

Dr. Yerkes is himself distinguished for the services he rendered the nation at that time, particularly in development of the psychological testing and classification system which has been used successfully in industry ever since.

But after the war, Dr. Yerkes said, America neglected the field of psychology applied to the service of the state, while Germany took the initiative and leadership. Research and training centers were established in Germany and hundreds of men were trained for psychological service to the state.

Now the Nazis have an unparalleled organization to deal with problems of propaganda, morale, personnel and like matters of human engineering. The United States has no comparable organization, few military psychologists, and

no training schools in Army or Navy to meet prospective needs, he said.

Psychology has other than military values for defense, Dr. Yerkes declared.

"In the interest of social progress it would seem incomparably more important," he said, "to improve human nature and increase the ability and usefulness of the individual, than, in accordance with our current concentration of effort, to prolong life into senility."

Dr. Yerkes urged the establishment of professional schools of psychology, similar in principle to those of medicine and engineering, with courses leading to the degree of Doctor of Psychology. For those who wish to practice their profession, licensing under federal and state laws should be provided.

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## PHYSICS

## Cosmic Rays Seem to Consist Mostly of Heavy Protons

### Measurements in Airplanes Far Above Earth Show Particles Can Penetrate Seven Inches of Lead

THE COSMIC rays that continually bombard the earth from outer space seem to be mostly of protons, the heavy parts of atoms, rather than electrons. New evidence in favor of this theory is contained in experiments reported by Dr. Arthur H. Compton, University of Chicago's Nobel prizeman in physics, to the American Philosophical Society.

He told of various measurements made of the cosmic rays far above the surface of the earth, from airplanes and balloons. Some of these measured the number of particles that came in which were capable of penetrating thick blocks of lead. It was found that most of the particles which could get through an inch and a half of the metal were able to traverse some seven inches.

Many electrons are stopped by the magnetic field of the earth. Those with enough energy to penetrate this field, and so to reach the lead blocks, should be stopped by only four inches of lead, explained Dr. Compton. On the other hand, he said, the observations fit in with the idea that protons, with positive electrical charges, are the primary cosmic rays. When these strike the nuclei of atoms in the air, they produce mesotrons, which constitute an important part of the cosmic radiation observed on the earth's surface.

He also reported observations by V. C. Wilson, W. P. Jesse, M. Schein and E. O. Wollan, using detector tubes carried aloft in airplanes and balloons. These showed that an inappreciable number of mesotrons are produced below  $3\frac{3}{4}$  miles altitude. At about 5 miles the production becomes strong, and increases up to at least  $12\frac{1}{2}$  miles.

"At the highest altitude, where the

barometer is 2 centimeters of mercury," he said, "the number of mesotrons is at least as great as the number of incoming cosmic ray particles as estimated by Millikan and his collaborators."

Another experiment described, made by G. Herzog and W. Bostick, made use of a cloud chamber between the poles of a powerful magnet. The chamber shows, by a fine line of water droplets, the passage of one of the various particles. With it, said Dr. Compton, there were found many slow mesotrons, which are exceedingly rare at ground level. The production of positive and negative pairs of slow electrons was also noticed.

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## Diphtheria Antitoxin

PRODUCTION of diphtheria antitoxin in crystalline form was announced before the meeting by Dr. John H. Northrop of the Rockefeller Institute for Medical Research laboratories at Princeton, N. J.

First step was the formation of a precipitate, by mixing diphtheria toxin with serum from a horse which had been immunized against the toxin. This precipitate, said Dr. Northrop, is a mixture of toxin and antitoxin. The toxin was digested away with trypsin, one of the digestive enzymes, leaving the antitoxin in solution. Further treated with ammonium sulfate, the solution yielded a more highly purified, unstable, crystalline protein in the form of small plates. This protein has anti-toxic properties, which remained unchanged after three re-crystallizations.

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