

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.

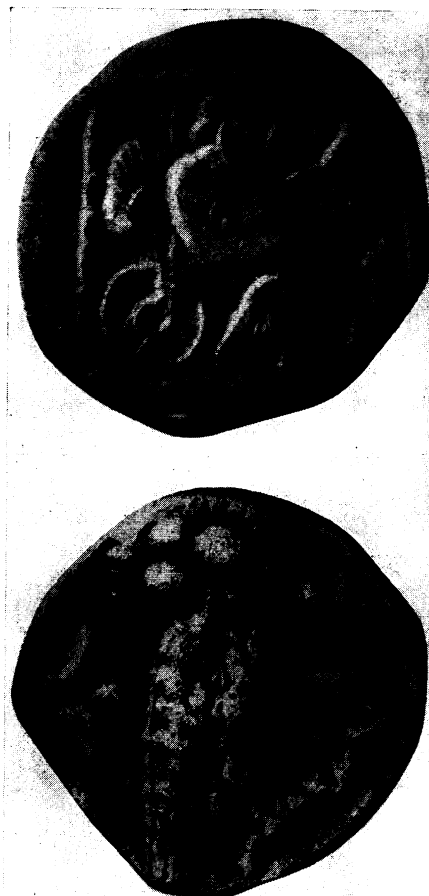
This step has been taken by Prince Louis de Broglie, physics Nobelist of 1929, who presented a paper on the subject to the Paris Academy of Sciences (published in the *Comptes Rendus*). Recalling that Prof. P. A. M. Dirac in his electron theory proposed that there were holes or anti-electrons, as he 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