



NO ELONGATION HERE

High speed photographic proof that a falling drop of water does not elongate into the conventional "raindrop" shape, but instead tends to maintain a spherical form, is contained in these photographs showing a drop of inky water falling from a wet electric light bulb. The pictures were taken at the rate of 500 per second with the fast stroboscopic motion picture camera developed at Massachusetts Institute of Technology.

combine to form heavyweight hydrogen. That combination would result in the emission of energy in the form of gamma rays, equal to the loss of weight experienced in the transmutation. This conversion of mass into energy should give rise to million volt gamma rays and this would require the attacking neutrons to have two to six million volt energies, which is about what they have.

Science News Letter, January 27, 1934

PHYSICS

Atomic Bullets Aimed At Secrets of Matter

Preparations Being Made for New Attacks With Powerful Weapons and Recently Discovered Projectiles

CONCENTRATED streams of atomic bullets are being made ready in experimental laboratories for attacking non-living and living matter.

There will be:

1. Attacks upon atoms, investigations of the constitution of matter and transmutations of energy and matter.

2. Explorations of the effect of the newer radiations upon living matter, specifically in the treatment of cancer and upon germplasm with consequent changes in heredity.

The atomic projectiles used are:

Electrons—Units of negative electricity, given off when anything becomes hot, propelled from disintegrating radioactive substances with high speed they are called beta rays, propelled by high voltage they are called cathode rays.

Protons—Nuclei or kernels of hydrogen atoms, units of positive electricity, about 1800 times as heavy as electrons.

Neutrons—Electrically neutral particles, close combinations of proton and electron, discovered 1932.

Deutons—Nuclei or kernels of deuterium or heavy hydrogen atoms, constituted of two protons and one electron. Deuterium discovered 1931.

Alpha particles—Nuclei or kernels of helium atoms, disintegration product of radioactive substances.

Canal Rays

Positive ions—Nuclei or kernels of the various chemical elements. Protons and alpha particles are special kinds of positive ions. Streams of positive ions, propelled by high voltage, are called positive or canal rays.

High-voltage electrical machines constituting "atom guns" of great power are being perfected to speed the atomic particles and make them hit harder and perhaps more effectively.

Most common are the conventional evacuated tubes for producing cathode rays, X-rays, positive or canal rays, etc. They range from a few thousand up to hundreds of thousands of volts. One of the largest of X-ray tubes of more

or less conventional type, rating a million volts, is at the California Institute of Technology, Pasadena, Calif.

A whirling electrical machine, in which reversing magnetic polarity of 85-ton magnets accelerates particles until they obtain speeds equivalent to as much as 3,000,000 volts, has been developed by Prof. E. O. Lawrence and associates of the University of California.

In an airship hangar at Round Hill, Mass., there is a giant electrostatic direct current generator of the Massachusetts Institute of Technology, designed by Dr. Robert J. Van de Graaff, which has generated 7,000,000 volts potential and is capable of 10,000,000.

Atomic Energy Tapped

In addition to these man-made atom guns for speeding atomic particles, the scientists have learned how to tap energies within the atom so as to augment the electrically induced energies.

Most striking are the streams of neutrons produced when the light metal beryllium is bombarded with deuterons. Here is an atomic particle unknown a relatively few months ago that can be used to produce unusual streams of another atomic particle also unknown a few months ago.

The research group consisting of H. R. Crane, a graduate student, Dr. C. C. Lauritsen, who developed the C. I. T. million volt X-ray tube, and Dr. A. Soltan, an international research fellow from Poland, working at the Pasadena laboratory, were astonished to find that deuterons flung at beryllium metal released many more neutrons than alpha particles (helium nuclei) either artificially speeded or produced by radioactivity. At Berkeley, Calif., Prof. E. O. Lawrence and his colleagues, Drs. M. Stanley Livingston and Malcolm C. Henderson, discovered the same effect.

Both sets of scientists realized that here is a case of transmutation. Dr. G. N. Lewis of the University of California furnished both groups of physicists with some of his very pure heavy water containing deuterium or heavy hy-

drogen. He wanted to know whether the deuterons (deuterium nuclei) shattered themselves against heavier atoms. They do not. 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, so the Pasadena experimenters found.

With the Lawrence whirligig atom gun, the yield of neutrons has been increased until 10,000,000 neutrons per second are produced and the experimenters are confident that at least five times that number will be produced shortly by increasing the current that carries the deuterons into the machine.

It is the most concentrated and powerful stream or ray of atomic projectiles that man now has at his command. This artificially produced blast of neutrons is larger than the stream that can be produced by using radium as a bombarding and instigating source.

Neutron streams are not the same sort of radiation as X-rays or as gamma rays from radium. Neutrons are minute atomic particles, while gamma or X-rays are electro-magnetic waves. Neither is neutron radiation the most

energetic radiation studied by physicists, for the cosmic rays, some of which consist of high speed particles, have energies in some cases several times greater. Cosmic radiation sprinkles the earth like continuous rain, making it impossible to use it in concentrated form.

The electrical neutrality of the neutron is a great advantage to it when it is used as a tool for penetrating the very hearts of atoms. Ions or kernels of atoms, protons and electrons have electrical fields that complicate the process of penetrating the hearts of atoms.

Investigation of the constitution of matter is the immediate objective of the physicists who have developed these neutron streams and other tools for attacking the atom. Biologists and medical research workers will utilize these newer radiations in experiments to discover their effects on living organisms. First these experiments will be on the lower forms of life, on experimental animals, and then if the results are promising, the investigations will be extended to human beings and possibly to the treatment of diseases for which the radiations are found to be effective.

Science News Letter, January 27, 1934



FORESTRY AND YOUTH CONSERVATION

an address by

Ferdinand A. Silcox

Chief Forester of the U. S.
Forest Service

Wednesday, January 31, at
4:30 p. m., Eastern Stand-
ard Time, over Stations of
the Columbia Broadcasting
System. Each week a promi-
nent scientist speaks over
the Columbia System under
the auspices of Science
Service.

IMMUNOLOGY

Adrenal Cortex May Give Resistance to Poliomyelitis

DOES the vital cortex of the adrenal glands play a part in developing resistance to infantile paralysis?

Evidence that this may be so and that, at all events, resistance to this disease is not produced in the manner typical for other diseases was presented by Dr. Claus W. Jungeblut of College of Physicians and Surgeons, Columbia University, at the meeting in Philadelphia of the Society of American Bacteriologists.

Dr. Jungeblut was investigating the problem of how blood serum from normal persons inactivates infantile paralysis virus, so that the person whose blood possesses this inactivating power does not acquire the disease even if the virus enters his body.

He tested the anti-virus property of the blood of one monkey both before and after the animal's adrenal glands had been removed. Before the operation the animal's blood serum inactivated the virus, but failed to do so after removal of the adrenal glands. The neutralizing power could be restored to the blood serum, in the test tube at least, by adding a small amount of adrenal cortex hormone but not by adding adrenalin, the hormone from the medulla of the adrenal glands.

He reported many other tests with blood sera possessing antiviral, antibacterial and antitoxic properties which showed indirectly that the substance in human blood which can neutralize or inactivate infantile paralysis is not a typical antibody, in the immunological sense of the word.

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PARASITOLOGY

Many Found to be Carriers Of Disease-Causing Amoeba

MINUTE animal parasites, some of them the kind of amoeba that caused the dysentery which was reported as epidemic and took death toll in Chicago this summer, are more widespread in the general population than has been suspected, Drs. D. H. Wenrich, R. M. Stabler and J. H. Arnett of the University of Pennsylvania conclude as the result of a survey of 700 freshmen entering college in 1931 and 1932.

A single examination made for each person showed that about one in 20 harbors the parasite, *Endamoeba histolytica*, which causes the amoebic disease and belongs to the group of microscopic animals known as the protozoa. But the scientists believe that five or six examinations may be required to determine the actual percentage, so that probably about ten per cent. of those examined harbor these parasites.

Most of those with the parasites are not ill, but are carriers who through

carelessness may infect others in their community. This is especially true if they are food-handlers.

Surveys made recently in Tennessee show that in the rural populations of that state probably one in five persons harbor the disease-producing amoeba. Closer to the tropics the incidence of the parasite tends to be larger.

One-third of the college freshmen tested once by Drs. Wenrich, Stabler and Arnett were found to harbor one or more of seven kinds of protozoan parasites, including the dysentery-producing amoeba. Four other kinds of amoeba are likely to be confused with the disease-producer and expert knowledge is needed to make the diagnoses. Two other parasites belonging to the flagellate protozoa were found and these are thought by some to produce a mild illness in susceptible persons.

This elaborates previous article (*See SNL, Jan. 6, '34, p. 7.*)

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