

PHYSICS

Existence of Anti-Photon Suggested by Nobelist

Prince de Broglie Works Out Mathematics For New Particle Just as Dirac Foresaw Now-Confirmed Positron

THE SUCCESS of science in finding the positron which is the running mate for the electron has spurred more speculation, and the latest prediction is that an anti-photon will be found.

Science has come a long way from the days when the atom was visualized as the ultimate unit of matter, and when energy and matter were looked upon as quite different manifestations of nature.

The photon is conceived of as the ultimate unit of radiation, or as the physicists say, it is "a quantum of radiation energy." It is a corpuscle of light.

Physicists believe that under certain circumstances the photon can be transformed into a corpuscle of matter, such as a positron, and conversely, it will be created when a corpuscle of matter is annihilated. Naturally physicists would like to know something of the mechanism of these operations, and in a thing so far removed from direct observation the first step is to think out mathematically how it might happen.

This step has been taken by Prince Louis de Broglie, physics Nobelist of 1929, who presented a paper on the subject to the Paris Academy of Sciences (published in the *Comptes Rendus*). Recalling that Prof. P. A. M. Dirac in his electron theory proposed that there were holes or anti-electrons, as he called them, into which the electron could fall and disappear from this world, and that this seemingly fantastic theory was later confirmed by the discovery of the positron, which corresponded in its behavior exactly with Prof. Dirac's anti-electron, Prince de Broglie proposed that the light corpuscle is always accompanied in its flight by an anti-corpuscle or hole, which has the same relation to it that the positive electron has to the negative electron in the theory of Prof. Dirac.

"The photon," Prince de Broglie said, "is thus a complex particle formed of two symmetrical constituents capable of self-annihilation." In the presence of matter, the photon is capable of delivering to the latter a quantum of energy,

the light corpuscle falls into the hole that accompanies it, and the photon is annihilated.

This theory of "holes" goes back to the hydrodynamic theory of sources and sinks, points where the fluid flows into and out of the region considered. Adding a fourth dimension, so that the material could flow into and out of the universe of our perceptions, and assuming that the "holes" were free to move, the equations showed that they would obey the law of gravitation and otherwise comport themselves like material particles. The sources behaved in every way like respectable atoms. For the sinks one had to assume a kind of negative or anti-matter. This was the difficulty which kept those old theories of matter in the realm of fantastic speculation, although the mathematics was perfect.

Now it is only necessary to assume that energy as well as matter can flow into and out of these holes, and that whenever energy flows in, an equivalent quantity of matter flows out of the same hole, and vice versa: in short, that a source for energy is a sink for matter and vice versa. If further the energy is quantized, that is, atomized, to correspond with the electronic construction of matter, then the essentials of the theories of Prof. Dirac and of Prince



COINS OF HISTORY

The recently discovered bottom coin explains the top one.

de Broglie will be fulfilled. It remains to be seen whether the theory of Prince de Broglie will be confirmed like that of Prof. Dirac. If satisfied with his mathematics, physicists will undoubtedly soon be looking for the anti-corpuscle of light.

Science News Letter, February 24, 1934

ARCHAEOLOGY

Oldest Known Jewish Coins Reveal Freedom After Exile

COINS that shed new light on an obscure period of Jewish history have just been discovered in a private collection in Jerusalem.

The coins are of the fifth century B.C., which is three hundred years older than any Jewish coins heretofore known. The money known to have been regularly used in ancient Palestine was for-

eign money, chiefly coins of nations which in turn dominated the Hebrew country. It has been supposed that the Jews were not allowed to issue their own coinage until a Syrian king granted that liberty about 139 B.C.

The new discovery shows that after the Persians swept the Babylonians from power, and allowed the exiled Jews

to return to Jerusalem, the Persian king granted autonomy. Discovery of the coins was made by Dr. E. L. Sukenik, field archaeologist of the Hebrew University.

The Jerusalem coins are said to match a small silver coin which for the past 150 years has been in the British Museum. It bears an inscription of three Aramaic letters, which Dr. Sukenik now declares have always been wrongly interpreted by scholars and therefore the significance of the coin was not completely understood. He reads the letters as "Yehud" which was at one time the official name of the province of Judea. The coins bear the engraving of an owl, under which appear the three letters in the old Phoenician Hebrew script.

Science News Letter, February 24, 1934

ASTRONOMY

Woman Uses Prize To Found New Award

DR. ANNIE J. CANNON, the Harvard astronomer, has utilized the thousand dollar prize awarded her last year by the Association to Aid Scientific Work by Women to found an award which will honor other women for distinguished contributions to astronomy.

The American Astronomical Society will administer this endowment and the first award of the "Annie J. Cannon Prize in Astronomy" will be made next December. Women of all countries will be eligible to the award which will be made triennially.

Dr. Cannon is noted for her work on the Harvard Star Catalog and she has been given honors both here and abroad for her researches in astronomy.

Science News Letter, February 24, 1934

▼ POPULATION TRENDS OF AMERICAN GROUPS

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an address by

Dr. Frank Lorimer

of Washington, D. C., engaged in population research

Wednesday, February 28, at 4:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

PSYCHIATRY

Only One of Identical Twins Attacked by Mental Disease

Case of Successful Man and His Unfortunate Brother Shows That Environment, Not Heredity Alone, Causes Insanity

A CASE of twins, one of whom developed the mental disease schizophrenia, while the other remained well for a period of eight years, was reported to the Boston Society of Neurology and Psychiatry by Dr. J. Kasanin, of the State Hospital of Mental Diseases, Howard, Rhode Island.

The twins were always so much alike that they have been mistaken for each other, even their fingerprints bearing striking resemblances. It is therefore believed that they are of the type known as "identical twins," which have their origin in a single egg cell and hence have identical heredity.

A case of such identical twins, only one of whom develops the insanity, is very important in indicating that environment, not heredity alone, is the determining cause of the disease.

The lives of the brothers were very much alike up to the age of 18. Both were bright, studious boys, and both became excellent mechanics. While in high school, both became extremely interested in religion. Both suffered from an impairment in hearing which was greater in one ear than in the other.

But after graduation from high school, one of the boys had an opportunity to go to another city and work with an uncle. This boy, whom we shall call "C. D.," became very successful. "Life smiled on him." He soon had saved enough money to go to a college of osteopathy and at the present time is doing comparatively well in private practice.

The twin brother, "A. B.," was like the unfortunate "little piggy" of the nursery rhyme. He stayed home. He tried to write, but was unsuccessful in having anything published. Instead of confessing to himself his inability to write, the patient began to feel that some person or organization was preventing him from making good. He thought people were trying to blackmail him and trying to prevent the publishers from accepting his manuscripts. He thought he was

being shadowed by detectives. This delusion made life so miserable for him that he went from city to city to escape the persecution. Gradually his mental condition grew worse and worse until he was sent to a hospital for treatment.

"I think this case illustrates very beautifully the relative importance of environmental factors," Dr. Kasanin commented.

"Both these individuals with the same endowment and the same early environmental forces begin to show at eighteen an altogether different psychological reaction. With the favorable environment for one individual he becomes a successful, well adjusted man in his community. When the environment becomes bad for the other individual, who is endowed exactly as his brother, he has to find a solution of his failure in a psychosis."

Science News Letter, February 24, 1934

PHYSICS

Findings of Stratosphere Flyers Surprise Scientists

THE SCIENTIFIC findings of the explorers of the stratosphere in the Soviet "stratostat" USSR are at variance with earlier theoretical calculations of physicists which were based upon the theory that no convection of air takes place at that height, it appears from an announcement by Prof. A. Wengenheim.

Analysis of samples of air taken during the flight last September showed that the oxygen content of the stratosphere 19 kilometers (11.8 miles) above the surface of the earth varies very little from the oxygen content of the air at the surface. The analyses were carried out by a special commission under the leadership of Academician A. A. Chernishev of the Institute of Physical Chemistry, Moscow.

Tests of the samples of air, made in two laboratories, proved identical in their results, which differ slightly from the theoretical calculations of such sci-