PHYSICS

"Positron" Confirmed As New Particle of Matter

Discovery of California Physicist Proved Reality As Positive Electron Is Found at Cavendish Laboratory

THE EXISTENCE of a positive electron has been confirmed and it will be christened the "positron."

The discovery of this fourth fundamental particle and atomic building block was made last fall by the American physicist, Dr. Carl D. Anderson, (SNL, Sept. 24, 1932, p. 197) and now physicists at famous Cavendish Laboratory, Cambridge, England, have announced confirmation.

Positive electrons were found in cosmic rays by Dr. P. M. S. Blackett, working with G. Occhialini. Their method makes the new positive electron rays photograph themselves. It has a life of only a fraction of a second and meets its end by colliding with an ordinary negative electron.

The Cavendish Laboratory work confirms the discovery and prediction made by Dr. Anderson of the California Institute of Technology, Pasadena, last September, who on evidence contained in several cosmic ray photographs reported the probable existence of a new particle of matter, positively charged but with the mass of the familiar negative electron.

Theory in Confusion

The demonstration of the existence of a positive electron, as a fundamental particle of matter, throws atomic structure theory into at least a momentary state of confusion. And since the positive electron was found in cosmic rays it may prove to be helpful in explaining the nature of this radiation.

Two years ago there were only two fundamental particles of matter or bricks out of which atoms might be built, the positive particle, or proton, and the negative particle, or electron In 1931, Dr. J. Chadwick in Cambridge's Cavendish Laboratory forged the last link in the chain of experimental evidence for the reality of the neutron, the close combination of electron and proton that carries no electrical charge. Now out of the same famous laboratory presided over by Lord Rutherford of Nelson has come the demonstration of the reality of the positive electron, confirming the discovery by Dr. Anderson.

The fundamental corpuscles or particles of matter may be listed as follows:

Electrons—Units of electricity, negatively charged, discovered by Sir J. J. Thomson in 1897, widely recognized in all electrical phenomena, considered to make up the "outer shell" of atoms or to revolve about atomic hearts like satellites about a sun, in the last few years proved to have many of the properties of light and partake of the nature of a wave motion, called beta rays when issued from radioactive substances.

Protons and Neutrons

Protons—Positive particles or corpuscles, nuclei or hearts of hydrogen atoms. Mass of protons 1850 times that of electrons.

Neutrons—Neutral particles of matter, consisting of a close combination of electron and proton, whose electrical charges neutralize each other. Discovered in 1931 by Dr. Chadwick.

Positive electrons—Positively charged particles or corpuscles or rays discovered in cosmic rays by Dr. Carl D. Anderson, 1932, just confirmed by Drs. P. M. S. Blackett and G. Occhialini. Mass of electrons but opposite electrical charge. (*Turn to Page* 124)

MEDICINE

Typhoid Carriers Made Safe By Gall-Bladder Removal

REMOVAL of the gall-bladder freed nine typhoid fever carriers of the germs and made them no longer a menace to society, reports a hospital in Trondheim, Norway.

The operation has been performed on four other patients. In one case it is too early to claim permanent results. The operation proved fatal in the other three cases. These were all elderly persons on whom the operation was not urged by the hospital authorities, but was undertaken on the express wish of the patients and their relatives. The nine patients successfully operated on ceased to discharge typhoid or paratyphoid bacilli after the operation.

The lot of the typhoid carrier today is little better than that of the leper in the past. The typhoid or paratyphoid bacilli lurking in the gall-bladder of the carrier are constantly being discharged, and if she handles food in any way (the carrier is nearly always a woman for some unknown reason) the odds are she will sooner or later infect her neighbors and kill some of them.

Science News Letter, February 25, 1933

ARCHAEOLOGY

History Pushed Back In America and Asia

RECORDS in American history are being made and broken fast, just now.

Not long ago, Dr. Harold S. Colton of the Museum of Northern Arizona reported that his museum had set United States history back 76 years, by finding a timber dated 708 A.D. in an Indian dwelling in Arizona. And the next week Dr. Colton broke his own record for pushing United States history back into the dark centuries. The museum has discovered a charred timber cut about 660 A.D. (*Turn Page*)

MORE HISTORY

Prof. E. A. Speiser of the University of Pennsylvania Museum is holding one of the 3200-year-old cuneiform tablets that add 300 years to Assyrian chronology.

changes that seem to have produced in America the highly specialized modern *Equus* from his diminutive, four-toed predecessor, the Eocene *Orohippus*. The line of descent appears to have been direct and the remains now known supply every important intermediate form. It is, of course, impossible to say with certainty through which of the three-toed genera of the Pliocene that lived together, the succession came. It is not impossible that the later species, which appear generically identical, are the descendants of more distinct Pliocene types, as the persistent tendency in all the earlier forms was in the same direction. Considering the remarkable development of the group through the entire Tertiary period, and its existence even later, it seems very strange that none of the species should have survived, and that we are indebted for our present horse to the old world.

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To these four particles there might be added the alpha particle, which is the heart or nucleus of the helium atom, with a mass about four times that of the proton or heart of the hydrogen atom. It is considered to be a unit used in atom building. Prof. G. Gamow, the Soviet authority in atomic structure, says that atomic nuclei are composed of neutrons and alpha particles, with one proton in atomic hearts of odd atomic number.

The photon must have a place in any list of fundamental "particles." It is the unit of light and other electromagnetic radiations, such as X-rays and gamma rays. It is possible to think of light as consisting either of waves or particles, as most convenient at the time. Or under quantum theory and wave mechanics, the newer developments of physics, it is possible to think of the fundamental entities as not waves or particles, but mathematical equations.

How speedily the theory and experimental facts of physics move these days is shown by the opening phrases of a survey of research on neutrons contributed by the Bell Telephone Laboratories physicist, Dr. Karl K. Darrow, to the Review of Scientific Instruments, February, 1933, issued on Friday, Feb. 17: "The discovery of what may prove to be the third and last of the fundamental corpuscles of matter, and what at any rate is a distinctive kind of ionizing ray (neutrons) . . . ."

As this was being published came the cabled news of the enthronement of the positive electron, the fourth fundamental corpuscle.

Negatron or Positron?

When the London correspondent of Science Service cabled the news of the confirmation by the British physicists, the news was specially relayed by telegraph to Dr. Anderson with the suggestion: "Why not christen your new particle 'positron'?"

"With regard to your suggestion," Dr. Anderson wired in reply, "we have already discussed here negatron and positron.

"Historically and derivatively the word, electron, denotes the unit charge, positive or negative, without any reference to the associated mass. The discovery that there exists a positive charge which, like the free negative electron is unassociated with any mass of atomic magnitude, requires the introduction of a new term to distinguish it from the proton which is used to denote the positive electron associated with the mass of the atom of hydrogen. We have been discussing in the laboratory for some months past the desirability of calling the free positive electron, positron, and then using the similar contraction, negatron, for the free negative electron. This makes a logical and systematic notation which should be introduced if and as soon as the existence of the free positive electron becomes established.

"If the observations obtained here, part of which are already published, are actually due to positrons then we have new experimental evidence that in passing through matter positrons lose energy more rapidly than do negatrons."

Science News Letter, February 25, 1933

PHYSIOLOGY

Secretion From Crustacean Eyes Causes Color Change

RESEARCHES on a melanin-regulating hormone in the eyestalks of crustacea, (SNL, Jan. 7, '33, p. 12) were inadvertently credited to Prof. Lloyd M. Bertholf of Western Maryland University and the University of München, whereas the actual authors of the report were Prof. Earle B. Perkins and Benjamin Kropp of Rutgers University.

Science News Letter, February 25, 1933

Grapefruit and orange production in the world has increased ten-fold in the past 40 years.

ASTRONOMY

Small Telescopes Reveal Comet Just Reported

A COMET that may become visible to the unaided eye was discovered early Thursday, Feb. 16, in the northern evening sky by Leslie C. Peltier, an amateur astronomer of Delphos, Ohio, the Harvard College Observatory has been informed. It was eighth magnitude and sufficiently bright to be visible through small telescopes or high powered field glasses.

This discovery was confirmed by other observatories.

The comet was observed between the constellations of Cepheus and Cassiopeia in the region of the Milky Way and is moving eastward.

Mr. Peltier is a veteran comet discoverer.

Science News Letter, February 25, 1933

SURGERY

Grafted Nerves Restore Normal Facial Expression

SIXTEEN patients with hideously twisted, paralyzed faces have had normal expressions and the use of facial muscles restored to them by a newly-improved nerve-grafting operation.

The operation was developed by Dr. Arthur B. Duel of the Manhattan Eye, Ear and Throat Hospital in New York, and Sir Charles Ballance, for many years surgeon-in-chief at St. Thomas' Hospital, London. Dr. Duel has described the operation in a report just published here by the Milbank Memorial Fund which, with the Carnegie Corporation, the Lillia Babbitt Hyde Foundation, the New York Foundation and a number of the surgeons' personal friends, gave the necessary financial support to the research.

In Dr. Duel's opinion, the restoration of facial movements is not only a great boon to a patient's morale in his social contacts, but is also of tremendous importance in making him self-supporting.

The new operation gives the patients the ability to use their facial muscles either voluntarily or in response to their emotions. They can put on a polite, society smile or laugh spontaneously at a funny story. Both factors are important, Dr. Duel pointed out.

Dr. Duel and his collaborator worked first with animals. They found that grafts of nerves from other parts of