

GENERAL SCIENCE

Mesotrons, in Upper Air, Produced by Cosmic Rays

Welterweights Among Atomic Particles, Between Protons And Electrons in Weight, Abundant Above 25,000 Feet

MESOTRONS, recently discovered welterweight atomic particles which are intermediate in mass between heavyweight protons and lightweight electrons, are abundant in nature, but in a part of the outdoors that few of us ever get to—the upper air above 25,000 feet, Prof. Arthur H. Compton of the University of Chicago reported to the American Philosophical Society.

Instruments for detecting and counting these particles were exposed at sea level, on mountain heights and in a high-flying airplane by several of Prof. Compton's associates. At sea level and up to 14,000 feet, he said, mesotron production is almost non-existent. At 20,000 feet it is readily observable, and at 25,000 feet it is abundant.

Calculations based on observations at accessible altitudes indicate that greatest mesotron production goes on close to the very top of the atmosphere. At this level, the mesotrons are produced by bombardment of atmospheric molecules by incoming cosmic rays. At lower altitudes, Prof. Compton stated, photons (particles of light) and secondary cosmic rays are responsible. The mesotrons thus produced in the upper levels of the atmosphere disintegrate into smaller particles by the time they reach the levels at which men live.

Among those associated with Prof. Compton in these researches were Drs. Volney Wilson, Marcel Schein, D. S. Hsiung, F. R. Shonka and P. S. Gill.

Celestial Pinwheel

MEASUREMENTS of the rotation of the sky's most famous giant pinwheel, the great spiral nebula in the constellation Andromeda, were reported by Dr. Horace W. Babcock of the Lick Observatory, University of California. This object is really a vast mass of stars and star-stuff on the order of 50,000 light-years in diameter, so that it makes a really massive wheel.

In its spinning, Dr. Babcock said, the parts near the center and the parts near the rim move at nearly the same angular

rate, just as a point on the hub and one on the tire of a wheel always keep opposite each other. This means of course that the linear velocity, the speed in miles per hour, is vastly higher in the outer parts of the nebula than it is near the center. The "arms" of the nebula are spirally curved, and Dr. Babcock found that movement is in the direction of the convex curvature.

Dr. Babcock also made an approximate calculation of the amount of material in this nebula. It amounts to 10^{11} or 100,000,000,000 times the sun's mass.

Six Billion Electron Volts

COSMIC rays strike the outermost parts of the earth's atmospheric envelope at the terrifically high energy level of six billion electron volts, Dr. Robert A. Millikan of the California Institute of Technology reported. This figure is based on records of instruments sent aloft in small, unmanned balloons that penetrated the stratosphere and went on up until only one or two per cent. of the atmosphere remained above them.

"This maximum corresponds closely to the energy to be expected if there is a possibility of transforming into cosmic-ray energy the whole of the rest-mass of the carbon atom," Dr. Millikan explained. "This is the most abundant element save hydrogen and helium which the spectroscopist, in Dr. Bowen's hands, has revealed in the nebulae."

Soldiers Married Late

WHEN a Roman soldier married at the end of a long term of honorable service in a foreign land, he received a "diploma," which legalized the status of his wife and his children, by then often pretty well grown up.

Evidence of this practice was presented before the meeting by Prof. Henry A. Sanders of the University of Michigan.

The document described by Prof. Sanders is the marriage certificate of a Roman soldier of the second century

A.D. It was found in the ruins of the Egyptian town of Karanis, where the University of Michigan has been conducting researches into the lives of the common people of antiquity, rather than those of their nobles and kings recorded in the pretentious tombs and pyramids.

The soldier's marriage "diploma," which bore the fragmentary names of seven witnesses on its back, gives a hint of the origin of the term, because it was folded double, and that is exactly the Greek meaning of the term. Curiously enough, modern graduates of schools and colleges will do almost anything to avoid folding their diplomas.

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OCEANOGRAPHY

President Invites Scientists To Sail on Navy Ships

TUCKED away in a foreword to one of its articles, the newly issued report of a year's explorations and field-work by scientists of the Smithsonian Institution contains a Presidential invitation to the Institution's naturalists to use U. S. Navy ships as collecting boats.

When President Roosevelt and his fishing party last summer sailed on the cruiser Houston to the Galapagos and Cocos islands, among those on board was Dr. Waldo L. Schmitt, curator of fishes. The President has written a foreword to his report, in which he says, "I am advised that the collections he made, with the assistance of the officers and enlisted men of the Houston, have contributed greatly to the treasure of exhibits the Smithsonian already has gained possession of through previous explorations by its scientists in that part of the world we visited.

"I believe our experience points the way whereby the Smithsonian Institution, in the future, at practically no cost whatever to itself, will be able to extend its research work into other parts of the world and make it possible for its scientists still further to enrich our knowledge of natural history . . .

"If the Smithsonian Institution, in the future, would care to be represented in such expeditions as the United States Navy and other government services send out from time to time, I shall be glad to help make the necessary arrangements.

"We cannot know too much about the natural history of this world of ours. We should not be satisfied merely with what we do know."

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