PHYSICS

New Particle 'Glues' Atom

The newly found particle, epsilon, is expected to give scientists a closer understanding of the forces that hold the nucleus of the atom together—By William MacLaurin

➤ THE DISCOVERY of a new meson—a subatomic particle that has a mass greater than that of an electron but smaller than that of a proton—was announced at the National Academy of Sciences autumn meeting in Madison, Wis.

This discovery leads scientists closer to understanding the extremely strong forces that hold the nucleus of the atom together. Mesons are believed to be "glue" of the nucleus, or carriers of this force.

These forces are not like gravitational and electrostatic forces in that they are far stronger and can operate only at minute ranges.

Dr. Bogdan C. Maglic of CERN, the European Center for Nuclear Research in Geneva, Switzerland, and one of the 12 physicists who made the discovery, said the name of the new meson is epsilon. It is the 16th meson found.

Epsilon's discovery, however, adds to the dilemma of classifying elementary particles, or those subatomic bits of matter that cannot be broken down into two or more other particles.

For example, Dr. Victor F. Weisskopf of the Massachusetts Institute of Technology, Cambridge, has stated that there are only two such particles instead of the more than 30 believed to exist by others. He contended that scientists have been discovering nothing more than different states of the same basic particles.

Other scientists, however, say there are as many as 100 such particles.

The team of scientists found epsilon by directing a beam of protons from a giant 29 billion electron volt atom smasher into an aluminum target. This set up a series of reactions resulting in what scientists had previously believed to be another particle, the rho meson.

However, with the help of a new detecting device, an acoustical spark chamber, the researchers found that the rho meson is actually a composite of two particles, one of which is epsilon.

The acoustical spark chamber can tell the direction of particles by sound, which allows scientists to analyze more events during an experiment than with older methods. At Brookhaven National Laboratory in New York, a bubble chamber has been used to photograph similar reactions.

The acoustical spark chamber was designed and developed in part by Dr. Maglic two years ago at University of California, Berkeley.

The data amassed from the acoustical spark chamber in the epsilon experiment was fed into a computer that analyzed the results.

Dr. Maglic, a native of Yugoslavia, has been in the United States for about seven years. He fled from Yugoslavia nearly 15 years ago.

The new meson was confirmed only three days before Dr. Maglic reported its discovery at the meeting.

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University of Wisconsin

TRACKING BY SOUND—The tiny ultrasonic transmitter is placed into the stomach of the white bass held by researcher H. Francis Henderson. The device which gives off ultrasonic signals is used for the study of migratory patterns of fish.

ICHTHYOLOGY

'Noisy' Fish Tracked By Team of Scientists

➤ STRANGE NOISES have been heard coming from a number of fish swimming in Lake Mendota, near Madison, Wis.

The noises, however, are not so strange to aquatic-biologists, who have equipped the fish with an ultrasonic signaling device to study their migratory habits.

Tags smaller than the tip of a pencil were inserted into the stomachs of white bass. These tags chirp ultrasonic signals (70 to 150 kilocycles), which are picked up by an underwater receiver in a boat following the fish.

Researchers Arthur D. Hasler and H. Francis Henderson began experimenting with the tiny transmitter a year ago. They have been charting the courses of the bass to discover how these fish so unerringly find their way back to home spawning grounds.

The white bass, which spawn in late May and early June, were chosen for the study because they always spawn in the same two areas near the shore.

The tracking boat must stay within one-half mile of the marked fish and can receive signals for about 15 hours before the power supply is exhausted, the researchers reported.

By tracking and charting the paths of the sonar-equipped fish in the lake, the researchers are trying to find environmental guides that the fish may use in their journey.

The researchers, who reported their fish-tracking work at a meeting of the National Academy of Sciences in Madison, are now in the process of developing a more advanced tag to study the larger salmon.

Eventually, the ultrasonic tag may be used to follow the migration patterns of other aquatic animals such as porpoises and turtles.

The study is being supported by a National Science Foundation research grant.

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PHYSIOLOGY

Key to Hearing May Be in Sending System

➤ A MORSE CODE-TYPE sending system that depends on time intervals may be the key to how a person hears.

A period-hyphen-period-hyphen-period-hyphen-dash could mean you are hearing a symphony or, perhaps, the Beatles.

A nerve fiber could be compared to a telegraph wire, two young scientists reported at the meeting of the National Academy of Sciences at the University of Wisconsin.

Drs. Jay Goldberg, assistant professor and fellow, department of physiology, University of Chicago, and Donald D. Greenwood, assistant professor of otolaryngology, Duke University, Durham, N.C., said the following:

An individual nerve cell fires off an impulse, rests, then fires again. This simple on-off mechanism somewhat resembles the binary number system used with digital computers, so the message transmitted by a nerve cell is carried as a sequence of time intervals between impulses.

To study the characteristics of this time code, the scientists recorded the impulses from single nerve cells in anesthetized cats. These cells were located in the cochlear nucleus, the first way-station of the auditory nerve system.

The resulting mass of records was analyzed in a digital computer.

The researchers were able to describe the nature of the code for individual nerve cells in their response to different sound stimuli, such as tones and noise.

Each nerve cell was found to have its own individual pattern of firing, particularly in relation to the regularity of spacing between impulses.

The scientists were able to account for these patterns in terms of a mathematical theory based on simple principles which have been known to neurophysiologists for many decades.

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