

PHYSICS

Cosmic Rays May Originate In Destruction of Elements

Evidence Presented by Dr. Millikan to National Academy Indicates Sun's Magnetism Extends in Space

NEW evidence for the creation of powerful cosmic rays through the annihilation of the universe's commonest chemical elements, sparsely scattered in the far reaches of space, was presented to the National Academy of Sciences by Dr. Robert A. Millikan, Nobel prizeman, of the California Institute of Technology.

The first evidence obtained by science that the sun's magnetic field extends out into space, enveloping the earth and the whole solar system, has also resulted from Dr. Millikan's latest cosmic ray researches.

Dr. Millikan, with his colleagues, Drs. I. S. Bowen and H. Victor Neher, probed the earth's atmosphere with balloons practically to its top. They found that the way in which the energy in incoming, highly penetrating cosmic rays is distributed gives evidence for the annihilation theory of cosmic ray production.

The most abundant elements that are destroyed in creating cosmic rays are carbon, nitrogen, and oxygen, together with relatively high percentages of sodium, silicon, and aluminum. These are among the commonest elements in the universe. The elements that give rise to cosmic rays range in atomic weight between 6 and 28.

Hydrogen, and perhaps helium, are also known to be extremely plentiful throughout the universe, and the fact that no cosmic rays corresponding to their energy of annihilation have been found gave Dr. Millikan his lead to the newly recognized extent of the sun's magnetic field.

The earth's magnetic field has been known to change the direction of cosmic rays. Similarly, the sun keeps the less powerful rays of hydrogen and helium origin from getting to earth.

Dr. Millikan summarized the new findings under four heads:

1. The curve of energy distribution of the incoming cosmic-ray electrons has a maximum at about 6 billion electron-volts.

2. This curve falls to less than one-third its maximum value both at an energy of 1 billion e-volts and at 20 billion e-volts;

3. This type of banded structure renders it unlikely that the cosmic rays originate in portions of the universe in which matter exists in appreciable densities; and

4. The observed energies of the cosmic rays are about those to be expected if the abundant elements have the capacity to transform their mass-energy completely into cosmic ray-energy.

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Benjamin Franklin in 1727.

Prof. Fox, as pathologist to the Philadelphia Zoological Society, has had ample opportunity to diagnose the disease in many living animals. He has also examined skeletons in several museums. The total number of animals examined was 1,749, of which 77 proved to be definitely arthritic.

Occurrence of the malady among animals appears to be as little governed by rules as it is among us suffering humans. It is not correlated with climate, location, food, focal infections, or kind of animal. It was most easily detected as an affliction of the spine, but was also found in other parts of the skeleton.

Animal families (*Turn to Page 287*)

ORNITHOLOGY

Audubon 100th Anniversary Marked by Exhibit of Art

See Front Cover

MARKING the hundredth anniversary of America's greatest early work on natural history, John James Audubon's *Birds of America*, a national exhibition of the works of the famous artist-naturalist will be held at the Academy of Natural Sciences of Philadelphia from April 26 to June 1.

In 1838 Audubon published the completing section of his marvelous series of colored plates showing the principal spe-



HOW HE LOOKED

This portrait of Audubon by his son, John Wodehouse Audubon, shows the great artist-naturalist as he appeared when in the field. Tradition has it that the elder Audubon painted the dog himself.

GENERAL SCIENCE

Wild Beasts Have Arthritis But Rats and Bats Are Immune

America's Oldest Scientific Society Hears Also Of Successful Use of Lindbergh's "Glass Heart"

GRANDPA Gorilla has his bad days with "rheumatiz", no less than his human nth-degree cousins. Hyenas have it, too—presumably they don't laugh then. It seems to be the same kind of rheumatism—arthritis—most common and most painful in human beings.

Occurrence of arthritis in wild animals was described by Prof. Herbert Fox of the University of Pennsylvania, who addressed the meeting of the American Philosophical Society in Philadelphia. The Society is the oldest of American scientific bodies; it was founded by