

PHYSICS

# Speedy Particles Released As Cosmic Rays Smash Atoms

## Millikan Associate Provides First Evidence That Electromagnetic Radiation can Disrupt Heart of Matter

**T**HE INCESSANTLY penetrating cosmic rays that bombard the earth from the depths of outer space smash the hearts of atoms and let loose speedy particles, Dr. Robert Andrews Millikan, Nobel prize physicist of the California Institute of Technology, announced in New York upon his return from a two and a half months' good-will trip to Germany and other parts of Europe.

Disintegration of the atomic nucleus by the cosmic rays was discovered by Dr. Carl D. Anderson, an associate of Dr. Millikan at the Norman Bridge Laboratory of Physics at Pasadena, during research planned jointly by Drs. Millikan and Anderson. The results were communicated to Dr. Millikan while abroad so that he might discuss their import with physicists who have been studying atomic disintegration at the Cavendish Laboratory at Cambridge for the past decade.

### Lacked X-Ray Intensity

Dr. Anderson's experiments provide the first scientific evidence that electromagnetic radiation can disrupt the innermost structure of matter. Artificial breaking down of elements has been accomplished in the past by the impact of alpha radiation from radium, which consists of rapidly speeding hearts of helium atoms. Heretofore scientists have not had at their disposal any X-rays or gamma rays of sufficient intensity or shortness to disrupt the tightly bound hearts of elements.

Cosmic rays, with energies of 100,000,000 to 300,000,000 volts, are extremely penetrating X-rays or gamma rays and provide an automatic tool for bombarding and smashing the atomic hearts. In his experiments Dr. Anderson found that cosmic rays knock both negative and positive electrons and protons out of the nuclei of oxygen and nitrogen. He used the famous Wilson cloud chamber apparatus in which the collision of cosmic radiation with atoms of gas is made visible by a line of small water droplets. The electrons or particles of electricity that are reemitted

from the collision travel at immense speeds—99.9 per cent. of the velocity of light, which is 186,000 miles per second. The protons or hydrogen nuclei also are given great velocities equal to half the velocity of light, or 75,000,000 volt electrons. These values provide physics with new speed records.

Dr. Millikan predicted that Dr. Anderson's bombardment experiments would be useful in understanding the fundamental nature of matter. It is another demonstration that transmutation of the elements, long considered an alchemistic dream, is possible in some cases. In Dr. Anderson's experiment hydrogen, simplest of elements, is obtained from the gases oxygen and nitrogen; although the quantities are of no practical importance.

Intensive research on cosmic rays now in progress in Germany is confirming, Dr. Millikan found, his conclusion that cosmic rays come to earth with equal intensity from all parts of the sky. Dr. E. Regener of the University of Stuttgart, by sinking electroscopes to thousand foot depths in the Bodensee, has ex-

tended and confirmed Dr. Millikan's own finding on the penetrating power of the most intense cosmic rays. Dr. Millikan visited Dr. Regener during his travel in German-speaking European countries as the guest of the Oberlaender Trust.

He also found Dr. F. Hoffman of Halle in complete agreement with him on cosmic rays. As a result of his extensive visits in Germany, Dr. Millikan declared that progress in physics is being accelerated in that country.

"We have much to learn from Germany and Germany has much to learn from us in physics," he said.

*Science News Letter, December 12, 1931*

REFRIGERATION

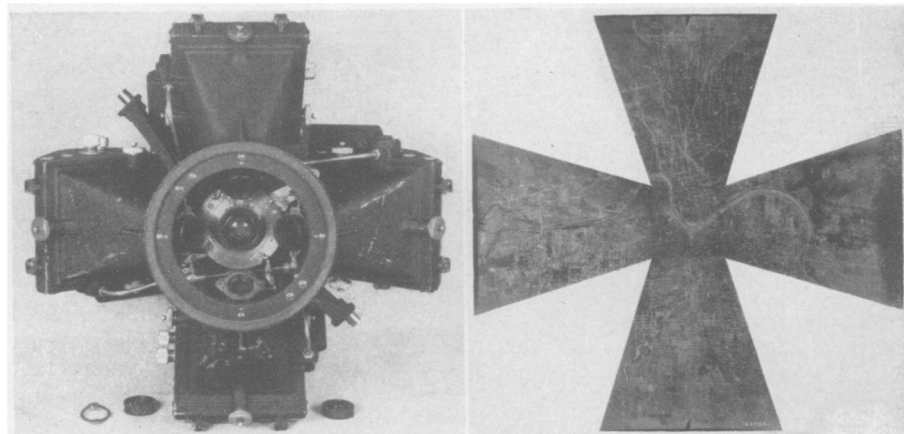
## New Type of Frozen Fruit being Developed

**A** NEW TYPE of frozen fruit, which not only will appeal to the palate but also will offer a new outlet for the fruit grower and packer, is being developed by the Food Research Division of the Bureau of Chemistry and Soils, U. S. Department of Agriculture.

By pulping the pitted fruit, adding a sugar syrup, mixing it thoroughly and then freezing it at very low temperatures, Department chemists have developed this frozen fruit product which they claim has a remarkably smooth texture and fully retains the original flavor.

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Sweet apple cider contains about the same food value as fresh apples.



*U. S. Army Air Corps*

### AERIAL MAPPING WITH FIVE-LENS CAMERA

A recent development in aerial photography is a camera, shown at left, which has four oblique lenses in addition to the usual vertical center lens. Operation of these lenses is simultaneous. In developing the exposed film, a special instrument is used which enlarges the wing pictures, and projects them on the same plane with the center view. Right shows a photograph of Dayton, Ohio, and vicinity made with the new camera. On an experimental mapping tour conducted not long ago aviators of the Army Air Corps were able in two days flying to cover an area which would require six months with usual equipment, and at one-thirtieth the cost allowed for such work.