SCIENCE NEWS

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THE RADIOACTIVITY OF POTASSIUM

A 32-YEAR-OLD mystery of atomic physics has been ended at the California Institute of Technology, according to a report to the American Physical Society. Dr. W. R. Smythe and A. Hemmendinger have succeeded in collecting, for the first time, less than a thousandth of an ounce of potassium isotope and have obtained results which may be the answer to the peculiar occurrence of helium in old minerals rich in potassium. A week of steady operation of one of the fastest isotope collectors in the world, the high intensity mass spectrograph, yielded a minute sample of the three isotopes of the element potassium, never previously separated in amounts sufficient to make possible a study of their properties.

One of those properties was the radioactivity first observed in 1905 by Sir J. J. Thomson. His discovery was made just a few years after the discovery of radioactivity in uranium and radium by the Curies. It gradually became evident that different kinds of potassium, or isotopes, existed. Potassium's atomic weight of 39.1 was finally found to be made up of a mixture of potassium with atomic weights 39 and 41 by Professor F. W. Aston in 1921. Potassium 39 naturally predominated. But still the question of whether a kind of potassium with a weight of 40 really existed, remained unanswered and there was the equally unanswered question of which of the three isotopes possessed the radioactive property. Or did all three possess certain amounts?

The present tests indicate that potassium 39, 40 and 41 do, indeed, exist. And because the samples of each one obtained are enough to study, it has been found that potassium 40—most rare of the three isotopes—alone possesses the radioactive property. The radioactivity is very weak, for about one potassium 40 atom out of a billion breaks down in a year and liberates an electron. Strangely enough, two kinds of electron activity were found in the potassium isotope which appear to make its activity different from any other spontaneous or induced radioactive disintegration. The discovery of the double shooting off of electrons may explain the occurrence of helium in old mineral containing potassium. After two electrons have been given off by a nucleus there is an excess positive charge left behind which tends to be lost by disgorging a helium nucleus. From the surrounding matter the helium nucleus picks up electrons and gaseous helium atoms are formed.

BEHAVIOR OF GIANT PROTEIN MOLECULES

THE chemical behavior and actions of those protein molecules which are one of the basic building blocks of life itself were described at the meeting of the New York Section of the American Chemical Society held at Columbia University on February 3. Professor Edwin J. Cohn, of the Harvard Medical School, in summarizing recent advances, said that during the last twenty-five years science has learned to separate the large protein molecules by whirling them at high speeds in ultra-centrifuges, passing them through the finest filters, and gained new knowledge by studying the rates at which they pass through animal membrane. While most proteins in the body are probably spherical, many of them, especially in the tissues, seem elongated. Muscle proteins may consist of molecules that are from 1,000 to 5,000 times as long as the ordinary atoms or ions. These super-giants of the tiny world of chemistry are far larger even than the ordinary protein molecular giants, which are anywhere from 20 to 100 times as large as the common atoms.

On the same program, Dr. Johannes H. Bauer, of the International Health Division of the Rockefeller Foundation, described one of the newest ultra-centrifuges, used to separate protein molecules of different weights. Protein molecules to be studied are placed in a quartz chamber in the rotor of the device and whirled by compressed air at speeds of 60,000 revolutions a minute. At this time the centrifugal force in the experimental cell is some 260,000 times the value of gravity. Speed limit of the apparatus is fixed only by the strength of the materials from which the rotor is made; fracture of the rotor being the final happening if the speed is indefinitely increased.

Professor Vincent du Vigneaud, of the George Washington University School of Medicine, described the synthesis of such bodily-important chemicals as the cystine peptids and glutathione and thiolactone. Dr. A. A. Horvath, of the Agricultural Experiment Station, University of Delaware, reviewed research in the extraction of proteins from the soybean, a basic food of Oriental peoples. The chemistry of the soybean has major industrial significance, since soybean chemicals are now converted into plastics and as a water-proofing agent used with celluloid. In addition, soybean proteins find application as a glue and can be made water-resistant and of value for aviation veneer construction. Paper sizing and water paints are other uses.

THE PEKING MAN

THE face of Peking Man, vanished from earth nearly a million years ago, will be seen again. Discovery of a new skull of this most ancient Asiatic provides science, for the first time, with material showing the eye socket, nose bones and certain other parts of the head heretofore unknown. The skull, pronounced the most complete specimen yet unearthed, was found in the now famous cave of Choukoutien, near Peiping, China. Since the first discovery of Peking Man, no less than twenty-four individuals have been found in the cave, but always in crushed and very incomplete state. A series of discoveries within recent months has brought to light five skulls, including the latest and most enlightening example. The discoveries which offer new hope of reconstructing the features of Peking Man are being studied at Peiping Union Medical College by Professor F. Weidenreich.

An appeal has been issued to scientific workers to withhold judgment on the place in human history that this ancient Asiatic type deserves, until Professor Weidenreich can make his report. W. C. Pei, Chinese geologist, in a communication to *Nature* says that inaccurate rumors have already arisen. The last three skull discoveries are erroneously being called exactly like remains of Java Man, or Pithecanthropus, which is usually classified as the earliest of all specimens of man. Another false rumor, according to Mr. Pei, is that the discoveries show Peking Man to be identical with Neanderthal Man, an extinct form which throve in Europe some 75,000 years ago.

SUNSPOTS AND POLICE CALLS

POLICE calls on short-wave radio are now frequently heard across the Atlantic. Two years ago they could be received only 30 to 40 miles away. The increased number of sunspots is the cause, according to Dr. L. V. Berkner, of the Carnegie Institution of Washington. The activity on the sun produces its effect by increasing the density of the electrically charged layers 65, 130 and 190 miles above the earth that reflect radio waves.

When the police radio stations were first established, the high frequency (short-wave) radio signals used penetrated these ionosphere layers and were lost in space. Now owing to the increased density of ions in the layers, they are reflected back to earth and their echoes are received at great distances.

An intensive research program of the Department of Terrestrial Magnetism of the Carnegie Institution has shown that electrical conditions in the earth's outer atmosphere vary radically not only from day to night but also with the seasons. Many vagaries of radio transmission and fluctuations in the earth's magnetism can be explained by changes in the ionosphere. There are three well-defined regions of electrification that exist in the upper atmosphere, on a typical summer day at Washington about noon. In the lowest, 65 miles aloft, called the E-region, the electrical particles or ions number about 2,800,000 per cubic inch. The F1 region, with a height of 130 miles, has 5,300,000 per cubic inch and the F2 region, 190 miles aloft, has 16,000,000. Ultra-violet light ionizes the two lower regions, while corpuscles from the sun are believed to cause the high charge on the outermost layer. During the past two years due to increased sunspots the electrical charge in the two lower layers has increased by 50 per cent. and in the upper layer 200 per cent.

GROWTH OF COLLEGE STUDENTS

COLLEGE freshmen are taller, heavier and younger than they were twenty years ago. Several years ago Harvard University discovered that its students were growing taller at the rate of one inch every thirty-two years. But, it was argued, Harvard students represent a privileged class. What about middle class Americans? The University of Cincinnati undertook to find out. Its students come from middle class homes, very few are specially privileged and many are underprivileged and entirely self-supporting. Dr. Laurence B. Chenoweth, of the Students' Health Service, assisted by workers of the National Youth Administration, has studied the history and physical examination records of every Cincinnati freshman for the last twenty years. Men freshmen entering this university for the 1935–36 term were a full 1.78 inches taller than those entering in 1916. Freshman women entering in 1935–36 were 0.79 inch taller, on the average, than those admitted twenty years earlier. Weight has increased gradually during that period in all students, although the increase has been greater for men than for women.

In 1916 the average male student entered this university at the age of 19.45 years. In 1935–36 the average age for entering students was 18.83 for men and 18.60 for women. The probable causes of the increase in stature and weight of young people are better nutrition in infancy and childhood, less communicable disease, higher standards of living and a higher degree of health intelligence among people in general. Those who have contributed most to this improved state, in Dr. Chenoweth's opinion, are doctors (particularly pediatricians), nutritionists, public health workers and educators. These studies in the "end product of the public schools" seem to indicate that a definite racial betterment is taking place in the United States and that the improvement is only partially influenced by social and economic position.

THE STUDY OF ELECTRIC EELS IN THEIR NATIVE WATERS

WHAT happens to an electric eel when another electric eel "shocks" it? This is one of the questions being taken to the Brazilian tropics by Dr. Richard T. Cox, of the department of physics of New York University, who is leaving soon for an extended research visit in Para, Brazil, near the mouth of the Amazon, a favored haunt of the "shocking" elongate fish whose ability to generate and discharge paralyzing "jolts" of electricity is one of the classic riddles of biophysics.

Among the pieces of apparatus which Dr. Cox is taking with him is one calculated to deliver electrical discharges like those of the eel itself. His plan is to put his eel into contact with the device and then make a careful scientific record of the fish's reaction. This is something that has never been done in the aquarium studies thus far undertaken in temperate lands. Even more intimate studies of the electric eel's internal power plant and its workings are planned by Dr. Cox. He plans to block off various parts of the system of electric organs, either by sectioning nerves or with anesthetics, and thus to make analytic studies which have never been possible under aquarium conditions, where the supply of specimens is so limited that only studies of surface reactions have been possible. Dr. Cox's apparatus will include a cathode ray oscillograph, a relatively new instrument which has proved a most powerful tool in the hands of physicists and engineers in the study of the nature and rates of sudden electrical discharges. Modern apparatus of this kind has never been used in electric-eel studies. One reason why Dr. Cox is going to the tropics where the eels are, instead of having the eels brought to him, is that these peculiar fish do not survive the voyage north at all well, so that it is better economy for him to go where they

are plentiful and where it will not be necessary to keep an anxious eye on a diminishing supply in a tank.

PAPERS READ AT THE ATLANTIC CITY MEETING OF THE AMERICAN ASSOCIATION AND ASSOCIATED SOCIETIES (*Continued*)

A PRECISE chemical test that shows lack of anti-scurvy vitamin C in cells of the body, even in parts of the cells, was reported by Professor A. Giroud, of the Medical School of Paris, and Dr. C. P. Leblond, of the Yale University School of Medicine. A solution of acid silver nitrate, they found, makes visible even the minutest quantity of vitamin C. With this test Professor Giroud and Dr. Leblond have not only checked accurately on cells starved of this necessary vitamin, but have also traced it on its whole course through the body, from the walls of the digestive tract when it was taken in, to the kidney tubules when it was eliminated.

YOUNG plants were grown in atmospheres that might prevail on other worlds than ours, by Dr. William A. Beck, of the Institutum Divi Thomae, Cincinnati. Dr. Beck grew his seedlings under high pressures, in atmospheres of carbon dioxide, oxygen, and air, and in air at normal atmospheric pressure. He watched effects on the formation of two yellow pigments normally present in leaves. Pressure as such, he reported, did not inhibit the development of the pigments. In carbon dioxide under pressure the plants were quickly killed; in compressed oxygen they died also, but only after many hours. They throve in compressed air, and it stimulated the development of the yellow pigments.

CELLULOSE, the wonder-material that scientific manufacture has turned into such varied products as rayon, lacquers, artificial leather, explosives and transparent wrapping sheets, has been put to equally wide uses by plants, for many ages. Before the botanists attending the meeting, Miss Florence L. Barrows, of the Boyce Thompson Institute for Plant Research, told of her search for a place in the plant kingdom where cellulose was not. She failed to find such a "cellulose vacancy." Delicate microchemical tests proved its presence in groups of plants where it had previously been said to be lacking, such as seaweed and the lower fungi. All plant cell walls that Miss Barrows investigated appear to be made of the same kind of cellulose building-blocks.

HOW pulse waves travel along an artery, in sickness and in health, was demonstrated with a fifty-foot "artificial artery" made of rubber tubing, by Professor Noel C. Little, of Bowdoin College. The model was constructed as a teaching aid in getting pre-medical students to understand some of the complex mechanical problems involved in human plumbing through the fact that its pipes have walls that can stretch. By modifying conditions in his fifty-foot rubber circulatory system, Professor Little gave a clear mechanical picture of how pulse-waves travel along a normal artery, and how differently they behave when the artery is stiffened by arteriosclerosis or blocked by an aneurism.

TRANSPORT planes will cruise within the next decade at 300 miles per hour instead of the present 200, thanks in part to flying at 35,000-foot altitudes in super-charged cabins. This prediction was made by T. P. Wright, Curtiss Wright Corporation engineering director. He predicted that the continent would be crossed in 12 hours and the Atlantic in 18 hours. Eight years ago two thirds of the horsepower was absolutely wasted in overcoming useless drag. This is now reduced to 25 per cent. horsepower loss. Seaplanes of much larger size were predicted for the future by Igor I. Sikorsky.

DROUGHT'S approach can be detected in the soil, even before plants have begun showing signs of distress, by a new instrument demonstrated by Professor B. E. Livingston and W. L. Norem, of the Johns Hopkins University. The instrument measures the power of the soil to absorb water from a wet surface against resistance. It consists of a cone of porous porcelain buried in the soil, with a projecting tube full of mercury, against which the soil must pull, to get the water when it is poured in through a second opening. A graduated tube is attached in such a way that the rate of water absorption by the soil can be read off directly. It proved possible to tell in advance when the wilting point of plants may be expected. Professor Livingston suggested practical applications in irrigated lands and in greenhouses, so that water may be supplied when the soil actually indicates that it is needed, and not as hitherto, more or less by rule of thumb, resulting in frequent over-moistening of the soil and waste of water.

ITEMS

DISEASE-RESISTANT varieties of tobacco have been brought back to the United States from northern South America by Raymond Stadelman, who searched for them on a 10,000-mile trip through Colombia, Venezuela, Peru and Ecuador. Plants raised from the 359 samples of seeds obtained by Mr. Stadelman will be crossed with cultivated tobaccos in an effort to obtain profitable strains for the market which will also be resistant to the half-score fungi, bacteria and viruses that cause the tobacco planter his chief losses at present.

LOSSES of best farm soil during the present flood period reach almost astronomic figures, according to calculations of the U. S. Soil Conservation Services. From the Ohio watershed, where most of the rains fell, it is figured that the prolonged storm period carried away, at a very conservative estimate, three hundred million tons of top-soil. The very fact that the rain has been long drawn out, indeed, operated toward making the losses less; the same amount of precipitation concentrated in a shorter time would have washed away an even greater mass of soil. Even as it is, gullying has been exceedingly rapid. Careful measurements were made by the Soil Conservation Service of the run-off from certain fields in Ohio. From plowed land the run-off has been eight inches for the period of the rains; from comparable areas under grass and trees the run-off has been only two inches. Soil losses from the plowed land were of course several times as great as from the protected soil.