SCIENCE NEWS

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POSITRONS

THE positron is formally introduced to the world of physics in a communication by its discoverer, Dr. Carl D. Anderson, of the California Institute of Technology, to *The Physical Review.*

August 2, 1932, is given as the date of the first photograph of the positive electron, christened positron for short, which has the mass of the older negative electron but a positive electric charge like the proton, which is nearly 2,000 times more massive.

A search for a negative particle of the mass of the proton was urged by Dr. Anderson, who predicted the possibility of its existence.

To date, Dr. Anderson has obtained 15 photographs of positron tracks in a group of 1,300 photographs of cosmic ray tracks. Positrons are let loose from atoms bombarded with cosmic rays. Dr. Anderson offers the following suggestion as to what happens:

"From the fact that positrons occur in groups associated with other tracks it is concluded that they must be secondary particles ejected from an atomic nucleus. If we retain the view that a nucleus consists of protons and neutrons (and alpha particles) and that a neutron represents a close combination of a proton and electron, then from the electromagnetic theory as to the origin of mass the simplest assumption would seem to be that an encounter between the incoming primary ray and a proton may take place in such a way as to expand the diameter of the proton to the same value as that possessed by the negatron. This process would release an energy of a billion electron-volts appearing as a secondary photon. As a second possibility the primary ray may disintegrate a neutron (or more than one) in the nucleus by the ejection either of a negatron or a positron with the result that a positive or a negative proton, as the case may be, remains in the nucleus in place of the neutron, the event occurring in this instance without the emission of a photon. This alternative, however, postulates the existence in the nucleus of a proton of negative charge, no evidence for which exists. The greater symmetry, however, between the positive and negative charges revealed by the discovery of the positron should prove a stimulus to search for evidence of the existence of negative protons. If the neutron should prove to be a fundamental particle of a new kind rather than a proton and negatron in close combination, the above hypotheses will have to be abandoned, for the proton will then in all probability be represented as a complex particle consisting of a neutron and positron."

BERYLLIUM ATOMS PROVED RADIOACTIVE

A NEW and striking case of radioactivity, the spontaneous explosion of beryllium atoms, is the discovery announced at the California Institute of Technology by Dr. R. M. Langer and his associate, Russell Raitt, a graduate student.

This is probably the first successful prediction of radioactivity and it promises to lead to many others. Dr. Langer and Mr. Raitt first predicted the radioactive disintegration of the metallic atoms of beryllium and then systematically searched for the expected effect until they found it.

The effect of the explosion is so weak that the physicists know that the average beryllium atom will live a hundred trillion years (100,000,000,000,000 or 10 to the fourteenth power) before exploding. Extended researches show that none of the known radioactive elements can be responsible for the effects that the experimenters attribute to the beryllium atoms.

Beryllium is almost as unlike the ordinary radioactive elements as it is possible to be. It has a mass only nine times that of hydrogen whereas the most active radioactive elements have masses ten or more times larger.

Data gathered from studying the spontaneous explosions of beryllium atoms into fragments are expected to provide powerful tools in unraveling the mysteries of the atomic nucleus.

The radioctivity of beryllium accounts for the puzzling fact that beryl minerals often contain much more helium than could be explained on other hypotheses. Helium is set free when beryllium explodes.

Of great interest to physicists also is the prediction by Dr. Langer and Mr. Raitt that a new form of helium atom will be found in the future. This has a mass of five instead of the usual mass of four, and it is predicted that this heavy helium will explode spontaneously and thus prove to be the lightest radioactive element.

MOSQUITO MAY CARRY HORSE PLAGUE

A SERIOUS epidemic disease of horses and mules, popularly known as Kansas-Nebraska horse plague, may be spread by the yellow fever mosquito, *Aedes aegypti.*

Whether the mosquito actually is the villain that spread an epidemic of the disease which affected 6,000 and killed 3,000 head of horses and mules in one season in California has not yet been proved. So far neither the mosquito nor any other insect has been caught in the act of spreading the disease from horse to horse.

But strong evidence of the mosquito's possible guilt has been obtained at the Army Medical School. Major R. A. Kelser, of the Veterinary Laboratory Division, has reported the fact that the yellow fever mosquitoes can spread the disease among guinea-pigs.

Mosquitoes infected with the causative virus of the disease have so far failed to give it to a horse. This may be explained by the fact that the horse on which the infected mosquitoes were allowed to feed is an old army horse and may have been exposed to the disease and consequently developed resistance to it earlier in its career. Major Kelser plans to feed the infected mosquitoes on a young horse whose history of infection and exposure to disease is known. He is also planning investigations with monkeys as to the rôle of mosquitoes in this disease.

Known to scientists as equine encephalomyelitis, this horse plague has been known under various names in both America and Europe for half a century or more. In Europe its most common name is Borna disease, taken from a region where a disastrous epidemic raged, just as the popular name in this country, Kansas-Nebraska horse plague, comes from the wide-spread outbreak in those two states some years ago.

The disease has been confused with many other diseases, among them forage poisoning, but in 1930, 1931 and 1932, Professor K. F. Meyer, of the Hooper Foundation, and associates of the University of California and California Agricultural Experiment Station definitely proved that the disease is caused by a germ of the filtrable virus type. The virus attacks the brain and spinal cord of the animals. Two types of the disease are said to occur: the sleepy type in which the animals may drowse until disturbed, when they may have convulsions, and the walking type in which the animals pace around and around the field.

The disease attacks only horses and mules under farm conditions and is not apparently a serious menace to humans, although two cases in California were reported in which men apparently acquired the disease from handling infected animals.

In a discussion of Major Kelser's report, investigators of the U. S. Department of Agriculture brought out the fact that while yellow fever mosquitoes were not found in California, Kansas or Nebraska, where the chief epidemics of this disease have occurred, many other kinds of mosquitoes and biting insects were found. It is possible that some of these other species may have spread the disease in those localities. Studies at the Bureau of Animal Industry seemed to show that contact between healthy and infected horses is not an important factor in the spread of the disease. This supports the theory of insect transmission.

CHEMICAL ANTIDOTES FOR BACTERIAL POISONS

WE may not have to depend forever on painfully, often uncertainly elaborated antitoxins, serums and vaccines for the combating of our bacterial foes. Eventually antidotes for germ poisons may come off the chemist's shelf instead of out of a horse's veins. But before that day, as yet far off, a great deal of fundamental research will have to be done, involving cooperation by scientists in a number of fields.

Thus Dr. Stanhope Bayne-Jones informed the Yale chapter of the Sigma Xi in a recent lecture. Dr. Bayne-Jones is professor of bacteriology at Yale University and chairman of the medical division of the National Research Council at Washington, D. C.

But before we can undertake to make synthetic antidotes for bacterial poisons we must find out what these poisons are, and that is no easy task, Dr. Bayne-Jones reminded his hearers. They are exceedingly complex in their chemical make-up, and at the same time exceedingly easy to break down, so that efforts at study often end in destroying them without finding anything about them.

However, enough has been found out about some of them to constitute at least a fair chemical "lead," and something may be accomplished without waiting for the complete solution of these chemical and pharmacological problems.

Dr. Bayne-Jones stated that "it is probable from the ability of formaldehyde to deprive bacterial poisons of toxicity that the amino nitrogen group in the molecule has a good deal to do with the poisonous effect and that this group may be vulnerable to a chemical antidote. Oxidases destroy toxins and have some protective value. Acids remove toxicity, possibly according to the benzoyl serin intramolecular rearrangements described by Bergmann. Copper and iron appear to be essential to the production of some bacterial toxins. There are evidently enough 'chemical leads' to justify a more extended investigation of the possibilities of chemical antidotes for these poisons.

"Although the search for chemical methods of neutralizing bacterial poisons in the body might have a frankly practical objective, the end could not be reached satisfactorily without extensive bacteriological, immunological, biochemical and clinical research. The problem, like that of the chemistry of tuberculosis, needs for its solution the joint endeavors of investigators in several fields."

MORE EARTHQUAKES EXPECTED IN SOUTHERN CALIFORNIA

THE Long Beach, California, earthquake, the aftershocks of which will be felt for months, was nevertheless not a general one and probably did not relieve the strain in the earth's crust in other parts of Southern California.

This is the opinion of Professor Bailey Willis, the eminent authority on geology and seismology who is professor emeritus at Stanford University.

There is, therefore, continued danger of severe earthquakes in southern California. When these will come, whether to-morrow or a decade or more from now, neither Professor Willis nor other geologists can attempt to predict.

"The Long Beach earthquake appears to be a shock of moderate intensity on one of the several faults of the San Pedro fault zone," Professor Willis said in response to a Science Service inquiry. "This fault zone was recognized by H. O. Wood, who described it in the *Bulletin* of the Seismological Society, 1916, in his account of the 1812 quake.

"Among the effects of movements on that zone we may recognize the elevation of the San Pedro point which is terraced by marine benches up to more than 1,000 feet above sea and demonstrates activities extending back more than a million years. The zone has the earthquake habit and may be expected to behave accordingly from time to time as in the past. Aftershocks are likely to continue for several months and some of them may be strong. Measures of safety should be rigidly enforced. Although locally disastrous, this Long Beach shock is not a general one and probably does not relieve the strain in the San Jacinto or San Andreas faults. The disaster

emphasizes the need of earthquake-resistant buildings under a reasonable building code recognizing earthquake hazards.''

The San Andreas fault is the long cleavage in the earth's crust which runs from north of San Francisco along the coast to northwest of the Los Angeles region inland. Along this fault the great 1906 San Francisco earthquake occurred. The San Jacinto fault is to a certain extent an extension of the San Andreas fault southward of it.

INCREASE IN NUMBERS OF THE PRONGHORN ANTELOPE

THE pronghorn, slender and beautiful antelope-like animal of the American West, is believed to be on the increase. Thought to be even nearer extinction than the American buffalo or bison was a generation ago, they are shown by a census conducted by the New York Zoological Society to be approximately 68,000 in number in the United States, with 2,400 additional in Canada. A similar census by the U. S. Biological Survey ten years ago indicated less than 27,000 in this country and 1,327 in Canada. Figures for the present zoological society census were supplied by federal, state and dominion authorities.

Wyoming leads the list, with 25,000 animals, as estimated by that state's fish and game commission. An unofficial estimate disagrees with this, setting the number considerably lower. Other states show pronghorn populations ranging from as high as 9,000 in Oregon down to a mere baker's dozen in Nebraska.

When white men first came to the plains, pronghorn were even more numerous than the bison, but the spread of agriculture and grazing, and the relentless guns of the hunters reduced them to an even lower estate than that of their shaggy-maned companions. Only by rigid protection in most states, together with an extensive propaganda campaign urging hunters to spare the beautiful little animals, have they been given a chance to begin their hopeful comeback.

There is a small herd of a few hundred pronghorn in Yellowstone National Park, on the buffalo range in the Lamar Valley. It is here that the average citizen perhaps has the easiest chance to see them, for the Yellowstone pronghorn are even less timid than their brethren elsewhere. Confident in their remarkable running speed, they will race automobiles, being able to keep up a speed of 35 miles an hour for considerable distances.

Zoologically the pronghorn is not related to the true antelopes of the Old World, and it has no other near relatives. It is remarkable among horned creatures in that it is the only hollow-horned animal that sheds its horns every year. Deer shed their antlers, but these are solid. Cattle and sheep have hollow horns, but never shed them. It is because of this unique scientific position as well as because of its rarity that zoologists have been anxious to see the pronghorn saved.

ITEMS

DOUBLE weight hydrogen, the newly discovered mass two isotope of this lightest of the elements, will be ''so different from common hydrogen that it will be regarded almost as a new element,'' Professor Gilbert N. Lewis, of the University of California, expressed as his belief in a communication to the *Journal* of the American Chemical Society. He recently obtained the heaviest water on record as a result of separating electrolytically hydrogen gas consisting largely of the heavier kind of hydrogen. If the heavy hydrogen proves to be as different as he expects, Professor Lewis predicts that the organic chemistry of compounds containing the heavy isotope of hydrogen will be a fascinating study.

MOTION-PICTURES of life at its lowest possible denomination were shown at the Atlantic City meeting by Dr. Frank L. Howard. Dr. Howard exhibited two films showing the activities of myxomycetes, or slime molds, which are creatures so far down the evolutionary ladder that it has never been decided definitely whether they are plants or animals. They have some of the characteristics of either. The films showed the streaming, creeping motion of the masses of naked protoplasm of which the slime molds' bodies are composed during certain stages of their lives. They showed their ripening into the reproductive stage, the production of the spores and the ingenious mechanisms by which these reproductive bodies are scattered to the wind to drift away and germinate in a new place.

SYNTHETIC vitamins manufactured by organic chemists from cheap and plentiful raw materials were predicted by Dr. George Oliver Curme, Jr., in the annual Chandler lecture which he delivered upon the occasion of his receiving the 1933 Chandler Medal for research in chemistry. Dr. Curme directs the research of the Carbide and Carbon Chemicals Corporation. Vitamins A, B and C have been found to be closely related to substances of complex molecular structure, so that synthesis ''seems entirely possible,'' he explained. In the case of other vitamins less is known, although it would be surprising from the information now available if they were beyond the range of synthetic chemistry. He predicted that adequate supplies of vitamins will soon be available from relatively cheap and abundant sources and that under the guidance of physiological chemists and dietary experts synthetic chemistry will be able to add another triumph to its many past successes.

PROPAGANDA now being spread among school officials contending that individual experimentations by students of chemistry can be replaced by lecture demonstrations, slides or motion pictures, was deplored in a statement by Professor Ross A. Baker, in charge of the College of the City of New York's department of chemistry, issued as a preliminary to the Washington meeting of the American Chemical Society. Many school boards are likely to accept inconclusive data and scrap school chemical laboratories to save expense. Sales of chemical toy sets by hundreds of thousands is evidence of the desire on the part of boys and girls to experiment. He urged organized education to answer this need or the formation of chemistry clubs with the aid of chemistry teachers.