

PHYSICS

New Kind of Atom Smashing Liberates Millions of Volts

Experimenters Bombard Lithium, a Metal, Which Combines With Hydrogen and by Disintegration Forms Helium

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A NEW TYPE of atomic disintegration that liberates millions of volts of internal atomic energy is disclosed by experiments by Drs. J. D. Cockroft and E. T. S. Walton working in the Cavendish Laboratory, Cambridge, England.

Details of the experiments are given in a letter to *Nature*. These are experiments that Lord Ernest Rutherford, director of the Cavendish Laboratory, has described as important additions to his own previous researches on the constitution of the atom and radioactivity.

Drs. Cockroft and Walton found that when lithium of atomic weight seven is bombarded with protons accelerated at 600 volts, a new kind of splitting of the atom occurs with the release of sixteen million volts of internal energy. The lithium atom apparently captures a proton and then breaks up into two alpha particles with energy of eight million volts each.

Not Practical

Since the proton, the positive particle of electricity and matter, is the nucleus or heart of the hydrogen atom, and the alpha particle is the nucleus or heart of the helium atom, it may be said that lithium, the lightest of metals, was bombarded and combined with hydrogen to form by disintegration the gas helium. More important than this transmutation is the fact that energy wrapped up in the lithium atom was let loose and given to the helium atom hearts or alpha particles that were produced. Quantitatively sixteen millions of volts were obtained whereas only six hundred volts were fed into the transformation. The reason the experiment does not provide a practical source of power is that this occurs only one time in several million attempts.

The experiments of Drs. J. D. Cockroft and E. T. S. Walton at Cambridge, England, are important because they demonstrate that atoms in being arti-

cially smashed can liberate more energy than is put into the smashing process.

Although atoms have been disintegrated before, the kind of splitting discovered by Drs. Cockroft and Walton is novel. Atoms are made up of various building units, principally protons, alpha particles, and loose electrons. The proton is the positive unit of electricity and matter and it is the heart or nucleus of the hydrogen atom. The alpha particle is the nucleus or heart of the helium atom and is made up of four protons and two electrons bound together. The electron is the negative unit of electricity or matter. Atoms are visualized as made up of hearts consisting of protons, alpha particles and electrons wrapped in a compact, heavy nuclear package, surrounded by outside electrons that can be easily removed.

The lithium atom attacked in the Cambridge experiments consists of one alpha particle and three protons with necessary negative electrons to balance the charge of the positive part. The bombardment under relatively low voltage added a proton to the combination, which then split into two alpha particles. The three protons originally in the lithium atom evidently combined with the proton to form another alpha particle.

Lord Ernest Rutherford in 1919 was the first to disintegrate artificially an element when he bombarded nitrogen gas with alpha particles, which are rushing hearts of helium atoms given off by

radioactive substances, and obtained hydrogen. It was familiarly said that Rutherford thus knocked H out of nitrogen. Even earlier in 1896 Becquerel in France observed the spontaneous disintegration of the element uranium and thus discovered radioactivity, inaugurating the fruitful search of science into the constitution of matter. Since then it has been discovered that many atoms, particularly the heavy ones, are radioactive and that any of the light ones can be disintegrated (*Please turn page*)

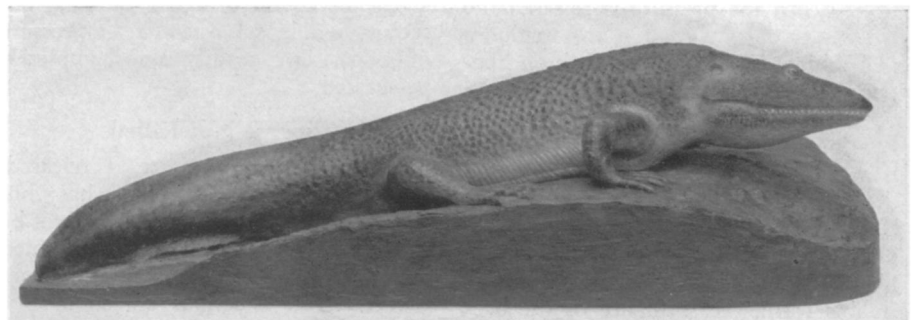
PALEONTOLOGY

Land Animals Small When Coal Was Forming

THERE were giants in the earth in the Coal Age, but they were all trees; weird growths like the modern horse-tail rushes, but fifty feet high and a foot thick; others just as strange, with sword-like leaves, that have left no living representatives. But all the land animals, in those days before the dinosaurs, were comparatively puny things; small creatures very much like modern salamanders, not over a foot or two long; though some, by virtue of interminable tapering tails, attained a length of nine feet. And there were a few eel-shaped ones, like the so-called "blind-worms" of the present day.

Their bones are not at all well preserved. Most of the little we know about them comes from impressions of their bodies in coal beds, and from more abundant tracks of their feet in muds that subsequently hardened into shales. But sufficient skeletal material has been gathered to enable the noted paleontologist, Dr. William K. Gregory, to direct the sculpturing of a restoration which can now be seen at the Field Museum of Natural History in Chicago.

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Field Museum Photo.

FROM THE PRIMAL SLIME

Diplovertebron is the formidable name given to this not-very-formidable salamander-like animal that crept through the primal slime of Coal Age swamps. Its descendants, relatively little modified, are found in wet places today.