MANUFACTURERS OF
LUMINOUS DIALS
NEUTRON SOURCES
RADIATION SOURCES
RADIOACTIVE SPECIALTIES
NAME PLATES
ETCHED AND LITHOGRAPHED
"UNDARK"
LUMINOUS MATERIALS
"IONOTRON"
STATIC ELIMINATORS
"RADELIN"
X-RAY SCREENS
TELEVISION PHOSPHORS
"LACKON" PANELS
"HELECON"
LUMINESCENT PIGMENTS

TELEPHONE JEFFERSON 8-4000

PLANTS AND LABORATORIES
BLOOMSBURG, PA.
BERNARDSVILLE, N. J.
WHIPPANY, N. J.
NO. HOLLYWOOD, CALIF.

EUROPEAN AFFILIATE
UNITED STATES RADIUM
CORPORATION (EUROPE)
GENEVA, SWITZERLAND

CANADIAN AFFILIATE
RADELIN-KIRK LTD. TORONTO

CABLE ADDRESS
RADELIN-NEW YORK

UNITED STATES RADIUM CORPORATION

MORRISTOWN, NEW JERSEY

April 11, 1957

DICTATED 4-9-57

VIA AIR MAIL

Mr. Cecil Buchanan
Isotope Division
U. S. Atomic Energy Commission
Oak Ridge, Tennessee

Dear Mr. Buchanan:

It was certainly a pleasure to see you a few days ago, and I hope that your trip to our Bloomsburg Laboratory was both worthwhile and also instructive.

I understand that you were somewhat puzzled as to how we might intend to handle the quantities of tritium and krypton we have been discussing, with the equipment we are now using, and I would like to assure you that we have no intention of using the existing equipment for handling large quantities of these isotopes. The quantities now handled are relatively small, and the set ups which you saw were designed, first of all for experimental use, and secondly to gain experience in proper design so that a minimum of problems will be encountered when production equipment is set up. We have made no attempts to set up production equipment, since we must first be assured that adequate supplies of isotopes will be available, and once such assurance is received, we will design the larger scale equipment and submit plans to the A.E.C. for approval.

You will no doubt recall that we discussed very briefly the Wesix Ion Generator. I am enclosing herewith a reprint from the magazine "MD" of January 1957. This article is a condensation of some of the work which has been done, and reams of additional documentation can be supplied, however, I felt that perhaps you would be interested in this brief review just to see what has been done and the past history upon which this work has been based.

Sincerely,

C. W. Wallhausen
Vice President

CWW/ar
Encl.

Reprinted from MD, Vol. 1, No. 1, January 1957

SCIENCE

Of Ions and Men

Why do people feel depressed on warm soggy days, nervy before a storm, exhilarated in clear crisp weather? Are these purely subjective reactions or is there some physicochemical tie between the atmosphere and human metabolism?

Until fairly recently, these questions were brushed aside with vague references to humidity, barometric pressure, wind characteristics (e.g. the enervating *föhn* or depressing *sirocco*), or layers of hot and cold air. Yet as far back as 1931, German physicist Friedrich Dessauer had thrown suspicion on an unsuspected factor: the ionization of air.

The earth's normal atmosphere contains an approximately equal number of air molecules carrying either a positive or a negative electrical charge. These are air ions, not to be confused with the chemical ions familiar to most physicians and biochemists. Negative air ions are formed by radioactive gases such as radon and thoron breathed out of the earth's crust by the decay of radium and thorium. Positive ions pour down from the upper atmosphere as the product of collision of cosmic ray particles, solar radiation and possibly other electronic phenomena in outer space. The flow of negative ions upwards, balanced by the drift of positive ions downwards, produces the normal electrical conductivity of our atmosphere.

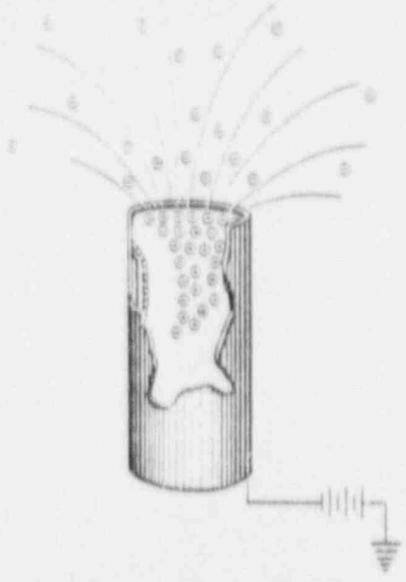
Migraine and Fatigue. In experimenting with human subjects, Dessauer noted that an excess of positive ions in the air produced feelings of nausea, fatigue, dizziness and headaches; an excess of negative ions stimulated a sense of exhilaration and well being. Negatively ionized air also had a good effect on blood pressure, respiration and migraine.

About the same time, two scientists working at the RCA Laboratory at Rocky Point noted that negatively ionized air produced feelings of comfort, optimism, exhilaration, good temper, friendly attitude, and relief of hay fever and asthma; positively charged air yielded discomfort, fatigue, headaches, dizziness, nausea, and faintness.

In the last quarter of a century since these empirical observations, researchers discovered more biologic effects traceable to air ions. Charles H. Danforth found that chickens grew quicker under negative ionization; John L. Worden (St. Bonaventure University) noted that the carbon dioxide combining power of plasma in hamsters increased in negatively ionized air, so did the blood pH.

Ions and Cancer. In the Southern Bio-Research Laboratory of Florida Southern College, a research group reported the effect of negatively ionized air on transplanted tumors: at the end of four weeks, the average size of tumors in negatively ionized rats was 10.7 cc. compared with 26.1 cc. in controls—less than half the size. And a Stanford investigator noted a lower rate of metastasis in negatively ionized mice than in mice breathing positively charged or normal air. Other findings: air containing an excess of positive ions produced histologic changes in the adrenal glands of rats, indicating an excess production of both salt and carbohydrate-regulating corticoids; it also reduced the succinoxidase activity of the adrenal gland.

Clinical Effects. In the United States, scores of Wesix polonium negative ion generators have been loaned out for trial. Clinicians reported good results in alleviating hay fever, asthma, sinusitis and hypertension. In Argentina, 29 out of 30 hypertensive patients were helped, the average drop in arterial pressure with negative ionization being 39 mm. of mercury. Three years ago, two University of Pennsylvania investigators reported that about 70 per cent of 27 patients with hay fever or asthma were relieved when placed in a room with two negative ion generators.

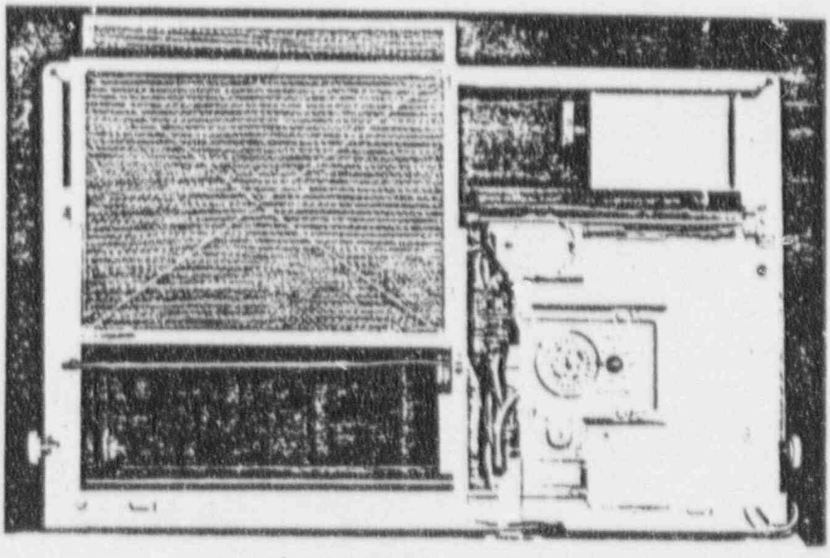


POLONIUM ION GENERATOR
Positives Are Depressing

Most recently, investigators at Philadelphia's Northeastern Hospital* reported that 62.2 per cent of 53 patients with hay fever were partially or completely relieved of symptoms in a negatively ionized atmosphere. Contrariwise, positive ionization not only produced no relief but in some cases actually increased irritation and discomfort. Their conclusion: "Based on four years of clinical experience, it is apparent that negative ionization is beneficial in the relief of symptoms caused by airborne allergies."

Smog and Ions. What has all that to do with the weather? The concentration of air ions in the atmosphere can vary between 400 and 2000 ion pairs per cubic centimeter. The density of air ions, and the ratio between positives and negatives, depend on factors such as barometric pressure, temperature, humidity, velocity of wind, air pollution and the nearness of large bodies of water.

Negative air ions seem to have an affinity for carbon and dust molecules, they tend to clump on these molecules



IONIZING AIR CONDITIONER*
Also Traps Aerosols

*with front removed

*Drs. Igho H. Kornblueh and George M. Piersol, with collaboration of Forrest P. Speicher and the Advanced Studies Group of Philco Corporation.

(Continued)

II-034

to form large (Langevin) ions. Result: an excess of positive ions is created. The atmosphere around cities and industrial regions is polluted by some 30 different types of molecules, ranging from carbon to chromium. On warm windless days these pollutants are not blown away by air currents, they may hover about to trap negative ions. Atmospheric inversions such as those causing London or Los Angeles smogs form a "lid" over the street-level atmosphere, preventing the normal flow of negative and positive ions. Thomas L. Martin, Jr. showed five years ago that more positive ions are found in polluted city air, the proportion is lowest in the countryside and at sea.

Ionic Mechanism? How do ionized air molecules breathed in from the outer air affect human or animal metabolism? No one knows for certain because routine biologic tests are useless in tracing the route and effect of ions entering the respiratory tract. Also, the life span of an air ion is very short.

That ionized air molecules find their way into the bloodstream via the lungs is likely. The permeability of cells depends to some degree on the pH of body fluids and on the polarity of the cell membrane itself. Contact with positively or negatively charged ions circulating in the blood might affect the delicate positive-negative balance at the cell membrane, causing changes in permeability or chemical function. Or contact with an ionized molecule might "excite" cell molecules and set off unusual chemical reactions. The field is wide open to speculation.

Meanwhile, sufferers from airborne allergies and some upper respiratory tract disorders will this year be able to use a novel air-conditioner complete with tungsten negative-ion generator. In the story of man's control of his atmosphere, a new chapter is opened.