SCIENCE NEWS

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NEW ARTIFICIAL RADIATION

WITH the production in Germany of million-volt gamma rays of intensities that approach those of the cosmic rays and with the possibility of twenty million volts being produced at Princeton, Professor Arthur H. Compton, of the University of Chicago, stated that it might eventually be possible to tap the internal energy of matter and put it to work. A new idea as to how the energy stores of the sun are supplied was advanced by Dr. Compton at a conference in New York City sponsored by the American Institute of Physics on November 10.

An experiment by Dr. Walter Bothe, German physicist, was heralded by Professor Compton as "remarkable" and as accomplishing what has long been "considered an impossibility." On his recent trip to Europe, Professor Compton learned that Dr. Bothe has been able to produce artificial gamma rays by bombarding beryllium metal with alpha rays. These artificial gamma rays are an approach to artificial cosmic rays. They are the same kind of radiation as light and x-rays, except that they are much more penetrating. The beryllium metal from which they were obtained is the lightest metal that can be used practically, and the alpha rays that were used by Dr. Bothe in the bombardment are speeding hearts of helium atoms given off when radium and other elements disintegrate radioactively.

The amazing result of Dr. Bothe's experiment, as explained by Dr. Compton, is that there is obtained from the bombardment of beryllium, through the giving off of the artificial super-gamma ray, much more energy than was supplied by the attacking helium atom heart. This is interpreted to mean that what happens is not the disintegration of the beryllium but an actual process of synthesis in which a heavier element, carbon, is formed and energy is liberated in the form of the artificial "soft" cosmic rays.

If that is so, the hope of obtaining energy from such artificial synthesis is due for a revival. There is hope also that one element can be changed into another and that the age-long wish for transmutation may be fulfilled.

The practical application of this possible new energy source is made difficult by the fact that only one in fifty thousand of the projectiles hurled at the beryllium hits its mark and the process is therefore inefficient. Although there may be places in the universe where the synthesis proceeds at a much faster rate, the physicists are not optimistic about making this energy source competitive with coal, oil and water-power.

But conditions in the sun may be different, and the theory is advanced that solar energy that warms and lights our earth may be the result of synthesis in the sun rather than the present favorite theory of the conversion of matter into radiant energy. This idea carried to its logical conclusions may greatly affect all ideas of how the solar system and our earth originated.

In testing these latest physical theories and providing more powerful electrical tools, a new electrical generator developed at Princeton University by Dr. Robert J. Van de Graaff, now of the Massachusetts Institute of Technology, will be useful. A large generator to be built in an airship hangar near New Bedford, Massachusetts, is expected to produce ten to twenty million volts. A model built at Princeton gave one and one half million-volt sparks that jumped three feet.

Simplicity marks this new method of producing previously unattainable direct current voltage. It operates on the ancient principle of static electricity, that is utilized when you obtain sparks from a cat's back or scrape your feet across a rug and then touch metal. In the large generator the operator will sit inside one of two fifteen-foot-diameter electricity-collecting spheres, and although he will be charged with from five to ten million volts, they will not harm him because he will not be grounded.

Professor Compton, as the result of his survey of present knowledge of the atomic nucleus, believes that "we may have to find some fundamental principles of the physical world which are as yet unknown" before the nucleus can be understood. He recalled that the Danish physicist, Professor Niels Bohr, has suggested that perhaps the principle of the conservation of energy, long considered the foundation rock of modern science, is not obeyed when electrons are ejected from atoms.

INFANTILE PARALYSIS

INFANTILE paralysis, epidemic in New York and New England this summer and fall, affects more frequently children who are brunettes, have mongoloid eyes, deeply pigmented skin, wide faces with widely separated eyes, irregular teeth, and certain endocrine deficiencies, according to Dr. George Draper, professor of clinical medicine at Columbia University.

"So far as the paralytic symptoms of poliomyelitis are concerned," Dr. Draper said, speaking at a conference in Albany, sponsored by pediatricians of New York and Canada, "the child is more important than the virus of the disease itself."

Dr. Draper's demonstration of the influence of bodily constitution on susceptibility and severity of this dreaded illness may provide a means of selecting children who can be given special preventive attention during another epidemic.

Dr. Thomas Parran, Jr., state health commissioner, reported that over 140,000 cubic centimeters of human convalescent serum were prepared and used for treatment during the epidemic in New York State. Twice that amount of human blood was collected to make the serum. Nearly 2,000 cases occurred in New York State outside of New York City, where over 4,000 were reported.

Under the leadership of Dr. William H. Park, director of the New York City Health Department Bureau of

Laboratories, every poliomyelitis case in the metropolis was visited by specialists drafted for the purpose. This special inquiry fails to show that in general the cases treated with convalescent serum progressed any better than those not so treated, although there was no evidence found that such serum injected intramuscularly did any harm. Dr. Lloyd W. Aycock, director of the Harvard Infantile Paralysis Commission, made carefully controlled clinical experiments on the use of serum, giving serum only to every other case that came to the hospital, but he reported that his results also were inconclusive.

Dr. Simon Flexner, director of the Rockefeller Institute for Medical Research, New York, explained that the fact that the virus causing infantile paralysis can not be seen does not mean that nothing is known about the disease. He suggested that the infection is introduced through the nose and that the victim must come into actual contact with someone carrying the disease. The nasal tract secretions are the most likely infective material.

Compared with 1916, when 21 out of each 100,000 died of the disease, this year's epidemic was mild, with only 8 deaths per 100,000. This may be due either to a milder form or a wider recognition of the disease by doctors.

INFLUENZA

A SCHEME of preparedness for the next influenza epidemic was strongly urged by Dr. I. S. Falk at a meeting in Washington of the Washington branch of the Society of American Bacteriologists. Dr. Falk, who is now on the staff of the Committee on the Cost of Medical Care, discussed the causes of influenza and described his own investigations on the subject made at the University of Chicago.

"If a virulent epidemic of influenza came upon us this winter, or at another time, we should not be much less helpless before it than in 1918," according to Dr. Falk.

The outlook for the next decade or so will not be very hopeful if further study of the cause and prevention of this disease are left to the casual development of research projects.

"There is an obligation upon public health authorities to provide carefully prepared personnel and facilities, located in strategically placed areas in the country, each with a carefully prearranged plan of study to be undertaken on the approach of an epidemic.

"Such a program does not necessarily conceive that the several research groups should sacrifice that independence of method and performance which is ordinarily essential in the prosecution of true research. It does require, however, that some suitable, central, authoritative body should take the necessary steps to insure that adequate preparation be made for the conductance of studies as effective as the state of knowledge requires."

Dr. Falk's theory of the cause of influenza is based on his and his associates' findings in Chicago during the 1928–1929 epidemic, when they isolated a germ from influenza cases which produced in monkeys a disease similar to influenza in man. This germ was a type of coccus. During the experiments it apparently lost its virulence. In further research, Dr. Falk was able to dissociate or separate this strain of germ into three types, one of which retained sufficient virulence to produce the disease. Dr. Falk suggested that spontaneous dissociation of this type occurring in the influenza germ may be responsible for the development of the disease. When the germ is in its virulent stage it may be the source of epidemics. In between epidemics it probably is present in the non-virulent form.

TRANSMISSION OF INFECTED MOSQUITOES BY AIRPLANES

PLANES from the tropics will probably carry on their sides, along with the fire extinguishers, spray guns for killing insects. This innovation is to be expected as a result of studies of mosquito transportation by airplanes, recently announced by the U. S. Public Health Service.

Because a certain type of mosquito carries the virus of yellow fever, which still occurs in parts of South America, the Public Health Service investigated the possibility of their bringing the disease in planes to the United States.

Dr. T. H. D. Griffitts and J. J. Griffitts, of the U. S. Public Health Service, found that certain types of airplanes do carry mosquitoes. These investigators put stained mosquitoes onto planes leaving San Juan, Porto Rico, and recovered a certain number when the plane arrived at Miami, 1,250 miles away, that same day.

"With conditions at airports such as would permit of many mosquitoes getting aboard, it might be expected that approximately one fifth of the original number would be transported for a long distance—at least 1,250 miles—in one day with repeated landing and opening of doors, hatches and windows, and refueling, unloading and loading taking place."

Under normal average conditions about airports, heavy infestation of airplanes would not be likely, but even one infected or infective mosquito of the yellow fever type might be the means of starting an epidemic.

However, considering the small number carried by aircraft and the facility with which planes may be freed from mosquitoes, it is concluded that while the danger exists, airplanes can be efficiently treated so as to destroy mosquitoes and thus retardation of air traffic progress can be avoided.

The investigations were made with the cooperation of the Pan American Airways system on the three types of planes—Fokker tri-motor cabin planes; Sikorsky amphibian passenger planes and Commodore cabin planes —operating between the West Indies, the western coast of South America, Central America, Panama, Mexico, Jamaica and Miami, Florida.

EFFICIENCY OF THE RAILROADS

CONTINUED increase in efficiency of railroad operation as has been practiced during the past decade will be one of the chief methods by which the common carriers will extricate themselves from their present predicament.

This thought is gathered from an address given by William C. Dickerman, president of the American Locomotive Company, before the Franklin Institute.

Coming at a time when the railroads have been seeking higher freight rates, Mr. Dickerman's address emphasizes the great technical advances and economies the roads have made since 1920.

In spite of the fact that from 1920 to 1929 there was a reduction of 42 per cent. in the number of passenger-miles per year, this loss has been counteracted by savings and increased efficiencies. The loss of passenger-miles is not as serious as it at first seems because the bulk of the railroads' revenue is derived from freight, and freight revenue-ton-miles increased about 10 per cent. during the decade.

Mr. Dickerman said that railroad operating costs in 1929 had been reduced to nearly three fourths their 1920 value. The number of employees was reduced by 18 per cent., and 10 per cent. less coal was burned.

The concentration of trains into larger units and the expenditure of nearly $7,200,000,000 for capital improvements taking advantage of technical advances are held responsible for these savings. The number of freight cars decreased during the ten-year period, but their average size and their total carrying capacity increased. There are also fewer locomotives by 7,000, but as a group they have greater power, higher speed and make longer engine runs with less fuel consumption than they did in 1920.

"This technical experience with its background of research, invention and resourcefulness," Mr. Dickerman said, "may be expected to continue its unrelaxed efforts toward greater efficiency, whether to be secured through super-pressures in steam practice or in refinement of internal combustion power far beyond anything that commercially has been developed to date."

Mr. Dickerman believes that the most effective immediate economies to be achieved by the railroads will come from replacing 25,000 locomotives more than 20 years old—nearly half the total number in the United States —with modern up-to-date efficient locomotives. Leaders in practically all fields have long recognized what obsolescence means to the progress of industry. They have not hesitated to replace their prime mover equipment as more efficient apparatus has been developed. Mr. Dickerman believes that the same economic analogy holds good in the field of railroad motive power.

ITEMS

A NUMBER of diamonds have been found in gravel deposits in Michigan, Wisconsin and Illinois. While the majority of them are small, many diamonds of considerable value have been discovered. The largest so far reported found weighed 21½ carats. A great diamond field somewhere in the north is believed to be the source of these stray diamonds. Where it is—or was—no one knows. But undoubtedly at some time glaciers swept over it, carrying away with them some of the diamonds, and perhaps even sweeping away the entire deposit. As they moved down over the Great Lakes region they scattered the diamonds among the gravel they left in their wake. Attempts made to find this field have all failed. Probably if still in existence it is hidden in the great wild and inaccessible areas of Canada, and the search for it is on a par with the hunt for the proverbial needle in the haystack.

STRAY electric currents from street-car tracks may travel along nearby pipe lines and hasten their corrosion, but the currents which follow oil and gas pipe-lines for miles and miles do not speed up rusting and leaking. This is the conclusion of Mr. Stanley Gill and Mr. W. F. Rogers, research engineers with the Gulf Oil Companies, following a study reported in the scientific journal, *Physics*. It is well known that currents from electric railways often jump to nearby pipe lines and rapidly destroy the pipe. But the currents Mr. Gill and Mr. Rogers studied are found in pipe lines far from electric railways or other sources of stray currents and frequently follow the pipe for miles without getting larger or smaller. They called these "long line currents." The experiments which show that these currents are a negligible cause of corrosion also indicate that they originate in the action of soil on the pipe.

A SMALL five-foot model of the world's tallest building is being buffeted by seventy-mile-an-hour storms in the big wind tunnel at the U. S. Bureau of Standards as part of a study of the effect of wind on skyscrapers. The other part of the research consists in actual measurements of wind pressure at different levels on the Empire State Building itself, of which an aluminum model is a copy.

LITTLE cellulose spindles are no longer the smallest known units which make up the structure of a plant; spherical bodies, tinier still, have been discovered. These minute spheres, observed for the first time at the U. S. Forest Products Laboratory, measure about one fifty-thousandth of an inch in diameter. They were found through microscopic examination in the spindles which are larger structural units of the plant fiber.

THE monotony of the black and white of the U. S. Patent Office files is now to be enlivened by bright colors. The plant patents, recently authorized by act of Congress, will be issued in full color whenever the color is a part of the "invention" claimed by the horticulturist who has produced the new variety of plant. The two colored patents issued so far are for a white carnation with a delicate touch of yellow, and for a rose of deep pink. The necessity for putting out patents in color has set a new problem for the patent office officials, for color has never previously been required for any type of patent. Despite the great additional expense for printing, the office is not allowed by law to charge any more for copies of the patents, so it is planned to limit the sale of them to those who can show that they have real need for them.