SCIENCE NEWS

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DEUTONS CREATING NEUTRONS AS CAUSE OF ATOMIC DISINTEGRATION

Two particles recently discovered by science, the neutron and the deuton, promise to play an important rôle in atomic disintegration as the result of experiments just made at the California Institute of Technology, Pasadena, California.

Radium has been definitely superseded as the most effective generator of neutrons, those neutral particles which, since the discovery of their existence two years ago, have assumed an increasingly important place in experimental physics. Two weeks ago H. R. Crane, a graduate student, Dr. C. C. Lauritsen, and Dr. A. Soltan, an international research fellow from Poland, using the large million-volt x-ray tube developed by Dr. Lauritsen, showed that the hearts of helium atoms or helium ions could be speeded up sufficiently to knock neutrons out of beryllium atoms. In this way they produced twice as many neutrons as any radioactive source ever did.

Now they have tried deutons, the hearts of the double weight hydrogen atoms, as the projectiles flung by high voltage at various substances. They were astonished to find that deutons used instead of helium hearts release from beryllium five hundred times as many neutrons as ever before obtained.

Deuton is the name given to the nucleus of the hydrogen isotope of mass two. The heavy weight water was sent to Pasadena by Professor G. N. Lewis, of the University of California, to see whether the Pasadena workers could cause their deutons to shatter themselves against heavy atoms. They do not. But when propelled against the light beryllium atom they penetrate the nucleus and apparently turn it into boron. In its exuberance the newly born boron nucleus kicks out a neutron with ten million volts energy. Elated over their results, the physicists tried the deutons on lithium. It yielded neutrons even more copiously than beryllium. Helium is the by-product in this case.

With such powerful means of producing neutrons of varying energy it will be easy to disintegrate atoms in relatively large numbers. The neutron is the ideal tool for this purpose. It insinuates itself into any nucleus with great ease and then splits it open. The contriving physicist watches this process and gains knowledge therefrom.

NO PROOF THAT MOSQUITOES TRANSMIT SLEEPING SICKNESS

ENCEPHALITIS, popularly known as sleeping sickness, probably is not transmitted by mosquitoes or other insects, in the opinion of Surgeon-General Hugh S. Cumming, of the U. S. Public Health Service. "The disease is more likely transmitted in some other way, probably in the same way that influenza and infantile paralysis are conveyed from person to person," said Dr. Cumming upon his return to Washington from his second visit to St. Louis, center of the encephalitis epidemic.

So far, none of the U. S. Public Health Service officers, who let themselves be bitten by mosquitoes that had fed on encephalitis patients, have developed the disease. It is now ten days since the experiment was started, and sufficient time has elapsed for the disease to show itself in these men. However, while the mosquito transmission theory has not yet been proved, it has also not yet been entirely disproved.

Mosquitoes were suspected in the St. Louis epidemic partly because of work done by U. S. Army officers indicating that mosquitoes transmitted a similar disease in horses and partly because of the peculiar geographical situation in St. Louis, Dr. Cumming explained. The city has not enlarged its boundary line for over a generation. As a result there is a large population living in many small communities in St. Louis County which are not legally part of the city.

The communities have no organized system of sewage disposal, each community dumping its sewage into the many small rivers that drain the area. During the past summer there was a drought, with the result that the rivers were half dried up and mosquitoes bred in unusually large numbers and there was a great deal of malaria. The combination of greatly increased numbers of mosquitoes with the fact that there were more cases of encephalitis in the county than the city suggested that mosquitoes might be responsible for the outbreak.

Real progress in the fight against the disease can be made if attempts to isolate the causative virus are successful, according to Dr. Cumming. This would enable the investigators to find out more about how the virus grows and, possibly, how it is transmitted. Experiments along this line with monkeys are encouraging. Although the virus itself has not yet been isolated, there are indications that the disease has been transmitted to the animals, which is the first step.

THE PLAGUE OUTBREAK IN MANCHURIA

THE present outbreak of plague reported from Manchuria was foreseen by Dr. Wu Lien-teh, director of the Chinese National Quarantine Service. This is the impression gained by trained quarantine workers in this country from reading Dr. Wu's latest annual report, published in the spring of the current year.

In his official document, Dr. Wu, who has an international reputation in connection with plague prevention work, deprecates the emasculation of the Manchurian Plague Prevention Service as a result of the Japanese military occupation of the northern provinces.

According to latest consular report received by the U. S. Public Health Service from Tsien-tsien, bubonic plague is raging in the Taonan and Nungan districts, while the Tunchowliao district is suffering a visitation of pneumonic plague, the most dangerous form of the disease.

Dr. Wu was director of the Manchurian Plague Ser-

vice which was established after the terrible epidemic of pneumonic plague in Manchuria and North China in 1910 and 1911. This epidemic took a toll of 60,000 lives and the monetary loss was estimated at $100,000,000.

In 1920–21, pneumonic plague again was epidemic in Manchuria, having entered China from its haunts in Transbaikalia. By this time the Plague Prevention Hospital and Institute were operating at Harbin and were the means of checking the epidemic at that point and preventing its further spread, in Dr. Wu's opinion.

However, since the Japanese occupation, the activities at Harbin of the Plague Prevention Service have been "practically strangled," and the Plague Prevention Hospital is in charge of only a junior officer. The inference is, plainly, that the present plague outbreak is a direct result. Meanwhile, the activities of the Plague Prevention Service have been resumed at Shanghai for the territory within the Wall of China.

Health officials hesitate to forecast how far the present outbreak will spread. Plague is a winter disease in Manchuria. The fact that it has become epidemic this early in the year suggests that it will be wide-spread. Until it reaches the seaports, Darien in particular, no concern need be felt over likelihood of its spread to the Philippines or continental United States. Quarantine officers in Washington are sure that the Japanese will lose no time in fighting the epidemic if it reaches the occupied territory. So far it has always been north and west of Manchukuo.

In contrast to the Chinese situation, plague seems to be on the decline in other parts of the world. The Health Section of the League of Nations reports that during the last two years plague has disappeared from Algeria, Tunis, Tripolitania and Nigeria. There has been a marked decline in Egypt and East Africa, and in Senegal it is limited to Dakar. On the other hand, the disease has invaded fresh territory in South-West Africa and Angola and has increased in Madagascar.

Plague has been very rare in Europe. No cases of human plague have been reported in Central and North America during the past two years. In South America the disease is on the decline in Ecuador and Peru, but fresh small foci have appeared in Bolivia and Argentina. In Iraq the disease has been localized in Bagdad. There has been a very noticeable decrease in northern India and limitation of plague to a principal focus situated in the west of the Deccan. In the Netherlands East Indies the disease has spread to the mountainous area in the west, but declined in the center and east. In China, reports previous to the present outbreak showed revivals of endemic foci on the borders of Inner Mongolia.

RUBBER MEMBRANE FOR THE TELEPHONE

A NEW rubber compound which will withstand moisture for many years under the most adverse weather conditions has been developed by research chemists working in the Bell Telephone Laboratories. The rubber is to be used to prevent the ready entrance of moisture into telephone transmitters installed in exposed locations and will improve reception in markets, taxi stations, police boxes and harbor craft.

To keep moisture away from the thin aluminum diaphragm of the transmitter, a rubber membrane is interposed between the diaphragm and the mouthpiece. Such a membrane must be extremely thin and supple and it has been found can not be thicker than about three thousandths of an inch. Rubber as thin as this has been commercially used for a long time, but its life at best has been from one to two years. The new rubber compound, tests have shown, does not deteriorate when placed for varying periods of time in a vessel of pure oxygen at a pressure of 300 pounds per square inch and a temperature of 158 degrees Fahrenheit.

When subjected to this test, poorly compounded rubber usually loses shape and deteriorates in less than one day.

Following the development of the rubber, engineers were called to invent a contrivance to mold the compound in the necessary thinness and shape. A highly polished steel mold is now used. The mold is shaped to the dimensions of the desired part, with allowance for the slight contraction which takes place in soft rubber when it cools to room temperature. A quantity of the plastic compound is inserted in the mold cavity, which is subjected to a pressure of several tons per square inch by a hydraulic press. Steam at 20 pounds per square inch is circulated about the mold. Under the pressure and heat the compound takes shape and becomes ready for assembly.

Used along with waterproof cord, the new compound has been installed and found successful aboard the U. S. S. *Lexington* and *Saratoga* in withstanding the effects of salt water.

THE PEKING MAN'S BRAIN

PEKING man had a brain distinctly human in type, showing a notable advance in development over the brain of Pithecanthropus, the Java man discovered over forty years ago by Dr. Eugene Dubois. But the one brain cast it has been possible to make thus far indicates that the first-found Peking skull belonged to a young man with a small head.

"The adolescent Sinanthropus is a human male, belonging to the Neanderthal group of mankind, the species *Homo neandertalensis*, maybe an interesting new race, with individually imperfectly developed and hence abnormally small brain," according to Dr. Dubois.

Dr. Dubois presented his conclusions to the Royal Academy of Sciences in Amsterdam, after he had made a long and careful comparative study of brain casts made in the Peking man and Java man skulls.

The total volume of the brain cast received by Dr. Dubois from Dr. Davidson Black, first student and describer of Peking man, was 918 cubic centimeters. This is approximately the same size as the brain cast of Java man.

In shape and anatomical development, the Peking man's brain cast resembled the Neanderthaler's—and even modern man's—much more than it did the brain cast of Java man. Most notable was the relatively high-arched

front portion, as compared with the almost flat-fronted brain of the Java man. This arching of the front part of the brain is considered one of the most distinctly human characters found in brain architecture.

This presented a poser: here was a brain almost as small as that of the very primitive Java man, but showing the same basic form as that of advanced human species. But Dr. Dubois points out that the brains of modern "microcephals" show exactly the same peculiarity: they are subnormal in size but quite normal in general shape and structure. Hence he suggests that this particular individual Peking man was an ancient "microcephal." He found further support for his opinion in certain peculiarities in the bones of the skull itself, which have their counterparts in the skulls of modern "microcephals."

The skull which yielded this interesting brain cast was that of a young male individual, perhaps fifteen or sixteen years old. It was most nearly whole when found, so that it was possible to prepare the cast with relatively little loss of time.

The second Peking man skull, which appears to be that of a woman, was broken into many fragments, so that before a cast can be made in its brain-cavity it will be necessary to piece it together—a tedious and time-consuming task. It may be several years before the second brain cast will be ready for study.

The development of the speech-center area of Peking man's brain led both Dr. Dubois and Dr. Black to the conclusion that this race was capable of articulate speech. Remains in the cave where the skulls were found indicate that Peking man knew the use of fire and that he could make at least crude implements of stone.

INDIVIDUAL OCCUPATIONAL ABILITIES

THE analysis of individual occupational abilities through a testing service was urged as an important part of any program for the new federal-state employment service being created under the Wagner-Peyser Act, in a report just issued by the Employment Stabilization Research Institute of the University of Minnesota. The report was prepared by Drs. John G. Darley, Donald G. Paterson and I. Emerick Peterson.

The proposed testing division in the public employment service can easily become the center of occupational analysis and guidance for the community, it was pointed out in the report. It can become the focal point for individuals who need guideposts to economic stability and occupational adjustment.

"The past few years have shown the bewildering lack of such guideposts," the report went on. "The two years of the Minnesota project, out of which the testing division has grown, have proved that individuals need to be directed to economic stability through occupational analysis and individual planning.

"Unemployment is a sore spot in the social economic order that harbors it; but in all probabilities, unemployment in greater or lesser degree will characterize the industrial system of this country for many years to come."

A program of individual analysis and planning will not eliminate unemployment. Nevertheless, it does hold out hope for a better utilization of existing knowledge of human engineering in preventing unnecessary human waste.

"The Occupational Testing Division as an integral unit in the new type of public employment office, will approach the goal of a healthy occupational system, through a study of the individual's adjustments to the problem confronting him in economic competition. In the evolution of this work, traditional notions of vocational fitness will give way to an understanding of the measurable, human capacities and interests that underlie job success. Aimless job hunting will tend to disappear in the face of occupational analysis and guidance and centralized clearance of employment opportunities."

ITEMS

ELECTRICITY was used to treat disease as early as the third century before Christ, Dr. Leo Pariseau, radiologist of Montreal, told members of the American Congress of Radiology meeting in Chicago on September 25. He traced the history of the therapeutic use of electricity from this early time down to the Century of Progress through statements in 100 famous old books from his own collection. First mention of this use of electricity was found in Aristotle's "De Natura." The electricity came from the torpedo fish whose live body was said to possess qualities of healing pain. From Aristotle down to the sixteenth century various writers told of the same fish, identified as the "electric ray." The word electricity, however, was not used until William Gilbert, physician to Queen Elizabeth, coined it.

CANCEROUS diseases are now being fought with continuous low-voltage doses of x-rays over the entire body as well as with 700,000 volt dosages for short periods. The comparatively new method of continuous irradiation was reported by Drs. Lloyd F. Craver and William S. MacComb, of Memorial Hospital, to the Congress of Radiology. Patients being treated by this new method, called the Heublein method because it was first put into operation at Memorial Hospital by the late Arthur C. Heublein, lie in one of four beds in a specially constructed ward. For as long as 20 hours out of every 24, x-rays are sent into their bodies from a low voltage machine near the ceiling of the room. This is continued for a period varying from several days to three weeks.

"VERY high-voltage x-rays will prove to be of great value in cancer therapy," stated Dr. G. Failla, of New York City, at the meeting of the American Congress of Radiology. Dr. Failla described recent tests made at Memorial Hospital which showed that 700,000 volt x-rays are superior to 200,000 volt x-rays in treating internal cancer, and that radium is still better. Because of the expense, the full value of radium, however, can not be realized in practise. A method of expressing radium dosage in roentgens, the international unit of x-radiation, was also reported by Dr. Failla. The dose just large enough to produce reddening of the skin with a large beam of gamma rays from radium is 1,500 roentgens as compared to 540 roentgens required to produce the same degree of reddening with filtered 200,000 volt x-rays.