SCIENCE NEWS

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RESEARCH IN COSMIC RAYS

BALLOONS bearing automatic recording instruments, floating free to heights hitherto unattained in such studies, are planned for the further investigation of cosmic radiation by Dr. Robert Andrews Millikan, of the California Institute of Technology. The launching place for these unmanned explorers of the upper air has not been announced, except that it will be in a different latitude from that used for similar experiments in 1922, when Dr. Millikan and his colleague, Dr. I. S. Bowen, sent up recording balloons from Kelly Field, Texas.

In these tests ten years ago, one of the balloons reached a height of 15.5 kilometers, or 9.6 miles. Dr. Millikan hopes to send this year's balloons to greater heights, carrying their feather-weight equipment of recording electroscopes, barographs and thermometers into regions where the blanket of air is far less dense and correspondingly more penetrable to the cosmic rays.

Investigations at great heights, as well as under great depths of water, have been considered of much importance in the study of cosmic radiation. With other rays, there is a difference in their penetrating power, depending on their wave-length: the shorter the wave-length, the "harder" and more penetrating the radiation. The same rule may be presumed to hold for cosmic rays. Dr. Millikan has stated as a result of his earlier studies that he has been able to distinguish a cosmic-ray "spectrum" of several wave-lengths. Possibly the higher ascensions planned for this year will carry his instruments out into a region where they can pick up "softer" rays of greater wave-length, that are stopped by the deep atmospheric blanket that surrounds the earth.

A PHOTOELECTRIC RECORDER

A NEW and extremely sensitive recorder that uses light and electricity to measure smoke, heat, light, pressure, noise and thicknesses of thin materials was introduced to the American Institute of Electrical Engineers meeting in New York, on January 25, by its inventor, Mr. C. W. LaPierre, of the General Electric Company.

Less than a hundred millionth of the electricity used by an ordinary 40-watt electric light will set the new photoelectric recorder in full operation. Errors of a millionth of an inch are detected when this new engineering tool is used to measure dimensions.

Anything that can be indicated by a sensitive instrument can now be continuously recorded by the photoelectric recorder, Mr. LaPierre explained. It is rapid in its response as well as sensitive. An optical system, using a galvanometer mirror, is combined with a photoelectric circuit in the new instrument.

As a 24-hour watchman on the alternating frequencies of electric current supplies, the new recorder promises to keep tab on the very small variations that may cause electric clocks in households to lose or gain small fractions of a second. Variations undetectable to the ordinary users of these clocks will show up as deviations of an inch or more in the photographic records of the new instruments.

By combining a photoelectric cell smoke detector with the new recorder, the amount of smoke in the stack of a furnace has been charted continuously and automatically. A photoelectric cell or electric eye is also used in the recording device itself.

TUBERCLE BACILLI IN THE BLOOD

A NEW method by which the presence of tuberculosis germs can be detected in the circulating blood of patients suffering from tuberculosis has been found. The method, developed by Professor Ernest Loewenstein, of Vienna, was described by Dr. Laszlo Detre, of the University of Budapest, Hungary, in a report to the District of Columbia Medical Society.

By this method, Dr. Detre said, the presence of the germ can be detected in very early stages of pulmonary tuberculosis, which is important from the standpoint of successful treatment; in cases of surgical tuberculosis in which there is no fever; and in different forms of tuberculosis of the skin.

Dr. Detre stated "that it has proved, contrary to older opinions, in an organism attacked by tuberculosis there is a regular circulation of tubercle bacilli in the blood stream."

By means of the new method, it is claimed, certain other diseases have been found to have a tuberculous origin, for instance, acute polyarthritis or acute inflammation of the joints, popularly known as rheumatism. Until now, certain infections of teeth or tonsils have been considered responsible for this disease, Dr. Detre pointed out. But by means of the new test, a tuberculous origin of the disease was found. In most of these arthritic cases it was the bovine form of the tuberculosis germ, that is, the form found in cattle, which played the important rôle. Another disease which the new test is said to show has a tuberculous origin is multiple sclerosis, a nervous disease whose cause is generally considered unknown.

Dr. Detre emphasized the practical consequences of the new findings and advised American bacteriologists to follow this new line of research. New methods of treatment are suggested as a result of this new test, he said. Dr. Loewenstein, who has been working for 15 years on this test, which involved the development of a new synthetic culture medium for the germs to grow on, is receiving samples of blood from cities all over Europe for examination by the new method.

SUBMARINE VALLEYS

A SPRING of fresh water gushing from the sea bottom just off St. Augustine, Florida, and flavoring the air with sulphur, submarine springs of oil off the California coast, a drowned canyon of the Hudson River outside New York harbor—these and other oddities of the ocean that are seen by the men that go down to the sea in the

ships of the U. S. Coast and Geodetic Survey were described to the radio audience of the Columbia broadcasting system on January 22, by Lieutenant-Commander R. R. Lukens in a talk arranged by Science Service.

The drowned canyon of the Hudson, Commander Lukens said, has been accurately surveyed by government investigators. Soundings have found a depth of 2,400 feet and a width of three miles. Although men will never see the grandeur of the scenery this might provide were it lifted above the ocean, this canyon still performs a useful function, for it serves as a sure guide in thick weather to ships provided with echo-sounding devices to aid in their navigation. They can "listen their way" along this deep trough, with as much confidence as they could watch beacon lights if they were visible.

Far on the other side of the world, off the southern Philippines, is a submarine valley compared with which the drowned Hudson gorge is a mere pinscratch. This is Mindanao Deep, where the new cruiser *Emden*, Germany's first post-war fighting ship, in 1927, echo-sounded a deep spot for a record of 35,400 feet, or nearly six and three quarters miles. This "hole in the bottom of the sea" lies within 75 miles of a mountain 6,027 feet high; so that there is a total difference in elevation of over 41,000 feet, which is 12,000 feet greater than the height of Mt. Everest.

ARCHEOLOGICAL WORK IN ALASKA

MAROONED for nine months in the Arctic by his own wish, a young Smithsonian archeologist, Mr. James A. Ford, is spending his time studying Eskimo villagers and taking long automobile trips across the ice. His automobile, said to be the first ever used north of Nome, has been equipped with skis instead of front wheels. The first letter from Mr. Ford, reporting his winter activities, has been received by the Smithsonian Institution.

Mr. Ford is spending nine months at Point Barrow, so that he may start digging at ancient village sites as soon as the ground thaws. By being on the spot he can have three full months for his excavations, June, July and August. Ordinarily, archeologists who go to the Arctic take the first boat which can break through the thawing ice, and return on the last boat of the summer, just in time to escape being icebound. With the most favorable ice conditions, this allows a brief month for scientific digging.

The sites which Mr. Ford will explore next June are four or five large mounds which represent ancient villages. Investigators who are trying to trace the ancient history of the Eskimos have looked with an interested eye on these mounds, because they may contain new evidence of the evolution of Eskimo culture. Point Barrow was a sheltered spot on the Arctic coast, and is believed to have been a pivotal point in migrations of far northern tribes.

Mr. Ford is now studying the customs of the Eskimo people and also taking their hand and foot prints. The prints are being collected for a scientific study of racial differences. Anthropologists making the study at Tulane University believe that there are differences in the hand and foot prints of the various races.

Touring over the Arctic ice by moonlight in an auto sledge is exciting, Mr. Ford writes, but it is not an ideal way of riding. The ice is rough and there is constant danger of upsetting. Still, the automobile on skis offers the fastest means of travel, faster than either boat or dog sledge.

ITEMS

VITAMIN A, the growth-promoting vitamin found in liver, cod-liver oil, butter fat, egg yolk, and green and yellow vegetables, has just been isolated by Professor J. C. Drummond, professor of biochemistry in University College, University of London, in association with Professor I. M. Heilbron and Dr. R. A. Morton, of the University of Liverpool. The report to the Society of Chemical Industry, which will appear in the forthcoming issue of the society's journal, *Chemistry and Industry*, describes how, by splitting carotene into two products, the very elusive vitamin A was obtained. Carotene is the pigment which gives the yellow color to carrots, yellow corn, butter, egg yolk and other yellow-colored members of the plant and animal kingdoms. One of the two products obtained by splitting carotene is vitamin A, they believe. They describe it as an alcohol and state that it contains no nitrogen and has a potency about equal to that of the newly discovered crystals of vitamin D. At the same time these investigators reported that they had obtained from halibut liver oil a sticky, yellowish oil which is nine tenths pure vitamin A.

EVERY time the lightning flashes fertilizer is being added to the earth, according to computations made by Dr. W. J. Humphreys, of the U. S. Weather Bureau. Ozone of the lower atmosphere, ammonia and oxides of nitrogen are produced by the electrical discharge of the thunderbolt in the atmosphere. All of these synthetic chemicals made by lightning react with water in the air. The ammonia dissolves in rain, becomes ammonium hydroxide, and serves as plant food. The nitrogen oxides react with atmospheric water to form nitric and nitrous acids carried to earth to form soluble nitrates and nitrites which are good fertilizers. Over 770 million tons of 100 per cent. nitrogen fertilizers are thus delivered to the soil each year, at the average of 12 pounds per acre a year. It is thus believed that regions where lightning is frequent and heavy may be more fertile because of this free gift of lightning-made nitrogen compounds.

EVOLUTION has been reversed for a stock of guinea-pigs in the laboratories of the University of Chicago. As a result of protracted breeding experiments conducted by Professor Sewall Wright, the animals have recovered five of their six toes, which disappeared somewhere on the long road from the days when guinea-pigs, or their ancestors, had the full typical vertebrate complement of twenty toes apiece. Ordinary guinea-pigs now-a-days have only fourteen toes. Big and little toes are missing from their hind feet, and "thumbs" from their front feet. In Professor Wright's breeding stock each animal now has a total of nineteen toes. Extra toes have been produced in some of the animals during the course of the experiment. One specimen had forty-four digits.