SCIENCE NEWS

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ELEMENT 87

WITH a method so delicate as to detect the presence of a chemical compound when dissolved in ten billion times its own weight of water, Dr. Fred Allison and Edgar J. Murphy, of the physics department of Alabama Polytechnic Institute at Auburn, Alabama, have located the unknown element number 87 in two well-known minerals. They will make a preliminary report of their research in the forthcoming issue of the *Physical Review*, the official journal of the Americal Physical Society.

Lepidolite, a form of mica, and pollucite, a mineral consisting chiefly of the elements caesium, aluminum and silicon, were the substances studied. As the properties of element number 87 are known in a general way, even though it has not yet been discovered, Dr. Allison and his colleague were able to predict its effect. Studies of the substances in four different chemical combinations all showed the effects that should be caused by element 87. This, say the experimenters, "affords evidence of considerable weight for its presence in the sample under test."

The next step will be to extract the element from the minerals, and when this is done it may truly be said to have been "discovered." Then only one unknown element will be left. According to modern conceptions there are 92 elements, numbered from hydrogen, which is number 1, to uranium, number 92. At present the series has two vacant spaces, one being number 87, to which the name eka-caesium has been tentatively assigned, and which is in the same group as lithium, potassium, rubidium and caesium. The other element is number 85, in the same group as fluorine, chlorine, bromine and iodine, known chemically as halogens.

About seven years ago there were six unknown elements. Then, in 1923, two Danish chemists, Coster and Hevesy, found number 72, which they named hafnium, after the Latin name for their city of Copenhagen. In 1925 Dr. Walter Noddack, at the University of Berlin, with the aid of two assistants, discovered numbers 43 and 75, which he named, respectively, masurium and rhenium. This was followed in 1926 by illinium, number 61, discovered by Dr. B. S. Hopkins, and named after the University of Illinois, with which he was connected. This was the first element discovered by an American.

THE SUN AND WEATHER FORECASTS

WEATHER predictions in the future must take into consideration variations in solar radiation, especially those eruptions noted in connection with sun-spots, according to William J. Rooney, associate physicist of the Department of Terrestrial Magnetism of the Carnegie Institution. Mr. Rooney has just returned on the Grace liner *Santa Barbara* from the Carnegie observatory at Huancayo, Peru, 12,000 feet above sea-level.

Observations made by him during his two months there are part of a series he is making throughout the world of the resistance of earth materials in order to check measurements of currents flowing through the earth.

"While there is still considerable scepticism among scientists as to the connection between weather and sun-spots," Mr. Rooney declared, "I believe that all those who have made a careful study of the available data are now agreed that there is a direct connection."

Mr. Rooney said that his work upon the resistance of earth materials had shown that certain solid substances, such as clay impregnated with magnesium salts, were better conductors of earth currents than sea-water, formerly considered one of the best conductors. The resistance of earth materials may vary from 100 ohms to 5,000,000 ohms per cubic centimeter within the same square mile.

This has an important bearing upon geophysical prospecting, he explained, for the variation in conductivity of earth materials enables the physicist to determine the depth of strata without boring or excavation by setting up electrodes in the earth's surface and measuring the resistance between them. He said he had determined the depth of surface water to within six inches by this method.

Measurements of the potential gradient of the atmosphere, he said, might vary during the day from 100 volts per meter positive to 50 volts per meter negative electricity. Although the potential is high there is very little current flowing so that it is difficult to measure. There is a continual radiation of electricity from the earth taking place, he said, but most of it is not lost. One of the most usual theories for its return is that it flows back in large quantities during thunder storms and in connection with ordinary precipitation.

CORONA DISCHARGES

MORE knowledge about the mysterious high voltage phenomena of corona, a source of great losses in long-distance transmission of electrical energy, was reported by Professor Sigmund K. Waldorf, of the Johns Hopkins University, before the winter convention of the American Institute of Electrical Engineers.

Professor Waldorf was most successful in measuring with very sensitive instruments the power losses caused by corona and in recording its wave form. The results of his experiments form a valuable addition to the present paucity of literature on the subject.

Ordinary metals like copper and iron are conductors of electricity. But even air will carry electricity if there is enough voltage or pressure to force it from one conductor to another. As the voltage or potential between the conductors is increased the air begins to undergo changes. First, there is a dark discharge; current actually passes through the air but it can not be seen. Then, with higher voltage, a glow is seen, and finally the discharge appears to be a number of sparks, called brush discharge.

Corona is manifest most on damp days when the conductivity of the air is great. Then it can be heard along

high tension transmission lines as a loud humming, and the glow or brush discharge can sometimes be seen.

In his experiments Professor Waldorf measured the corona loss from a wire conductor in the middle of a copper cylinder. He found that the loss from the wire across a 12-inch air radius to the cylinder per foot length is 25 Watts, enough to light a small room.

A MATERIAL BOTH INSULATOR AND CONDUCTOR

THE discovery of a material that will prevent the flow of electricity at low voltages and allow it to pass at high potentials, reported by K. B. McEachron, General Electric engineer, to the American Institute of Electrical Engineers, gives the electrical industry a nearly ideal material for protecting its power lines from the great damage caused by lightning.

In normal times a lightning arrester of thyrite, the new material, will keep the current on the line. In storms, when lightning strikes, electricity will escape by way of the very arrester that so faithfully keeps normal power on the line.

Thyrite is a moulded compound including silicon carbide or carborundum. Figures on its relative cost compared with the cost of present types of lightning arresters have not been made public.

Each time the voltage across a piece of thyrite is doubled, the current increases 12.6 times. With practically all other substances current follows Ohm's law and is directly proportional to the voltage, so that doubling the voltage doubles the current.

Samples of the substance have a resistance of 50,000 ohms at 100 volts and less than half an ohm at 10,000 volts. They will carry lightning discharges as high as 30,000 amperes without any signs of distress.

The successful production of thyrite requires control of a large number of variables. The new material resembles black slate in color. It has mechanical properties similar to those of dry-process porcelain. In manufacturing, the material is moulded to the shape required and the contact surfaces are coated with metal by the Schoop metal-spraying process.

PLANT ROOTS AND DAYLIGHT

ROOT development in plants is seriously affected by the number of hours of sunlight per day to which the plant is exposed, just as the growth of stems and leaves is similarly influenced. Plants getting only half of the normal day of sunlight show less than half of the normal root growth. These results have been brought out in experiments reported to *Plant Physiology* by Professor J. E. Weaver and Dr. W. J. Himmel, of the University of Nebraska.

Experiments on the top growth and flowering habits of plants have been made by a considerable number of plant physiologists during the past few years, but up to the present no one has paid special attention to the possible effects of light duration on the parts of plants that never see the light. These effects, of course, are indirect, the results of what happens to the leaves aloft; but the studies of Professor Weaver and Dr. Himmel have shown them to be none the less pronounced.

Eight species of plants were used, in a very miscellaneous assortment: red clover, radish, iris, sunflower, dahlia, tall ragweed, oats and cosmos. Parallel lots of each were planted in two sets of large metal containers. One set was left outdoors to get the full benefit of the thirteen- to fifteen-hour days of May and June; the other set was kept in a dark house and wheeled out for only seven hours of sunlight a day.

In all cases the results were similar, so far as root growth was concerned. All of the long-day plants showed at least twice as much root growth at the end of seven weeks, and in some cases the ratio was four to one or more. Furthermore, the plants enjoying the benefit of the fifteen-hour sunlight day established a deeper "working level" for roots. That is, the region where the freest branching took place and where the plant did its most active work of gathering water and mineral nutrients from the soil was markedly deeper in the long-day than in the short-day plants.

WAR ON THE FRUIT FLY

THE first warm weather in the South will see a renewal of the warfare waged by federal and state forces against the Mediterranean fruit fly after its discovery in central Florida in April, 1929. Officials of the U. S. Department of Agriculture state that much the same methods of inspection and clean-up will be used this year, though the campaign will have to be more intensive and far-reaching because the success of last year's drive in reducing the number of the pests will probably make surviving infestations harder to locate.

So far as is now known, the outlying points of infestation discovered during the campaign of last spring and summer in Florida have been cleared of their last fly, and the area where the insect is likely to be seen again this year has been reduced to the territory where it was first discovered and where its initial development in this country probably took place. But federal entomologists do not feel that it will be safe to let these outlying areas go uninspected, because of the possibility of a few insects having overwintered in some hidden corner. A single female laying a batch of eggs could start one of these infestations all over again.

In spite of the fact that not a single fly has been seen in Florida since last fall, it will be necessary to have a full force of men in the original infested area when the breeding season returns. The pest hibernates invisibly within any one of a number of fruits and vegetables, and even a series of chill nights much colder than Florida experiences in the winter will not kill off all the brood.

The inspection force will need to be at work in the great peach belt of Georgia as well as in the citrus and truck regions of Florida. Peaches are just as fair game to the hungry grubs of the fruit fly as are oranges and grapefruit, and if the fly should once get started in Georgia it would not only work havoc in the peach orchards, but would be in a much more favorable position to begin a westward march than it now is, in its confined area within the Florida peninsula.

EXPLORATION OF THE EVERGLADES BY AIRSHIP

A BLIMP, baby sister of the big airships, was added to the list of aircraft that have been used for purposes of scientific exploration when an official National Park Service party took the air from Miami for a reconnaissance flight over the proposed Tropical Everglades National Park area on February 11. This small type of airship is regarded as especially well adapted for this particular kind of flight, for it is less likely than an airplane to get into difficulties in case of engine trouble, and is wieldier and less expensive to handle than a big dirigible.

An aerial reconnaissance will save an immense amount of time in getting an estimate of the possible adaptability of the southern Everglades to national park purposes. Miami people who know something of the region say that it is possible to see as much from the air in one day as one could from the ground in several weeks.

The exploring party consisted of Horace M. Albright, director of the U. S. National Park Service; Arno Cammerer, associate director, and a group of scientists versed in various phases of tropical botany, zoology, ornithology, etc. They examined an area comprising approximately 2,500 square miles on the southern tip of Florida plus a number of small outlying islands. This land has been suggested as suitable for a national park. The party will make its report to the Secretary of the Interior, who may later be authorized by Congress to accept title to the land if it is offered as a gift to the United States. National the setting aside of public lands, as in the case of most parks are never created by Federal purchase, but only by of the western parks, or by the transfer of privately owned lands as a gift, as in the case of Acadia National Park and the new Great Smokies area.

The southern Everglades are of especial interest mainly because of the large elements of tropical life contained in their plant, insect, amphibian, reptile, bird and mammal populations. There are forms of life to be found here, especially on low coral-limestone ridges that rise in a sort of range, that exist abundantly across the salt-water channel in the West Indies but not to the north on the rest of the Florida mainland. Here can also be found the active geological processes of building up the land by corals, mangrove bushes and other agencies that turn water into land.

The area proposed for a new national park is almost wholly uninhabited. The Seminole Indians, who form a picturesque group in interior Florida, have their holdings to the north of this region, and their lands would not be disturbed. There may be a few of them, and possibly also a few white men and negroes, living within the area as squatters, but these could probably be compensated and removed without causing hard feelings or legal difficulties.

ITEMS

THE smallest of the U. S. National Parks, Sully's Hill Park in North Dakota, would have its formal status changed to that of a national game preserve, by a bill introduced in the House by Representative Thomas Hull. The change would be, in effect, simply an official recognition of *de facto* conditions, because the area in question has never been used as a national park and has long been the site of an important game preserve. By transferring it from the Department of the Interior to the Department of Agriculture it is felt that the use for which it is best adapted can be better promoted. Sully's Hill National Park was created by an act of Congress in 1904. It contains one and one-fifth square miles, fronting on Devil's Lake. Mr. Hull's bill provides for the enlargement of the game preserve by the acquisition of not more than 3,000 acres to the east and south of the present area.

AFTER having photographed with the aid of an Army airplane and camera equipment prehistoric irrigation canals near Phoenix, Arizona, Neil M. Judd, U. S. National Museum archeologist, is now tracing upon the ground the ancient Indian engineering works that he discovered from the air. At altitudes of 2,000 feet, the old canals were often visible to the naked eye in cultivated fields that had been plowed over for many years. The best photographs were obtained at heights of 10,000 feet or more. Smoke and ground haze limited the useful flying time of the expedition to three hours or less at the middle of the day.

AN analysis of the electric spark completed in the physics department of the University of California by means of a camera whose shutter operates in one-billionth of a second discloses that during its brief life a 20,000-volt spark is 50 per cent. hotter than the sun and 100 times more bright. Using a special electro-optical shutter camera developed by Abraham Lemoine and J. W. Beams, of Yale, the experimenters were able to take what amounted to slow-motion pictures of the life of a spark at intervals of four one-millionths of a second, and to show how the appearance of a spark changes from beginning to end. The spark lasts only one hundred-thousandth of a second, but that would allow time for about 250 views at the time interval in which the camera shutter operates.

NEW methods of ventilating worked out by the U. S. Public Health Service may save thousands of workers in automobile factories from serious nose trouble, now often caused when accessories and trimmings on the car are treated to a coat of non-tarnishable chromium. Hydrogen, carrying a slight amount of chromic acid, is released in the plating process, Dr. L. R. Thompson, of the Public Health Service, explained to the House Committee on Appropriations, and if this passes a man's nose, it may be drawn up in the nose and be deposited on the septum. "If this continues, in a short time he loses the entire nasal septum. . . . Some automobile companies have tried ventilation, but the methods they were installing would draw the air straight up rather than across the vat. . . . We showed them that if they would draw the current of air across rather than up it would relieve the situation."