL and e. TX. [= RAB, C, F, FNA, G, GW, K, S, W, Y; > *S. rotundifolia* var. *quadrangularis* (Muhlenberg ex Willdenow) Wood]

Smilax smallii Morong, Jackson-brier. Cp (GA, NC, SC, VA), Pd, Mt (GA): bottomland forests; uncommon, rare in VA (VA Rare). June-July; April-June of the next year. Se. VA to c. FL, west to s. AR and e. TX, primarily on the Coastal Plain. [= RAB, FNA, G, GW, K, W, Y; = *S. lanceolata* Linnaeus – S, misapplied]

Smilax walteri Pursh, Coral Greenbrier, Red-berried Swamp Smilax. Cp, Pd (GA, NC, SC, VA): swamp forests, bogs, often where submersed for at least part of the year; common (rare in Piedmont). Late April-May; September-November (and persisting). NJ south to c. FL and west to TN, AR, and TX. [= RAB, C, F, FNA, G, GW, K, S, W, Y]

Smilax leptanthera Pennell. See Pennell (1916) for additional information. Treated as valid and rare by GAHP. [= *Nemexia leptanthera* (Pennell) Small – S; < *S. pseudochina*] {investigate}

STEMONACEAE Engler 1887 (Stemona Family)

A family of 3-4 genera and 30-35 species, herbs and shrubs, of Asia, Australia, and se. North America. References: Whetstone in FNA (2002a); Rogers (1982)=Z; Kubitzki in Kubitzki (1998a).

Croomia Torrey 1840 (Croomia)

A genus of 3 species, 2 in China and Japan and 1 in se. North America. Sometimes segregated into the Croomiaceae. References: Whetstone in FNA (2002a); Rogers (1982)=Z; Kubitzki in Kubitzki (1998a).

Croomia pauciflora (Nuttall) Torrey, Croomia. Cp (GA): moist forests, often with beech and basswood; rare (GA Threatened). April-May. AL (or perhaps LA) to sw. GA, Panhandle FL, and allegedly se. GA (Whetstone in FNA 2002, Jones & Coile 1988). [= FNA, K, S, Z]

THEMIDACEAE Salisbury 1866 (Brodiea Family)

A family of 12 genera and about 60 species, herbs, of w. North America south to Guatemala. References: Rahm in Kubitzki (1998a).

Dichelostemma Kunth 1843

A genus of 5 species, of w. United States and Mexico. References: Pires in FNA (2002a); Rahm in Kubitzki (1998a).

* ***Dichelostemma congestum*** (Smith) Kunth, native of the Pacific northwestern North America, is cultivated and apparently escaped in the Piedmont of nc. GA (Jones & Coile 1988). {further investigate} [= FNA, K; = *Brodiaea congesta* Smith]

TOFIELDIACEAE Takhtajan 1994 (False-asphodel Family)

A family of 5 genera and about 30 species, of disjunct distribution in north temperate and subarctic areas, and in the Guayana Shield and northern Andes areas of n. South America. Reveal & Zomlefer (1998) place the Tofieldiaceae in the monotypic order Tofieldiales, only distantly related to the Liliaceae. Tamura in Kubitzki (1998a) treats this group as subfamily Tofieldioideae of the Nartheciaceae. References: Zomlefer (1997c, 1999); Tamura in Kubitzki (1998a).

1 Inflorescence 1-flowered; tepals yellow; seeds yellowish; [endemic to Panhandle FL] ..... ***Harperocallis***
1 Inflorescence a raceme or thyrse; tepals white to pale cream (fading to yellowish on dried specimens); seeds brown; [collectively widespread].
  2 Bracts of the inflorescence large, spathelike, acuminate-aristate at the tip; tepals 9-17 mm long; stamens (6-) 9 (-12) ..... ***Pleea***
  2 Bracts of the inflorescence minute; tepals 2.5-5 mm long; stamens 6.
    3 Inflorescence a raceme (the flower pedicels attached to the scape singly); scape smooth; flowering (late August-) late September-October ..... ***Tofieldia***
    3 Inflorecence a thyrse (flower pedicels attached to the scape in groups of 3-7); scape scurfy-scabrous; flowering June-August ... ***Triantha***

Harperocallis McDaniel 1968 (Harper's Beauty)

A monotypic genus, perennial, of southeastern United States. References: McDaniel (1968)=Y; Zomlefer (1997c)=Z; Utech & Anderson in FNA (2002a).

Harperocallis flava McDaniel, Harper's Beauty. Cp (FL): pineland bogs, nearby road margins; rare. Endemic to FL Panhandle (Franklin and Liberty counties). [= FNA, K, Y, WH, Z]

Pleea Michaux 1803 (Rush-featherling)

A monotypic genus, of se. North America, sometimes included in *Tofieldia*. References: Zomlefer (1997c)=Z; Tamura in Kubitzki (1998a); Packer in FNA (2002a).

Pleea tenuifolia Michaux, Rush-featherling. Cp (FL, GA?, NC, SC): locally abundant in wet savannas, pocosin margins, usually in peaty soil, locally abundant in a few counties in se. NC, rare inland (very rarely as far as Cumberland County, NC); uncommon (rare in SC). September-October; October-November. A Southeastern Coastal Plain endemic: se. NC and ne. SC south to sw. GA, n. FL and s. AL, but apparently absent from s. SC and ne. GA. When in flower in wet savannas and powerline rights-of-way in Brunswick County, *Pleea* visually dominates areas up to hundreds of hectares. In sterile condition, it is recognizable by its leathery equitant leaves, bright red at their bases. [= RAB, FNA, GW, K, S, WH; = *Tofieldia tenuifolia* (Michaux) Utech – Z]

Tofieldia Hudson 1778 (Bog Asphodel)

A genus of about 7-8 species, of temperate to subarctic North America and Eurasia. There is controversy about the circumscription of *Tofieldia*.relative to the related genera *Pleea* and *Triantha* (here recognized, but sometimes subsumed into *Tofieldia*. Some believe that *Tofieldia*, *Triantha*, and *Pleea* should be treated together in a broadly circumscribed *Tofieldia* (Utech 1978, Zomlefer 1997c); others that all three should be treated separately (Ambrose 1980; Packer 1993; Cruden 1991). Packer in FNA (2002a) has recently recognized *Triantha*, *Pleea*, and *Tofieldia* as separate genera, a conclusion followed here in part because of the ancient, relictual nature of these units. References: Zomlefer (1997c)=Z; Packer (1993); Ambrose (1980); Utech (1978); Hitchcock (1944)=Y; Tamura in Kubitzki (1998a); Packer in FNA (2002a); Cruden (1991).

Identification notes: In sterile condition, *Tofieldia glabra* can be distinguished from *Iris verna* by its minutely upwardly-scabrous margins (*Iris* has smooth margins).

Tofieldia glabra Nuttall, Carolina Bog Asphodel, White Asphodel. Cp (NC, SC): savanna-pocosin ecotones, wet savannas, seepage bogs; rare. (Late August-) late September-October; October-November. Endemic to the coastal plain and sandhills of NC and northern SC (the reports from GA are dubious). [= RAB, FNA, GW, K, S, Z]

Triantha (Nuttall) Baker

A genus of ca. 4 species, herbs, of North America and Japan. References: Zomlefer (1997c)=Z; Hitchcock (1944)=Y; Cruden (1991).

1 Perianth equal to or longer than the capsule; seeds with tails 1/2 or less as long as the body ..... ***Tr. racemosa***
1 Perianth shorter than the capsule; seeds with at least 1 tail equal to or longer than the body ..... ***Tr. glutinosa***

Triantha glutinosa (Michaux) Baker, Sticky Bog Asphodel. Mt (GA, NC, VA), Pd (NC): bogs and seeps, especially over mafic or calcareous rocks; rare. July-August; September-October. Newfoundland west to British Columbia, south to w. NC, ne. GA (Jones & Coile 1988), WV, OH, n. IN, WI, MT, and OR. [= FNA, K, S; = *Tofieldia racemosa* var. *glutinosa* (Michaux) Ahles – RAB; = *Tofieldia glutinosa* (Michaux) Persoon – F, G, W; > *Tofieldia glutinosa* ssp. *glutinosa* – GW, Y, Z; > *Tofieldia glutinosa* var. *glutinosa* – C]

Triantha racemosa (Walter) Small, Coastal Plain Bog Asphodel. Cp (FL, GA, NC, SC, VA), Mt (VA), Pd (GA): savannas, savanna-pocosin ecotones, seepage bogs, sinkhole ponds (dolines) in the mountains of VA; uncommon (rare in VA). June-early August; late September-October. NJ south to nw. FL, west to e. TX; disjunct in c. TN. [= FNA, K, S; = *Tofieldia racemosa* var. *racemosa* – RAB; = *Tofieldia racemosa* (Walter) Britton, Sterns, & Poggenburg – C, F, G, GW, W, WH, Z]

TRILLIACEAE Lindley 1846 (Trillium Family)

A family of 5 genera and about 80 species, perennial herbs, of temperate Northern Hemisphere. References: Farmer & Schilling (2002).

Trillium Linnaeus 1753 (Trillium, Toadshade, Wake-robin)

A genus of about 50 species, of e. North America, w. North America, and e. Asia (especially se. North America). The genus *Trillium* in our area is difficult and complex. *Trillium* is now usually separated from the Liliaceae (along with Eurasian genera such as *Paris)* into the Trilliaceae (Zomlefer 1996, Kato et al. 1995, Kawano & Kato 1995, and others) or less drastically as part of the Melanthiaceae (Chase et al. 2000; Tamura et al. 2004). The traditonal division of the genus into two well-marked subgenera, subgenus *Trillium*, the pedicellate trilliums, and subgenus *Phyllantherum*, the sessile-flowered trilliums, has been partly supported by molecular and morphological phylogenetic studies (Kawano & Kato 1995, Kato et al. 1995). These studies

support the monophyly of subgenus *Phyllantherum*, but suggest that subgenus *Trillium* consists of several groups which are only rather distantly related (Kawano & Kato 1995, Kazempour Osaloo et al. 1999; Farmer & Schilling 2002). Most species are slow-growing perennials; seedlings, juveniles, and depauperate or "tired" plants are one-leaved ("monilliums"), recognizable by the similar color, texture and venation of the single leaf to the three leaves of mature plants. In some species, such as *T. pusillum*, individual plants remain in the single-leaf stage for long periods of time, and populations may consist largely of juvenile plants. References: Patrick (1986)=Z; Patrick (2007)=V; Freeman (1975)=Y; Case & Case 1997=X; Patrick in Wofford (1989); Case in FNA (2002a); Mitchell (1990); Kato et al. (1995); Kawano & Kato (1995); Tamura in Kubitzki (1998a); Zomlefer (1996); Farmer & Schilling (2002). Key adapted from Patrick (1986, 2007), unpublished keys of J.D. Freeman, and other sources.

Identification notes: Teratological forms are frequent in some species, as, for instance, leaves, sepals, and stamens in 2's or 4's, petals sepaloid, or sepals petaloid, and so forth. What are called "leaves" in *Trillium* are actually bracts.

1 Leaves mottled with 2-3 different shades of green (very rarely the mottling not apparent); flower sessile; [subgenus *Phyllantherum*]..... **Key A**
1 Leaves solid green; flower on a pedicel (the pedicel sometimes very short or essentially absent in some varieties of *T. pusillum*); [subgenus *Trillium*].
  2 Petals relatively thick in texture, straight-margined, maroon or white, rarely yellow or green (if white, turning brown with age); stigmas thicker at base, tapering gradually toward tip, distinct; ovary purple-black, maroon, pink, or white, 6-angled; [*Erectum* group].....**Key B**
  2 Petals relatively delicate in texture, wavy-margined, white to deep pink (if white, generally fading to pink with age); stigmas thin, uniform in thickness from base to apex, somewhat fused at the base into a short style; ovary greenish-white to white, 3- or 6-angled or-lobed..... **Key C**

Key A – trilliums with sessile flowers and mottled leaves (subgenus *Phyllantherum*)

1 Scape more-or-less decumbent in a gentle S-shape, the leaves lying on the ground, or nearly so; flower fragrance putrid; [*T. sessile* group].
  2 Anther dehiscence extrorse (toward the outside of the flower); stamens about 0.25× as long as the petals; upper stem puberulent; petals 4-10 cm long; filaments 2-5 mm long..... ***T. decumbens***
  2 Anther dehiscence introrse (toward the inside of the flower); stamens about 0.5× as long as the petals; upper stem glabrous; petals 2.5-5.5 cm long; filaments 1-2 mm long..... ***T. reliquum***
1 Scape erect, straight, the leaves bone well above the ground (the leaf tips sometimes nearly touching the ground); flower fragrance various.
  3 Sepals abruptly deflexed between and below the leaves, distinctly descending below the approximately horizontal plane of the leaves; filaments about as long as incurved anthers; [*T. recurvatum* group].
    4 Leaves sessile or subsessile, borne in a descending or drooping manner (similar to the sepals); petals usually > 4× as long as wide..... ***T. lancifolium***
    4 Leaves distinctly petiolate, borne in an ascending manner (strongly contrasting in position with the strongly deflexed sepals); petals usually ca. 2× as long as wide..... ***T. recurvatum***
  3 Sepals erect, ascending, or spreading, usually borne at or above the approximately horizontal plane of the leaves; filaments much shorter than the upright anthers.
    5 Petals spreading to horizontal, with 1-2 spiral twists (looking something like an airplane propellor); anther dehiscence extrorse (toward the outside of the flower); [*T. sessile* group] ..... ***[T. stamineum]***
    5 Petals erect to slightly spreading, not spirally twisted; anther dehiscence introrse (toward the inside of the flower), or latrorse (toward the side).
      6 Petals broadly spatulate, clawed, broadly rounded (though sometimes with an apiculus) at the tip; petals pale lemon-yellow (the claws greenish or maroon); flower fragrance clove-like; [of the Savannah River drainage, from sw. NC southeastward along the GA-SC border]; [*T. sessile* group]..... ***T. discolor***
      6 Petals lanceolate, elliptic, obovate, or oblanceolate, but not broadly spatulate and distinctly clawed, generally acute at the tip; petals maroon-red, purplish-brown, yellow, or green; flower fragrance various; [collectively widespread in our area].
        7 Stigmas > 1.5× as long as the ovary; stamens about 0.5× as long as the petals; anther connectives prominently prolonged into a beak 1.0-5.0 mm long (beyond the anther sacs); [*T. sessile* group] ..... ***T. sessile***
        7 Stigmas as long as the ovary or shorter; stamens < 0.5× as long as the petals; anthers blunt, the connectives extended < 1.0 mm beyond the anther sacs.
          8 Ovary ellipsoid; leaves acute, the margins of the outer 1/3 more or less straight; leaf blade mottled with 3 or more shades of green, the palest shade forming a very conspicuous pale silvery-green streak along the midvein; [of the Coastal Plain and fall-line area of GA, AL, and FL panhandle]; [*T. sessile* group].
            9 Stem 2.5-3× as long as the leaves; petals oblanceolate-obovate, usually 1.5-3× as long as wide..... ***T. decipiens***
            9 Stem 1-2× as long as the leaves; petals narrowly elliptic to oblanceolate-obovate, usually 3-5× as long as wide..... ***T. underwoodii***
          8 Ovary ovoid; leaves acute to acuminate, the margins of the outer 1/3 convex; leaf blade mottled with 2-3 shades of green, paler shades sometimes prominent along the midvein, but not as above; [collectively widespread in our area]; [*T. maculatum* group].
            10 Petals < 4× as long as wide, elliptic-oblanceolate to oblanceolate; [of inland provinces, rarely in the Coastal Plain].
              11 Flower fragrance fruity-spicy, like green apples or *Calycanthus* (rarely musky); petals maroon, bronze, green, yellow; portions of ovary and stamens purplish during anthesis..... ***T. cuneatum***
              11 Flower fragrance lemon-like; petals greenish-yellow darkening to yellow; ovary and stamens greenish-white during anthesis ..... ***T. luteum***
            10 Petals > 4.5× as long as wide, narrowly oblanceolate-spatulate to linear-oblanceolate; [of the Coastal Plain, rarely further inland].
              12 Ovary 3-angled at base of stigmas (rarely hexagonal); petals 7-17 mm wide, narrowly spatulate (appearing clawed); outer whorl of stamens broader, anther dehiscence introrse; flower fragrance faintly spicy-fragrant, banana-like; [of AL, n. FL, GA, and e. SC]..... ***T. maculatum***
              12 Ovary 6-angled; petals 3-8 mm wide, linear-oblanceolate, narrowly elliptic, to linear-lanceolate (weakly or not clawed); flower fragrance putrid, like rotting meat; [of MS and LA].
                13 Petals 3-5 mm wide; anther dehiscence introrse; anther connective extending 1-1.5 mm beyond the anther sacs .....

.....[*T. foetidissimum*]

13 Petals 4-8 mm wide; anther dehiscence latrorse; anther connective scarcely extending beyond the anther sacs ..... [*T. ludovicianum*]

Key B – trilliums with unmottled leaves and pedicellate flowers, of the *Erectum* Group

1 Flowers held below the leaves (the pedicel declined below a horizontal plane).
  2 Stamens far exceeding the pistil, filaments as long as the ovary or longer, at least partly maroon, the anther sacs yellow to maroon; ovary small, globose, 3-12 mm long, dark purplish black; flower fragrance pungent, rose-like; pedicel long, 3-13 cm long; petals strongly overlapping, usually maroon (rarely white or whitish) ..... *T. vaseyi*
  2 Stamens at most 1.5× longer than the pistil, filaments shorter than the ovary, white (less commonly purplish), the anther sacs lavender to vivid purple (or albino); ovary white to pink or dull red, large, ovoid, 10-17 mm long; flower fragrance various; pedicel short to long, 1.5-12 cm long; petals not strongly overlapping, usually white (rarely maroon).
    3 Pedicels short, 1.5-3 cm long.
      4 Anthers 7.5 mm long or less, about as long as the filaments or shorter; petals narrowly elliptic to obovate, often scarcely larger than the sepals, delicate, occasionally margined in pink or green; [of damp forests of n. VA and northwards] ..... *T. cernuum*
      4 Anthers 7.0 mm long or more, longer than the filaments; petals ovate to elliptic, much broader than the sepals; [of mesic forests of n. NC southwards] ..... *T. rugelii*
    3 Pedicels long, 4-12 cm long.
      5 Stamens about as long as the ovary or slightly longer; filaments short, ca. 1/3 the length of the anthers or shorter; filaments ½ as long as the ovary or shorter; pollen creamy to pale yellow; filaments and anthers white, the anthers at least in part somewhat appressed against the ovary ..... *T. flexipes*
      5 Stamens far exceeding ovary height; filaments ca. ½ the length of the anthers; pollen creamy, yellow, or pale grayish purple; anthers and filaments also variable in color, mostly white, occasionally purplish; anthers mostly longer than the ovary and not appressed against it ..... *T. species 2*
1 Flowers held at or above the level of the leaves (the pedicel nearly horizontal, inclined above the horizontal, or erect).
  6 Ovary flask-shaped, broadest near the base, usually white to pinkish (sometimes darker); petals usually white to creamy white (maroon forma occasional)
    7 Stamens about as long as the ovary or slightly longer; filaments short, ca. 1/3 the length of the anthers or shorter; filaments ½ as long as the ovary or shorter; pollen creamy to pale yellow; filaments and anthers white, the anthers at least in part somewhat appressed against the ovary ..... *T. flexipes*
    7 Stamens far exceeding ovary height; filaments ca. ½ the length of the anthers; pollen creamy, yellow, or pale grayish purple; anthers and filaments also variable in color, mostly white, occasionally purplish; anthers mostly longer than the ovary and not appressed against it ..... *T. species 2*
  6 Ovary globose, widest near the middle, black to purplish black; petals white, maroon, yellowish, or otherwise.
    8 Petals lanceolate to narrowly ovate or elliptic, spreading from base in the same plane as the sepals, rarely > 2× as broad as the sepals; sepals 0.5-0.8× as long as the pedicel. weakly sulcate-tipped (keeled and upturned near apex); flower fragrance unpleasant, musty..... ..... *T. erectum*
    8 Petals ovate, overlapping in some instances and forming a cup-shaped base, variably recurved apically, > 2× as broad as the sepals; sepals < 0.5 as long as the pedicel, sulcate-tipped; fragrance pleasant, sweet to fungal.
      9 Sepals 0.4-0.7× as long as the pedicel; leaves broadly elliptic; stamens 1.2-1.8× pistil height; flowers generally large, petals much longer than the sepals; sepals green; petals usually white (rarely maroon); flower fragrance sweet, like green apples; [of sw. NC and nw. SC in our area] ..... *T. simile*
      9 Sepals 0.2-0.4× as long as the pedicel; leaves broadly obovate; stamens 0.9-1.6× pistil height; flowers relatively small, petals only slightly longer than the sepals; sepals suffused with purple; petals usually maroon (rarely white); flower fragrance fungal, like fresh mushrooms; [of sw. VA and nw. NC in our area] ..... *T. sulcatum*

Key C – trilliums with unmottled leaves and pedicellate flowers, of various affinities

1 Petals white with triangular red blaze (rarely entirely white or pinkish); anther sacs lavender to white, dehiscence extrorse; fruit a red berry; leaves long-acuminate; [of acidic sites in the Mountains, generally strongly associated with either *Pinus, Tsuga, Picea, Rhododendron*, or other heaths] ..... *T. undulatum*
1 Petals white to deep pink, lacking a red blaze; anther sacs yellow, dehiscence introrse; fruit a white to greenish-white, fleshy, irregularly dehiscent capsule; leaves obtuse to acute (or somewhat acuminate in *T. grandiflorum*); [of less distinctly acidic sites, collectively widespread in our area].
  2 Pedicel declined below the leaves (rarely erect); sepals arcuate-recurved; anthers irregularly twisted outward; pollen egg-yolk yellow..... ..... *T. catesbaei*
  2 Pedicel inclined above leaves to strictly erect; sepals not arcuate-recurved; anthers erect, regular; pollen light yellow.
    3 Sepals narrower than the petals, acute; anthers white to greenish-white between the anther sacs; leaves obtuse, acute, or acuminate; pedicel somewhat angled from the vertical.
      4 Ovary obscurely 3-lobed; leaves < 5 cm long, blue-green, obtuse ..... *T. nivale*
      4 Ovary sharply 6-angled (-winged); leaves > 5 cm long, green, acute to acuminate.
        5 Petals obovate, tightly rolled at base, abruptly flared near the apex; leaves broadly elliptic, acuminate; style minute, < 1.0 mm long ..... *T. grandiflorum*
        5 Petals elliptic, loose, gradually separating; leaves ovate, acute; style conspicuous, > 1.5 mm long ..... *T. persistens*
    3 Sepals about as broad as the petals or broader, obtuse; leaves obtuse; anthers purplish-green between anther sacs; pedicel erect through fruiting; [*Trillium pusiillum* complex].
      6 Leaves with stomates on the upper surface, appearing farinose; [of n. GA] ..... *T. pusillum var. 2*
      6 Leaves without stomates on the upper surface, appearing glabrous.
        7 Pedicel < 10 (-12) mm long.

8 Pedicel (0-) 0.5-1 mm long; leaves (1.5-) 2.0-2.4 (-2.9) × as long as broad; leaves (14-) 15-20 (-22.5) mm wide; filaments (4.5-) 4.6-5.8 (-8) mm long; [of upland woods of w. VA and e. WV Mountains] ..... ***T. pusillum** var. **monticulum***

8 Pedicel (0.5-) 1-6.5 (-11) mm long; leaves (2.1-) 2.5-3.8 (-6) × as long as broad; leaves (6-) 10-17 (-25) mm wide; filaments (2.5-) 3-5 (6.5) mm long; [of wetland woods].

9 Anthers (3.2-) 4.5-6 (-7) mm long; stamens (5.7-) 8.4-10.9 (-12.5) mm long; stigmas (1-) 2.1-3 (-5) mm long; leaves elliptic; [of the outer Coastal Plain of e. VA and ne. NC] ..... ***T. pusillum** var. 5*

9 Anthers (2.5-) 2.7-4.8 (-6.8) mm long; stamens (5.7-) 6-9.2 (-13.2) mm long; stigmas (1-) 1.2-2.5 (-4.7) mm long; leaves ovate; [of the upper Coastal Plain and Piedmont of ne. NC, se. VA, and Mountains of sw. VA].

10 Pedicel (1.2-) 1.8-6.6 (-11) mm long; stamens (5.7-) 6-7.6 (-13.2) mm long; stigmas (1-) 1.2-2 (-2.5) mm long; [of Piedmont to edge of upper Coastal Plain] ..... ***T. pusillum** var. 4*

10 Pedicel (0.5-) 1-2.1 (-7) mm long; stamens (6-) 7.5-9.2 (-11) mm long; stigmas (1-) 2-2.5 (-4.7) mm long; [of upper Coastal Plain] ..... ***T. pusillum** var. **virginianum***

7 Pedicel 10-56 mm long.

11 Leaves ascending; sepals ca. 1.4× as long as the petals; [of sphagnum bogs in the s. SC sandhills] ..... ***T. pusillum** var. 3*

11 Leaves horizontal to declining; sepals 0.9-1.1× as long as the petals.

12 Leaves narrower, (1.9-) 3-4.1 (-5.6) × as long as wide; pedicel (23-) 25-33 (-56) mm long; [of dry pine woods] ..... ***T. pusillum** var. **pusillum***

12 Leaves broader, (2-) 2.7-3.4 (-5.5) × as long as wide; pedicel (7-) 13-30 (-45) mm long.

13 Leaves elliptic, rounded; sepals (13-) 18-25 (-30) long, (4-) 6-8 (-12) mm wide, (1.8-) 2.7-3.1 (-4) × as long as wide; [generally of swamps and floodplains] ..... ***[T. pusillum** var. 1]*

13 Leaves ovate, acute; sepals (14-) 22-30 (-41) long, (4-) 6-11 (-17) mm wide, (2-) 3-4.3 (-5.6) × as long as wide; [generally of upland rocky slopes] ..... ***T. pusillum** var. **ozarkanum***

Trillium catesbaei Elliott, Catesby's Trillium, Bashful Trillium, Rosy Wake-robin. Pd (GA, NC, SC), Mt (GA, NC, SC), Cp (GA, NC): bottomland forests, mesic slopes, cove forests; common (uncommon in Mountains). Late March-early June; July-August. Nc. NC south to sw. GA and se. AL, north in the interior to n. AL and se. TN, centered in the Piedmont from NC to GA, but extending into the Mountains and Coastal Plain. Petals white to pink. [= RAB, FNA, K, S, V, W, X, Z]

Trillium cernuum Linnaeus, Northern Nodding Trillium. Mt (VA): damp forest with *Fraxinus nigra* and *Ulmus americana*; rare (VA Rare). Late April-May. Newfoundland, Hudson Bay area, and se. Saskatchewan south to n. VA, ne. WV, n. IN, n. IL, n. IA, and SD. Petals white, pink, maroon, or green. [= FNA, K, W, X, Z; < *T. cernuum* – RAB, F, S (apparently also including *T. rugelii*); > *T. cernuum* var. *cernuum* – C, G; >< *T. cernuum* var. *macranthum* A.J. Eames & Wiegand – C, G]

Trillium cuneatum Rafinesque, Sweet Betsy, Purple Toadshade, Large Toadshade, Wedge-petal Trillium, Bloody Butcher. Pd, Mt (GA, NC, SC), Cp (GA): in rich soils of cove forests, moist slopes, and bottomlands, usually over mafic or calcareous rocks; uncommon, but locally abundant. Mid March-April; late May-June. Centered in the Southern Appalachians (but is more abundant in adjacent physiographic provinces), extending north to the Highland Rim of KY, west to the Interior Low Plateau of TN, south to the Coastal Plain of MS and AL, and east to the Piedmont of GA, SC, and NC. Petals maroon, yellow, green, or various intermediate shades. [= C, FNA, K, V, W, X, Y, Z; = *T. cuneatum* var. *cuneatum* – RAB; > *T. cuneatum* – F; >< *T. viride* Beck – F, misapplied with respect to NC material; < *T. viride* var. *luteum* (Muhlenberg) Gleason – G, misapplied (also see *T. luteum*); > *T. hugeri* Small – S; >< *T. underwoodii* – S, misapplied]

Trillium decipiens J.D. Freeman, Chattahoochee Trillium, Deceptive Trillium. Cp (AL, FL, GA): moist forests; uncommon (rare in FL). Late January-early April. FL Panhandle (Jackson and Walton counties) and sc. AL east to ec. GA, and might be expected in SC, near the Fall Line. It is similar to *T. underwoodii*. [= FNA, K, V, WH, X, Y, Z]

Trillium decumbens Harbison, Decumbent Trillium. Mt, Pd, Cp (GA): moist forests; uncommon (rare in Piedmont and Coastal Plain). Mid-March-April. Se. TN (Chester et al. 1993) south and west to nw. GA and nc. AL, and disjunct in Houston County, in central GA Coastal Plain; it should be sought in extreme sw. NC, an extremely "under-botanized" area. [= FNA, K, S, X, Y, Z]

Trillium discolor Wray ex Hooker, Pale Yellow Trillium, Pale Trillium, Small Yellow Toadshade. Mt (GA, NC, SC), Pd (GA, SC): rich cove forests, restricted to the Savannah River drainage; rare (GA Special Concern, NC Threatened, SC Rare). Late March-early May; June-July. Endemic to the Savannah River drainage of nw. SC, ne. GA, and sw. NC, occurring in the Blue Ridge and Piedmont. In NC it is restricted to a few sites along the Whitewater and Thompson Rivers. Petals pale yellow, with maroon or greenish claws. [= RAB, FNA, K, S, V, W, X, Y, Z]

Trillium erectum Linnaeus, Red Trillium, Purple Trillium, Stinking Willie, Stinking Benjamin, Wake-robin. Mt (GA, NC, SC, VA): wooded slopes, usually at middle to high elevations; common. April-early June; July-August. New Brunswick, Québec, and MI south to w. NC, nw. SC, n. GA, e. TN, IN, and se. WI. Petals maroon, white, yellow, green, or various intermediate shades. [= C, K, V, W, X, Z; < *T. erectum* var. *erectum* – RAB (also see *T. sulcatum*); < *T. erectum* – F, G, S (also see *T. sulcatum*); > *T. erectum* var. *erectum* – FNA; > *T. erectum* var. *album* (Michaux) Pursh – FNA]

Trillium flexipes Rafinesque, Bent White Trillium. Mt (GA, NC, VA): moist coves over mafic or calcareous rocks; rare (GA Special Concern, NC Rare, VA Rare). April. E. PA, s. Ontario and s. MN south to w. NC, nw. GA, n. AL, n. MS, mostly west of the Blue Ridge, but scattered in the Blue Ridge of NC, and disjunct east of the Blue Ridge in DE, PA, and MD. Petals white or maroon. [= C, F, FNA, K, V, W, X, Z; < *T. erectum* var. *vaseyi* – RAB; = *T. gleasoni* Fernald – G; = *T. declinatum* (A. Gray) Gleason – S, misapplied]

Trillium grandiflorum (Michaux) Salisbury, Large-flowered Trillium, White Trillium, Great White Trillium. Mt (GA, NC, SC, VA), Pd (NC, SC, VA): rich coves and mesic slopes, also less typically on ridges over "rich" rock types; common (rare in SC). April-May; July-August. S. Québec, s. Ontario, MI, and MN, south to NJ, c. NC, nw. SC, n. GA, n. AL, s. IL, and IA. Petals white to pink. [= RAB, C, F, FNA, G, K, S, V, W, X, Z]

Trillium lancifolium Rafinesque, Lanceleaf Trillium, Narrowleaf Trillium. Pd (SC), Mt (GA), Cp (FL, GA): rich forests over marble, limestone, and other calcareous substrates, floodplain forests; rare. Late March-April. Nc. SC and se. TN south

through w. GA and AL to Panhandle FL and se. AL. Petals purple, green, or greenish-purple. [= FNA, K, V, WH, Y, X, Z; = *T. lanceolatum* (S. Watson) Boykin ex Small – RAB, S]

Trillium luteum (Muhlenberg) Harbison, Yellow Trillium, Yellow Toadshade, Wax Trillium, Lemon-scented Trillium. Mt (GA, NC, VA*): moist coves over mafic or calcareous rocks, restricted to the vicinity of the Great Smokies; uncommon (but locally abundant). Mid March-April; late May-June. Nearly endemic to the Southern Appalachians: w. NC, e. TN, nw. GA, and se. KY, allegedly disjunct in c. AL (planted and naturalized in Frederick County, VA). Petals yellow. [= C, F, FNA, K, V, W, X, Y, Z; = *T. cuneatum* var. *luteum* (Muhlenberg) Ahles – RAB; < *T. viride* Beck var. *luteum* (Muhlenberg) Gleason – G (also see *T. cuneatum*); < *T. sessile* – S, misapplied]

Trillium maculatum Rafinesque, Mottled Trillium, Spotted Trillium. Cp (FL, GA, SC), Pd (GA, SC): rich forests and floodplains, over calcareous materials such as coquina limestone ("marl") or on shell middens; uncommon. Early February-mid April. S. SC south to n. FL, west to sc. AL. Petals maroon or yellow. [= FNA, K, V, WH, X, Y, Z; < *T. viride* – RAB, misapplied; < *T. sessile* – S, misapplied]

Trillium nivale Riddell, Snow Trillium, Dwarf White Trillium. Mt (VA): rocky, calcareous forests; rare (VA Rare). Early March-early April. MA, sw. PA, MI, WI, s. MN, and e. SD south to n. VA, KY, s. IN, s. IL, s. MO, and se. NE. Petals white to pink. [= C, F, FNA, G, K, X, Z]

Trillium persistens Duncan, Persistent Trillium. Mt (GA, SC): acidic forests with hemlocks and heaths; rare (US Endangered, GA Endangered, SC Rare). April. Endemic to a short stretch of the Tallulah-Tugaloo river system in nw. SC and ne. GA. Petals white to pink. [= FNA, K, V, W, X, Z]

Trillium pusillum Michaux *var.* ***monticulum*** Bodkin & Reveal. Mt (VA): dry to dry-mesic forests and woodlands, moist forests along small mountain streams; rare. Endemic to nw. VA, e. WV, and w. MD. NC. Var. *monticulum* Bodkin & Reveal has been controversial; see Cabe (1995) and Cabe & Werth (1995) for additional discussion of variation within *T. pusillum* in Virginia and elsewhere. Petals white to pink. [< *T. pusillum* – Z; < *T. pusillum* var. *virginianum* – C, K; < *T. pusillum* var. *pusillum* – FNA; = *T. pusillum* var. *monticola* Bodkin & Reveal – X, orthographic error; = *T. monticola* in prep.]

Trillium pusillum Michaux *var.* ***ozarkanum*** (Palmer & Steyermark) Steyermark. Mt (NC): dry to dry-mesic slopes, in NC under *Quercus coccinea* and *Kalmia latifolia*; rare. Centered in the Ozarks of sw. MO, nw. AR, and e. OK; disjunct eastward at scattered localities in sc. KY, nc. TN, sw. NC, and s. MS. Petals white to pink. [= K, X; < *T. pusillum* – RAB, G, S, Z; < *T. pusillum* var. *pusillum* – FNA; = ***T. ozarkanum*** Palmer & Steyermark]

Trillium pusillum Michaux *var.* ***pusillum***, Carolina Least Trillium, Carolina Dwarf Trillium. Cp (NC, SC): ecotones of calcareous savannas and swamp forests in the lower Coastal Plain; rare. Late March-May; June-July. Endemic to the outer Coastal Plain of e. NC and e. SC. *T. pusillum* is somewhat reminiscent of a tiny *T. grandiflorum*. The *T. pusillum* complex has a wide but very fragmented range, involving most of the Southeastern states. In addition to the taxa treated here, the complex includes *T. texanum* Buckley (of e. TX). The *Trillium pusillum* complex is currently undergoing study by Susan Farmer (Univ. of Tennessee); preliminary analysis shows that the published varieties are "good" and that the recognition of additional taxa is warranted. Petals white to pink. [= X; < *T. pusillum* var. *pusillum* – C, F, FNA, K; < *T. pusillum* – RAB, G, S, Z; = ***T. pusillum*** (sensu stricto)]

Trillium pusillum Michaux *var.* ***virginianum*** Fernald, Virginia Least Trillium, Virginia Dwarf Trillium. Cp (VA): bottomland forests along small streams in the upper Coastal Plain, swamps and bottomland forests, also mesic beech islands in swamp forests; rare. Late March-May; June-July. Var. *virginianum* occurs in the Coastal Plain of se. VA. Petals white to pink. [= F, FNA, X ; < *T. pusillum* – RAB, G, S, Z; < *T. pusillum* var. *virginianum* – C, K (also see var. *monticulum*); = ***T. virginianum*** (Fernald) C.F. Reed]

Trillium pusillum *var. 2*, Georgia Least Trillium. Mt (GA): {habitat}; rare. Endemic to n. GA. Apparently most closely related to *Trillium texanum*. Petals white to pink. Under study by Susan Farmer. [< *T. pusillum* – V; = *T. georgianum* in prep.]

Trillium pusillum *var. 3*, Aiken Least Trillium. Cp (SC): seepage bogs; rare. Endemic to sc. SC. Petals white to pink. Under study by Susan Farmer. [< *T. pusillum*; = *T. telmacola* in prep.]

Trillium pusillum *var. 4*, Carolina Least Trillium. Cp (NC), Mt (VA): swampy forests, bottomland forests along small streams in the upper Coastal Plain; rare. E. NC (upper Coastal Plain and adjacent Piedmont) , moist mafic areas in Grayson Co. VA. The Grayson County site is within a kilometer of the Alleghany County, NC border, and the plant may be found to occur in nw. NC. Petals white to pink. Under study by Susan Farmer. [< *T. pusillum*; = *T. carolinianum* in prep.]

Trillium pusillum *var. 5*, Dismal Swamp Least Trillium. Cp (NC, VA): swampy forests; rare. E. VA south to ne. NC. Petals white to pink. Under study by Susan Farmer. [< *T. pusillum*; = *T. palustris* in prep.]

Trillium recurvatum Beck, Prairie Trillium, Prairie Wake-robin. Mt, Pd (NC): rich soils of cove over calcareous rock; rare (NC Rare). W. OH west to s. MI, s. WI, and e. IA, south to c. TN, c. AL, c. MS, n. LA, and e. TX; disjunct in the Cumberland Plateau of e. TN, e. KY, and the Blue Ridge and w. Piedmont of NC. The two known NC occurrences (Catawba and Madison counties) appear to be native. Petals maroon or yellow. [= C, F, FNA, G, K, S, X, Y, Z]

Trillium reliquum J.D. Freeman, Relict Trillium. Pd (GA, SC), Cp (GA): rich forests on bluffs and ravine slopes; rare (US Endangered, GA Endangered, SC Rare). Mid March-late April. Known from two disjunct areas, along the Savannah River in the vicinity of Augusta, on the border of SC (Aiken County) and GA (Richmond counties), and along the Chattahootchee River in sw. GA (Clay and Early counties). [= FNA, K, V, X, Y, Z]

Trillium rugelii Rendle, Southern Nodding Trillium. Mt, Pd (GA, NC, SC): rich woodlands and forests over mafic or calcareous rocks; rare (NC Watch List, SC Rare). April-early May. W. NC and e. TN south to c. GA, and c. AL. Petals white or maroon. [= FNA, K, V, W, X, Z; < *T. cernuum* – RAB, F, S; < *T. cernuum* var. *macranthum* A.J. Eames & Wiegand – C, G]

Trillium sessile Linnaeus, Sessile Trillium, Sessile Toadshade, Toad Trillium. Mt (VA), Pd (VA), Cp (NC, VA): rich forests, in NC limited to very rich soils of natural levees and lower slopes along the Roanoke River; uncommon in VA, rare in NC (NC Rare). March-April. Primarily a species of the northern Midwest, *T. sessile* ranges from MD, w. PA, w. NY, s. MI, n. IL and n. MO, south to e. VA, ne. NC, c. TN, n. AL, and n. AR. The easternmost occurrences are disjunct populations east of the Blue Ridge, in MD, VA, and along the Roanoke River in ne. NC. Petals maroon or green. [= C, F, FNA, G, K, W, X, Y, Z]

Trillium simile Gleason, Sweet White Trillium. Mt (GA, NC, SC): very rich soils of slopes and coves over mafic or calcareous rocks, often also in or near seepage; rare (GA Special Concern, NC Rare, SC Rare). Late March-early May; June-July. A Southern Appalachian endemic: Blue Ridge of w. NC, nw. SC, e. TN, and n. GA. Petals white or very rarely maroon. [= FNA, K, S, V, W, X, Z; < *T. erectum* var. *vaseyi* – RAB]

Trillium species 2, Amicalola Trillium. Mt (GA): rich forests; rare. Under study by Tom Patrick and Susan Farmer. ["Amicalola Trillium" – V]

Trillium sulcatum T. Patrick, Southern Red Trillium, Barksdale's Trillium. Mt (GA, NC, VA): coves and moist slopes; uncommon (rare in GA). April-May. Primarily a species of the sedimentary rock Appalachians, *T. sulcatum* ranges from s. WV, sw. VA, and e. KY south to nw. NC (where it enters the Blue Ridge), w. TN, nw. GA, and ne. AL. This species seems quite distinctive for its small, generally maroon flowers (with strongly sulcate sepals purplish as well), borne on very long pedicels. Petals maroon or white. [= C, FNA, K, V, W, X, Z; < *T. erectum* var. *erectum* – RAB; < *T. erectum* – F, G, S]

Trillium underwoodii Small, Underwood's Trillium. Cp (AL, FL, GA): moist forests; uncommon. Late February-mid April. N. FL north to wc. GA and c. and s. AL. The only erect trillium with the stems < 2× as long as the leaves. [= FNA, K, S, V, WH, X, Y, Z]

Trillium undulatum Willdenow, Painted Trillium, Striped Wake-robin. Mt (GA, NC, SC, VA): acidic soils of ridges, slopes, and bog margins, mostly at high elevations and often associated with *Rhododendron, Tsuga, Pinus,* or *Picea*; common (SC Rare). Late April-May; late July-August. New Brunswick, e. Québec, s. Ontario, and MI, south to w. NC, nw. SC, n. GA, e. TN, and ne. OH. Of all our species, this is the species best adapted to acidic soils. Petals white with a red blaze. [= RAB, C, F, FNA, G, K, S, V, W, X, Z]

Trillium vaseyi Harbison, Sweet Trillium, Vasey Trillium, Sweet Beth. Mt (GA, NC, SC), Pd (GA): cove forests; uncommon. Late April-early June. This species is a Southern Appalachian endemic: w. NC and e. TN south to nw. SC, n. GA, and ne. AL. Perhaps the largest trillium species, with the stems to 7 dm tall. Petals maroon or white. [= FNA, K, S, V, W, X, Z; < *T. erectum* var. *vaseyi* (Harbison) Ahles – RAB (also see *T. simile* and *T. flexipes*)]

Trillium foetidissimum J.D. Freeman, Stinking Wake-robin. Bluffs, ravines, bottomlands. Late February-early April. MS west to LA. [= FNA, K, X, Y, Z]

Trillium ludovicianum Harbison, Louisiana Wake-robin. Floodplains, streambanks, ravine forests. Early March-April. MS west to LA. Reports of this species for AL are based on specimens of *Trillium species 3*. [= FNA, K, X, Y, Z]

Trillium pusillum var. 1, Alabama Least Trillium C. TN south to n. AL. Petals white to pink. Under study by Susan Farmer. [< *T. pusillum* var. *pusillum* – C, F, FNA, K; < *T. pusillum* – G, S, Z; = *T. pusillum* var. *alabamicum* – X (nomen nudum); = *T. alabamicum* in prep.]

Trillium species 1. Pd (SC): rich forests; rare. Under study by L.L. Gaddy. Somewhat similar to *T. lancifolium* and *T. recurvatum*. So far as is known, endemic to Kershaw County, SC, along the Wateree River. With clawed, bicolored petals (the claw maroon and the blade green) and green sepals reflexed somewhat (in the same plane as the drooping leaves). [previously misidentified as *T. lancifolium*] {not yet keyed}

Trillium species 3, Lookout Mountain Trillium. Lookout Mountain area, resembles *T. ludovicianum*. Under study by Susan Farmer. [< *T. ludovicianum* – V] {not yet keyed}

Trillium stamineum Harbison, Twisted Trillium. Floodplains, slopes, especially over limestone. Late March-mid May. C. TN (Chester et al. 1993) south to c. AL and e. MS. [= FNA, K, S, X, Y, Z]

TYPHACEAE A.L. de Jussieu 1789 (Cattail Family)

A family of 2 genera with 16-30 species, wetland herbs, cosmopolitan. References: Kaul in FNA (2000); Smith in FNA (2000); Thieret & Luken (1996); Kubitzki in Kubitzki (1998b). [including *SPARGANIACEAE*]

1 Inflorescences headlike, globular ..... ***Sparganium***
1 Inflorescences spikelike, cylindrical ..... ***Typha***

Sparganium Linnaeus 1753 (Bur-reed)

A genus of about 14 species, wetland and aquatic herbs, primarily circumboreal in arctic and temperate regions, but also in the tropics of Asia, and temperate Australia. References: Kaul in FNA (2000); Thieret (1982)=Z; Beal (1960)=Y; Crow & Hellquist (2000b)=X; Kubitzki in Kubitzki (1998b).

1 Stigmas 2; fruits truncate at apex, obpyramidal, very abruptly beaked, 4-8 mm broad ..... ***S. eurycarpum***
1 Stigmas 1; fruits rounded or acuminate to a beak at the apex, elliptic, fusiform, or obovate, 1-3 (-4) mm broad.
  2 Pistillate heads (primarily those upward) supra-axillary (borne distinctly above the axils of the subtending leaf-like bracts); tepals lacking subapical dark spot ..... ***S. emersum***
  2 Pistillate heads (all) axillary (borne in the axils of the subtending leaf-like bracts) or several on axillary branches which lack leaf-like bracts; tepals with prominent subapical dark spot.
    3 Mature fruits dull, finely pitted, the body 3-5 mm long; fruiting heads 1.5-2.5 cm in diameter; branches of the inflorescence with (0-) 1-3 pistillate heads (in addition to staminate heads); stigma 0.8-1.9 (-2.8 in the Coastal Plain) mm long ..... ***S. americanum***
    3 Mature fruits shiny, smooth, the body 5.5-7 mm long; fruiting heads 2.5-3.5 cm in diameter; branches of the inflorescence with 0 (-1) pistillate heads (in addition to staminate heads); stigma 1.5-3 mm long ..... ***S. androcladum***

Sparganium americanum Nuttall, American Bur-reed. Cp, Mt, Pd (GA, NC, SC, VA): streams, marshes, ponds, pools, often submerged; common (rare in NC and SC Piedmont). May-September. Newfoundland west to MN, south to c. peninsular FL and c. TX. Beal (1960) discusses the interesting variation in *S. americanum*, perhaps worthy of taxonomic recognition. The

"Appalachian Race" has stigmas 0.6-0.9 mm long, inflorescence branches 0-3, and relatively narrow leaves; in our area it is montane in distribution, and in general is Appalachian, Ozarkian, and northern. The "Coastal Race" has stigmas 1.5-2.8 mm long, 2-5 inflorescence branches, and relatively wide leaves; in our area it is primarily of the Coastal Plain, disjunct to the mountains of NC and SC south of the Asheville Basin (like many Coastal Plain taxa), and in general is nearly limited to the Coastal Plain, ranging from MA south to FL, west to e. TX, and north in the interior to sc. TN, s. IN, and s. MO. The "Ubiquitous Race" is intermediate, with stigmas 1.0-1.4 m long; it occurs throughout the range of the species. The pattern is suggestive of imperfect evolutionary separation of two taxa. [= RAB, C, F, FNA, G, GW, K, W, WV, X, Y, Z; > *S. americanum* – S; > *S. eurycarpum* – S, misapplied]

Sparganium androcladum (Engelmann) Morong. Cp, Pd (VA): marshes, shores; rare (VA Rare). May-September. ME and Québec west to MN, south to se. VA, s. WV, e. TN, s. MO, and ne. OK. [= C, F, FNA, G, K, W, WV, X, Y, Z]

Sparganium emersum Rehmann, Greenfruit Bur-reed. Mt (NC, VA): bogs, stream margins; rare (NC Rare, VA Rare). May-September. Newfoundland and c. Québec west to s. Alberta and WA, south to w. NC, IN, IA, CO, and CA. [= FNA, X; > *S. chlorocarpum* Rydberg – RAB, C, F, G, W, WV, Y, Z; > *S. chlorocarpum* var. *acaule* (Beeby) Fernald – F; ? *S. angustifolium* Michaux – K, misapplied; > *S. acaule* (Beeby) Rydberg]

Sparganium eurycarpum Engelmann ex A. Gray, Giant Bur-reed. Cp, Pd, Mt (VA): marshes, shores; uncommon (VA Watch List). Nova Scotia west to British Columbia, south to w. VA, n. WV, IN, OK, and CA. [= C, F, FNA, G, K, W, WV, X; = *S. erectum* Linnaeus ssp. *stoloniferum* (Graebner) C.D.K. Cook & M.S. Nicholls]

Sparganium angustifolium Michaux, Narrow-leaved Bur-reed. South to n. NJ and n. PA; attributed to VA and WV by Kartesz (1999), apparently erroneously. [= C, FNA, K, X] {not keyed; synonymy incomplete}

Typha Linnaeus 1753 (Cattail)

A genus of 8-13 species, wetland herbs, cosmopolitan. References: Ward (2007a)=Z; Smith in FNA (2000); Kubitzki in Kubitzki (1998b).

1 Staminate and pistillate portions of spike normally contiguous; pistillate portion of spike (1.5-) 2.0-3.5 cm in diameter at maturity; leaves (8-) 10-24 mm wide, flat on one side; stigmas lance-ovate, fleshy, persistent; pollen grains in 4's; [in acid to alkaline waters, widespread in our area] ..... ***T. latifolia***

1 Staminate and pistillate portions of spike normally separated by a gap; pistillate portion of spike 0.5-2.2 (-2.5) cm in diameter at maturity; leaves 4-15 mm wide, biconvex (or flat on one side in *T.* ×*glauca*); stigmas linear to lance-linear, not fleshy (or slightly so in *T.* ×*glauca*), either quickly deciduous or persistent; pollen grains single; [in circumneutral to alkaline waters, primarily in tidal situations in the outer Coastal Plain, but scattered inland, especially in VA].

2 Pith at base of stem yellowish buff; stigmas lance-linear, slightly fleshy; pistillate portion of spike 1.6-2.5 cm in diameter at maturity; pistillate bracteoles usually absent (or present on a few flowers) ..... ***T.* ×*glauca***

2 Pith at base of stem white; stigmas linear, not fleshy; pistillate portion of spike 0.5-2.5 cm in diameter at maturity; pistillate bracteoles present on all flowers.

3 Leaves 4-7 (-11) mm wide, auriculate at the junction of the blade and the sheath; pistillate portion of spike 1.5-2.0 cm in diameter and dark brown at maturity; plants 1-1.5 m tall; pistillate bracteoles rounded to blunt at the tip ..... ***T. angustifolia***

3 Leaves 6-12 (-15) mm wide, most or all not auricled at the junction of the blade and the sheath; pistillate portion of spike (0.8-) 1.3-1.8 cm in diameter and light cinnamon brown at maturity; plants (1-) 2-4 m tall; pistillate bracteoles acute to acuminate at the tip ..... ***T. domingensis***

*? ***Typha angustifolia*** Linnaeus, Narrowleaf Cattail. Cp (GA?, NC, SC, VA), Pd, Mt (VA): brackish to fresh waters of marshes and swamps, usually tidal, and also inland in non-tidal wetlands; common (rare in Piedmont and Mountains). May-July; June-November. Nova Scotia west to ND, south to SC, FL (?), LA, and TX (?); Eurasia. Considered by some authors to be introduced in North America. [= C, F, FNA, G, GW, K, W, WV, Z; < *T. angustifolia* – S (also see *T. domingensis*)]

Typha domingensis Persoon, Southern Cattail. Cp (GA, NC, SC, VA): brackish to nearly fresh waters of marshes and swamps, usually tidal; common. June-July; July-November. DE south to s. FL, west to TX; north inland to NE and UT; and south into tropical America; Eurasia; Africa; Oceania. [= C, F, FNA, G, GW, K, Z; < *T. angustifolia* – S]

Typha* ×*glauca Godron (pro sp.), Hybrid Cattail. Cp (GA?, NC, SC, VA), Mt (VA): fresh to brackish waters of lakes, ponds, and rivers; rare. May-July; June-November. Both C and K apply this name to two different hybrids: *T. angustifolia* × *latifolia* and *T. domingensis* × *latifolia*. The name properly applies to *T. angustifolia* × *latifolia* (Smith in FNA 2000). [= C, GW, K, WV, Z; = *T. glauca* Godron – RAB, F]

Typha latifolia Linnaeus, Common Cattail. Mt, Pd, Cp (GA, NC, SC, VA): fresh waters of ponds, lakes, ditches, marshes, including in tidal freshwater marshes; common. May-July; June-November. Newfoundland west to AK, south to FL, TX, CA, and Mexico; Central America; South America; Eurasia. [= C, F, FNA, G, GW, K, S, W, WV, Z]

XYRIDACEAE C. Agardh 1823 (Yellow-eyed Grass Family)

A family of 5 genera and about 325-350 species, nearly cosmopolitan (most diverse in tropical and subtropical regions, and especially South America). References: Kral in FNA (2000); Kral in Kubitzki (1998b).

Xyris Linnaeus 1753 (Yellow-eyed Grass)

XYRIDACEAE

A genus of about 300 species, nearly cosmopolitan (most diverse in tropical and subtropical regions, and especially South America). This "technical" genus is known well by only a few botanists, and additional undescribed taxa are possible. References: Kral in FNA (2000); Ward (2007b)=V; Bridges & Orzell (2003)=X; Kral (1966a)=Z; Kral (1983b, 1999); Kral in Kubitzki (1998b). Key adapted from X, GW, and Z.

Identification notes: In vegetative condition, *Xyris* is often confused with other monocots with equitant leaves, such as *Iris* spp. (Iridaceae), *Lachnanthes caroliniana* (Haemodoraceae), and *Tofieldia* spp. (Tofieldiaceae).

1 Keel of the lateral sepals shortly ciliate-scabrid (or sometimes entire in *X. brevifolia*, and then the bract tips purplish-tinged).
  2 Plants small, usually < 30 cm tall; principal leaves usually < 10 cm long; mature spikes < 1 cm long when mature.
    3 Leaves filiform, with expanded brownish lustrous bases, usually exceeding the sheath of the scape; [plants of s. AL and the FL Panhandle] ..... ***X. isoetifolia***
    3 Leaves linear, the bases not expanded, shorter than, equaling, or slightly exceeding the sheath of the scape; [plants collectively more widespread].
      4 Keel of the lateral sepals straight to slightly curved, remotely ciliate or entire; spikes broadly ovoid to subglobose, the bracts loose, bicolored, the distal portions maroon or purplish and often with erose margins ..... ***X. brevifolia***
      4 Keel of the lateral sepals strongly curved, densely ciliate; spikes lance-ovoid to ovoid, the bracts entire, not purple-tinged, and lacking erose borders.
        5 Plants perennial; leaves ascending, green with a distinct brown patch at the base; fruiting spikes ovoid, blunt, somewhat 2-edged from the strongly keeled outer bracts ..... ***X. drummondii***
        5 Plants annual; leaves flabellate arranged, spreading to recurved against the substrate, usually maroon; fruiting spikes often elongated and acute, not 2-edged ..... ***X. flabelliformis***
  2 Plants large, usually > 30 cm tall; principal leaves > 10 cm long; mature spikes > 1 cm long when mature.
    6 Leaves ascending, twisted, strongly grooved; spikes ovoid, the bracts and lateral sepals with a small tuft of short, reddish-brown hairs; bases of leaves abruptly expanded, pinkish or purplish (dark brown in age), the outermost leaves often scale-like, the plant base therefore appearing bulbous; [of the Mountains, Piedmont, and Coastal Plain] ..... ***X. torta***
    6 Leaves spreading, not twisted or only slightly so; spikes narrowly ovoid, ellipsoidal, or oblong; bracts and sepals without a small apical tuft of hairs; bases of leaves whitish, tan, pink, purplish, maroon, or dark brown, the outermost leaves not scale-like, the plant base not appearing bulbous; [typically of the Coastal Plain, rarely disjunct inland].
      7 Seeds lustrous, translucent, broadly ovoid; spike pale brown or tan, the scales loosely imbricate; plant bases pinkish, purplish, or tan, with dark longitudinal striations on the inner leaf bases; leaves 3-20 mm wide; petal blades obovate, 6-7 mm long, opening in early morning, usually closing by mid-day ..... ***X. ambigua***
      7 Seeds farinose, dark brown (*X. stricta*) or pale (*X. louisianica*) at maturity, narrowly ellipsoid to ovoid; spike dark brown, the scales tightly imbricate; plant bases maroon, purplish, dark-brown, or reddish-brown; leaves 2-5 mm wide; petal blades triangular-cuneate, 3-5 mm long, opening at mid-day.
        8 Seeds pale when mature; plant bases maroon to maroon-brown, solitary or in small clumps; upper end of scape somewhat flattened, but not nearly as broad as the spike; spike narrowly ovoid to ellipsoid, slightly pointed ..... ***X. louisianica***
        8 Seeds dark brown when mature; plant bases dark maroon to dark brown, desnely cespitose; upper end of the scape conspicuously flattened, almost as broad as the spike; spike oblong-cylindrical, obtuse ..... ***X. stricta***
1 Keel of the lateral sepals irregularly lacerate or fimbriate, or if entire then the the bract tips not purplish.
  9 Leaves narrowly linear to filiform, 0.5-2.0 (-2.5) mm wide, not twisted (or scarcely so); leaf bases expanded, lustrous, hard, tan to brown, neither bulbous nor deeply set in the substrate; spikes ovoid or ellipsoid, 4-15 mm long.
    10 Leaves filiform, terete or elliptic in cross-section, 0.5-1.0 mm wide, without a paler, hardened margin; scape as broad as or broader than the leaf blades; scales smooth-edged to denticulate, not curled away from the head, the head thus appearing smooth; staminodia beardless ..... ***X. baldwiniana***
    10 Leaves linear, flattened in cross-section, 1-2 (-2.5) mm wide, with a pale, hardened margin; scape usually narrower than the leaf blades; scales ragged-lacerate, the tips curling away from the head, giving it a ragged appearance; staminodia bearded ..... ***X. elliottii***
  9 Leaves broader, (1.5-) 2.0-25 mm wide, strongly twisted to straight, the leaf bases either not expanded, lustrous, hard, and tan to brown, or, if so, then the base also either bulbous and/or deeply seated in the substrate; spikes narrowly lanceolate, ellipsoid, to broadly ovoid, 4-40 mm long.
    11 Keel of the lateral sepals long-fimbriate toward its apex, the fimbriate tip conspicuously exserted from the subtending bract (sometimes eroded and less conspicuous on older spikes).
      12 Leaves strongly twisted, 2-5 mm wide; leaf bases hardened, swollen, bulbous, dark lustrous brown; scape ridges smooth; petal blades white or yellow; [of moist to dry pinelands] ..... ***X. caroliniana***
      12 Leaves not twisted, 5-25 mm wide; leaf bases soft, not swollen, not bulbous, pale; scape ridges strongly scabrous; petal blades yellow; [of aquatic to very wet peaty, mucky, or sandy ponds, marshes, or other wetlands] ..... ***X. fimbriata***
    11 Keel of the lateral sepals lacerate, or if very shortly fimbriate, then not conspicuously exserted from the subtending bract.
      13 Lateral sepals longer than and exserted from the subtending bracts; scapes 5-15 dm tall.
        14 Leaf blades 1-2 (-3) mm wide, 6-30 cm long; spikes 10-16 mm long; seeds 0.4-0.6 mm long; [endemic to Panhandle FL and s. AL] ..... ***X. longisepala***
        14 Leaf blades 5-15 mm wide; (20-) 30-50 (-60) cm long; spikes 10-20 (-25) mm long; seeds (0.6-) 0.7 (-0.8) mm long; [more widespread in our area] ..... ***X. smalliana***
      13 Lateral sepals shorter than the subtending bracts, and therefore hidden (except when the spikes open to shed seeds); scapes 1.5-12 dm tall.
        15 Scapes flexuous, usually spirally twisted; upper portion of leaf blades conspicuously twisted; plant bases pinkish, purplish, or dark brown, bulbous or deeply set in the substrate.
          16 Base of plant deeply set in the substrate, without distinct outer scale leaves; leaf bases not noticeably expanded, the plant base therefore not bulbous; leaves smooth, 2-4 mm wide; petal blades ca. 3 mm long ..... ***X. chapmanii***
          16 Base of plant shallowly set on the substrate, often with short, black outer scale leaves; leaf bases noticeably expanded, the plant base therefore appearing bulbous; leaves either smooth and 5-10 mm wide, or scabrous and 2-10 mm wide; petal blades ca. 5 mm long.
            17 Leaf and scape surfaces prominently papillose or tuberculate-scabrid; petal blades suborbicular, yellow; seeds narrowly ovoid or narrowly ellipsoidal, ca. 1.0 mm long ..... ***X. scabrifolia***

17 Leaf and scape surfaces smooth (or scabrous only along margins and ridges); petal blades obovate, white or yellow; seeds ovoid or ellipsoid, 0.5-0.6 mm long.
18 Seeds translucent; leaf margins smooth; [plants of acidic sites of the Coastal Plain] ..... ***X. platylepis***
18 Seeds opaque; leaf margins slightly scabrous; [plants of calcareous seeps and fens of the Ridge and Valley] ..... ***X. tennesseensis***

15 Scapes usually not flexuous, usually not spirally twisted; upper portion of leaf blades not conspicuously twisted; plant bases variously colored, flabellate or equitant and set at ground level.
19 Summit of the scape distinctly flattened and broad relative to the spike; scape ridges 2-3, the 2 most prominent comprising the flattened edge of the scape.
20 The 2 principal scape ridges noticeably and abruptly flattened and winglike below the spike, their combined width (on fresh material) broader than the scape proper; fruiting spikes mostly 8-15 mm long; seeds 0.4-0.6 mm long, translucent, ovoid or ellipsoidal, about 1.5× as long as wide, with lines of very fine papillae, not farinose ..... ***X. difformis***
20 The 2 principal scape ridges not abruptly flattened and winglike below the spike, their combined width < the scape proper, which is itself flattened (narrowly elliptic in cross-section); fruiting spikes mostly (10-) 20-25 mm long; seeds 0.8-1.0 mm long, dark when ripe, fusiform to narrowly elliptic, 2-3× as long as wide, with lines of very fine papillae, these however obscured by a farinose covering ..... ***X. iridifolia***
19 Summit of the scape nearly terete or somewhat flattened, much narrower than the spike; scape ridges several (usually > 3), at least on the mid to lower portion of the scape.
21 Seeds farinose, very dark; surfaces of leaves tuberculate-scabrid, the leaves strongly ascending, linear, generally > 10 cm long; leaves generally dull-colored.
22 Mature spikes ovoid, sharply acute; plants solitary or in small clumps; leaves 10-30 (-50) cm long, 1.5-6.0 mm wide, dark maroon or purplish at the base ..... ***X. floridana***
22 Mature spikes ovoid to ellipsoid, acute to obtuse; plants typically in large dense tufts; leaves 20-50 cm long, 3-12 mm wide, the older ones with dark-brown to gray bases, the younger with tan bases ..... ***X. serotina***
21 Seeds translucent, not farinose; surfaces of leaves smooth (or sparsely tuberculate-scabrid in *X. curtissii*, which also has leaves linear-curvate and generally < 10 cm long); leaves generally a bright yellowish-green above the base.
23 Leaves broadly linear-curvate, spreading, typically < 10 cm long, 2-4.5 mm wide; plants perennial, in tufts (rarely solitary); mature spikes acute, with < 10 flowers; leaf bases pinkish or purplish; old flowers fugacious, not persisting on spikes ..... ***X. curtissii***
23 Leaves linear, ascending, 10-60 cm long, 5-10 mm wide; plants annual, solitary or in small tufts; mature spikes obtuse, many-flowered; leaf bases tan (very rarely pinkish); old flowers often persistent on the spikes, drying blackish .. ***X. jupicai***

Xyris ambigua Beyrich ex Kunth. Cp (GA, NC, SC, VA), Pd (NC), Mt (VA): wet savannas and flatwoods, pinelands, edges of depression ponds; common. June-August. Se. VA south to FL, west to AL and ec. TX, primarily on the Coastal Plain. [= RAB, C, F, FNA, G, K, W, X, Y; < *X. ambigua* – GW, S, Z (also see *X. louisianica*)]

Xyris baldwiniana J.A. Schultes, Grassleaf Yellow-eyed Grass. Cp (GA, NC, SC), Pd (NC): wet savannas, seepage bogs, sandhill seeps, wet savanna ecotones; rare (NC Watch List). June-July. Se. NC south to n. FL, west to s. AR and ec. TX, primarily on the Coastal Plain. [= RAB, FNA, GW, K, S, X, Y, Z]

Xyris brevifolia Michaux, Shortleaf Yellow-eyed Grass. Cp (GA, NC, SC): wet sands of pinelands, especially seasonally wet, open, white sands of spodosol longleaf pine flatwoods (Leon series soils), margins of Carolina bay sandrims; rare (NC Rare, SC Rare). June-August. Se. NC south to s. FL, west to s. AL and w. FL; West Indies and South America. [= RAB, FNA, GW, K, S, X, Y, Z]

Xyris caroliniana Walter, Pineland Yellow-eyed Grass. Cp (GA, NC, SC, VA): dry to moist pine flatwoods, moist savannas, scrub oak sandhills; common (VA Rare). June-July. Se. VA south to FL, west to se. TX, and disjunct northward in s. NJ. White-petaled populations of *X. caroliniana* occurring in the East Gulf Coastal Plain need additional study. [= RAB, C, FNA, GW, K, X, Y, Z; > *X. flexuosa* Muhlenberg ex Elliott – F, G, S; > *X. pallescens* (C. Mohr) Small – S]

Xyris chapmanii Bridges & Orzell, Chapman's Yellow-eyed Grass. Cp (GA?, NC, SC): sandhill seepage bogs in areas of copious lateral seepage in deep muck soils; rare (NC Rare). Sc. NC south to panhandle FL, west to e. TX. This taxon is abundantly distinct from *X. scabrifolia*. [= X, Y; < *X. scabrifolia* – FNA, K, Z]

Xyris curtissii Malme, Curtiss's Yellow-eyed Grass. Cp (GA, NC, SC, VA), Pd (SC): savannas; rare (NC Watch List, VA Rare). July-August. Se. VA south to n. FL and west to s. AR and ec. TX, primarily on the Coastal Plain; disjunct in s. NJ. [= RAB, G; = *X. difformis* Chapman var. *curtissii* (Malme) Kral – C, FNA, GW, K, X, Y, Z; > *X. bayardii* Fernald – F; > *X. curtissii* – F; ? *X. neglecta* Small – S]

Xyris difformis Chapman. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC): savannas, roadside ditches, pond margins, other wet habitats; common (VA Watch List). August-October. New England and s. Canada south to n. FL and ec. TX. [= X; = *X. difformis* Chapman var. *difformis* – C, FNA, GW, K, Y, Z; < *X. difformis* – RAB, F, G, S, W (also see *X. curtissii*)]

Xyris drummondii Malme, Drummond's Yellow-eyed Grass. Cp (GA): wet pine flatwoods, ditches; uncommon. Se. GA south to Panhandle FL, west to s. MS. [= FNA, GW, K, X, Y, Z]

Xyris elliottii Chapman, Elliott's Yellow-eyed Grass. Cp (GA, SC): margins of drawdown zones of clay-based Carolina bays, limesinks and flatwoods swales, wet savannas; uncommon. May-June. E. SC south to the Gulf Coastal Plain. [= RAB, FNA, GW, K, S, X, Z; > *X. elliottii* var. *elliottii* – Y; > *X. elliottii* var. *stenotera* Malme – Y]

Xyris fimbriata Elliott, Giant Yellow-eyed Grass. Cp (GA, NC, SC, VA): in mucky or sandy soils of upland depression ponds, also along sandhill streams, impoundments and in deep muck of sandhills seepage slopes often just below the zone occupied by *Xyris chapmanii*; common (VA Rare). September-October. Se. VA south to c. FL, west (interruptedly) to se. TX; disjunct in s. NJ, DE, and c. TN. [= RAB, C, F, FNA, G, GW, K, S, X, Y, Z]

Xyris flabelliformis Chapman, Savanna Yellow-eyed Grass. Cp (GA, NC, SC): wet sands of pinelands, especially seasonally wet, open, white sands of spodosol longleaf pine flatwoods (Leon series soils), margins of Carolina bay sandrims; rare (NC Rare, SC Rare). May-June. Se. NC south to s. FL, west to se. LA, on the Coastal Plain. [= RAB, FNA, GW, K, S, V, X, Z]

Xyris floridana (Kral) Bridges & Orzell, Florida Yellow-eyed Grass. Cp (GA, NC, SC): savannas, wet pine flatwoods, ditches; rare (NC Rare, SC Rare). August. Se. NC south to s. FL, west to se. LA. [= X; = *Xyris difformis* Chapman var. *floridana* Kral – FNA, GW, K, Y, Z]

Xyris iridifolia Chapman, Irisleaf Yellow-eyed Grass. Cp (GA, NC, SC, VA): marshes, upland pond margins, blackwater river channels, floodplain pools, other wet habitats; uncommon (NC Watch List, VA Rare). July-September. Se. VA south to n. FL, west to e. TX; disjunct in c. TN. [= RAB, C, GW, S, Z; = *X. laxifolia* Mart. var. *iridifolia* (Chapman) Kral – FNA, K, X, Y]

Xyris isoetifolia Kral. Cp (AL, FL): bogs, savannas, and depression pond margins; rare. Endemic to FL Panhandle and s. AL. [= FNA, GW, K, X, Y, Z]

Xyris jupicai L.C. Richard. Cp (GA, NC, SC, VA), Pd (NC), Mt (VA): ditches, various wet habitats; common. July-September. NJ south to s. FL, west to TN, AR, se. OK (Singhurst, Bridges, & Holmes 2007), and TX, and in Latin America. Sometimes weedy and considered by some to be adventive from further south. At least some populations in our area are native and may additionally be worthy of taxonomic recognition as distinct from "true" *X. jupicai* (P. McMillan, pers. comm., 2003). [= RAB, C, FNA, GW, K, W, X, Y, Z; = *X. caroliniana* – F, misapplied; > *X. elata* Chapman – G, S; > *X. communis* Kunth – S; > *X. caroliniana* – G, S, misapplied]

Xyris longisepala Kral. Cp (AL, FL): depression pond margins; rare. Endemic to FL Panhandle and s. AL. [= FNA, GW, K, X, Y, Z]

Xyris louisianica Bridges & Orzell. Cp (GA): pine savannas, bogs, ditches and disturbed areas; rare. FL Panhandle and GA west to se. TX. [= K, X; = *X. stricta* Chapman var. *obscura* Kral – FNA, Y; < *X. ambigua* – GW, S, Z]

Xyris platylepis Chapman. Cp (GA, NC, SC, VA): sandhill seeps, savannas, ditches; common (VA Watch List). July-September. Se. VA south to s. FL, west to se. LA; disjunct in sw. LA and se. TX. [= RAB, C, F, FNA, G, GW, K, S, X, Y, Z]

Xyris scabrifolia R.M. Harper, Roughleaf Yellow-eyed Grass. Cp (GA, NC, SC): sandhill seepage bogs and wet pine savannas; rare (US Species of Concern, NC Rare). Sc. and se. NC south to panhandle FL, west to s. AL and s. MS; disjunct in sw. LA-se. TX. *X. chapmanii* is a taxon distinct from *X. scabrifolia*. [= GW, S, X, Y; < *X. scabrifolia* – FNA, K, Z (also see *X. chapmanii*)]

Xyris serotina Chapman. Cp (GA, NC, SC): depression meadows, ultisol savannas (Lynchburg/Rains complex or Eulonia/Oketee), ditches; rare (NC Rare, SC Rare). September. Se. NC south to c. FL, west to s. MS, in the Coastal Plain. Reported for our area by Kral (1966b) and relocated by B.A. Sorrie. [= RAB, FNA, GW, K, S, X, Y, Z]

Xyris smalliana Nash, Small's Yellow-eyed Grass. Cp (GA, NC, SC), Mt (SC): pond margins, ditches; uncommon (NC Watch List). July-August. ME south to FL, west to s. MS; disjunct to se. TX. [= RAB, C, FNA, GW, K, S, W, X, Y, Z; > *X. congdonii* Small – F; > *X. smalliana* – F; > *X. smalliana* var. *smalliana* – G; > *X. smalliana* var. *olneyi* (Wood) Gleason – G]

Xyris stricta Chapman. Cp (GA, NC, SC): depression ponds, depression meadows, borrow pits, ultisol savannas and ditches; rare. July-September. SC south to n. FL, west to s. MS and se. LA. Reported for our area by Kral (1966b). P. McMillan (pers. comm.) reports this species from a number of locations in the outer Coastal Plain of NC and SC. [= GW, K, S, X, Z; = *X. stricta* var. *stricta* – FNA, Y]

Xyris tennesseensis Kral, Tennessee Yellow-eyed Grass. Mt (GA): seepy, fenlike areas over limestone; rare (US Endangered, GA Endangered). TN, AL, and nw. GA (Jones & Coile 1988). See Kral (1978b). [= FNA, K]

Xyris torta J.M. Smith, Mountain Yellow-eyed Grass. Mt, Pd (GA, NC, SC, VA), Cp (SC, VA): mountain bogs, marshes, ditches; uncommon (SC Rare). June-August. NH west to WI, south to e. VA, e. NC, w. SC, c. GA, LA, OK, and TX. This is our only species of *Xyris* not strongly associated with the Coastal Plain. [= RAB, C, FNA, GW, K, S, W, Z; > *X. torta* var. *macropoda* Fernald – F, G; > *X. torta* var. *torta* – F, G]

ZOSTERACEAE Dumortier 1829 (Eelgrass Family)

A family of 3 genera and about 18 species, nearly cosmopolitan in distribution. References: Haynes in FNA (2000); Kuo & McComb in Kubitzki (1998b).

Zostera Linnaeus 1753 (Eelgrass)

A genus of about 12 species, aquatic herbs, of nearly cosmopolitan distribution. References: Haynes in FNA (2000); Crow & Hellquist (2000)=Y; Kuo & McComb in Kubitzki (1998b); Green & Short (2003)=Z.

Zostera marina Linnaeus *var.* ***stenophylla*** Ascherson & Graebner, Eelgrass. Cp (NC, VA): estuarine waters; common. February-March. The species occurs in Eurasia and North America. Var. *stenophylla* is North American, and ranges south along the Atlantic coast to NC and allegedly to FL (though reports from that state are apparently not substantiated and may be based on misidentification of other aquatics). [= F, G, Y; < *Z. marina* – RAB, C, FNA, K, S, Z]

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