

## PHYSICS

# Neutron Shown as Elementary Particle, Not Combination

**T**HE NEUTRON is not a mere close combination of electron and proton acting like a fundamental particle of nature, but it actually is an elementary particle itself.

This is the conclusion of Dr. Franz N. D. Kurie, 26-year-old research fellow in the Sloane Physics Laboratory, Yale, after experiments on atomic collisions in which neutrons take part.

When Dr. Chadwick of Cambridge, England, last year discovered the neutron, it was held that it is an electrically neutral combination of the more familiar electron and proton.

By measuring the angles at which protons are ejected from nitrogen atoms, Dr. Kurie found that the neutron does not conform to the configuration described by physicists. Two views of neutrons have been held: that it is either like a dumbbell, with a positive and negative charge separated by a small distance with their effects cancelled; or is like an onion, with a sphere of one kind of electricity surrounded by a layer of the other kind so that again the charge is cancelled.

The direction in which either of these models of the neutron would eject protons has been calculated and it has been found that the dumbbell type should eject them all perpendicularly to its own path, while the onion type would eject some straight ahead, with about ten times as many being thrown off perpendicularly.

Dr. Kurie's experiments with neutrons did not confirm either of these theories and he believes that the neutron is not built according to either of the accepted models. He concludes that the neutron is an elementary particle possessing an individuality and discrete qualities as do the electron and proton.

Dr. Kurie performed his experiments with a Wilson cloud chamber, a device which makes visible the track of a swift-moving proton somewhat as an aviator can see the wake of a boat which is itself too small to be seen.

Of the three thousand neutrons which pour throughout the chamber each second but which cannot be seen since they do not disturb the molecules of the gas within, one neutron occasionally hits a

proton, the nucleus of a nitrogen atom. This proton, carrying an electrical charge, disturbs the molecules in the chamber and leaves a track which Dr. Kurie photographed with a special camera which he perfected while obtaining his doctorate at Yale under the direction of Prof. Alois F. Kovarik. The angle at which the proton has been ejected can thus be measured since the direction in which the neutrons are moving is known.

*Science News Letter, March 4, 1933*

## EVOLUTION

## New Evolutionary Ladder Outlined for Man's Ascent

**A** NEW evolutionary ladder of twenty-five steps, up which the human race ascended from the lowest known type of backboned animals, is outlined by Prof. William K. Gregory of the American Museum of Natural History and Columbia University.

The first complete ladder of this kind, Prof. Gregory said, was constructed by the German zoologist Haeckel. But because certain of Haeckel's views have fallen into disfavor with the present generation of biologists, the entire scheme of descent which he originated is more or less neglected.

The "New Anthropogeny" proposed by Prof. Gregory takes advantage of data that have been discovered since Haeckel was active, and leaves out some of the steps he considered important in favor of others which now appear more in keeping with the facts. The speaker emphasized, however, that the new evolutionary ladder also is to be considered liable to revision.

The lowest step on the new anthropogenetic ladder was a "pre-fish" stage, represented by the now extinct line of ostracoderms, which were mighty in the seas from a half-billion to a third of a billion years ago. These had certain structures, especially in brain and cranial nerves, fundamentally identical with those of the younger stages of the lamprey or hagfish of today.

From this stage, the descent envisioned by Prof. Gregory proceeded through primitive shark-like and fish-

like animals, through amphibians of the Coal Age, and reptiles that followed them, to "near-mammalian" reptiles that lived in South Africa when dinosaurs roamed the earth. From such a stage the transition to the reptile-like egg-laying mammals like the duckbill and the echidna still living in Australia is not too great a leap for the scientific imagination.

The more direct ancestry of man and his simian cousins can be traced through creatures grading from opossum-like animals to the tree-shrew type, Prof. Gregory holds. The earliest primates were probably something like the modern tarsiers, but less specialized. From these the old-world monkey stem developed, which in turn gave rise to more truly anthropoid forms, of which the recently discovered Australopithecus skeleton of South Africa is a striking example.

Truly human forms of early date are exemplified in Prof. Gregory's scheme of descent by the Javanese Pithecanthropus and the Peking Man of China. True man, *Homo sapiens*, originated during the Ice Age. His brain, Prof. Gregory said, retains many unmistakable marks of derivation from an anthropoid stage, but shows progressive development of centers and areas associated with speech and verbalized thinking.

"As to the possible future of mankind," he concluded, "to judge from the history of many other new groups (not species) and in consideration of his cosmopolitan distribution, mankind should be a 'good risk' for survival for an indefinite period."

*Science News Letter, March 4, 1933*



The Science Service radio address next week will be on the subject

**GOLD**

by

**Scott Turner**

Director of the Bureau of Mines of the United States Department of Commerce

**FRIDAY, MARCH 10**

at 12:45 P. M. Eastern Standard Time

Over Stations of The Columbia Broadcasting System