

PHYSICS

Ionosphere Rays Possible As New Name for Cosmic Rays

Dr. Arthur H. Compton's Researches Indicate That Cosmic Rays May be Atmospheric Electrons, Not Space Waves

DR. ARTHUR H. COMPTON'S new hypothesis suggests that the cosmic rays originate not in the depths of interstellar spaces but in the earth's own upper atmosphere only some hundreds of miles above our heads. If it is sustained by time, a new name will be needed for these penetrating radiations.

Perhaps they will be called ionosphere rays.

The University of Chicago physicist and Nobelist reported to the National Academy of Sciences meeting at the University of Michigan, just as Dr. Robert Andrews Millikan, also a Nobel prizeman in physics, at the equivalent autumn meeting of this Senate of American Science just seven years ago, called the attention of scientists and the public to the importance of studying the cosmic rays.

Rays Become Earthly

Dr. Millikan then characterized the cosmic rays as super X-rays or super gamma rays and saw them as "birth cries" of the formation of atoms in the distant spaces between the stars and the nebulae. This idea was seized upon as an escape from the running down or heat death of the universe, evidence that heavier elements were being built somehow from hydrogen and helium.

Now, after gathering new data in a fifteen-month world survey conducted by himself and some sixty physicists in all parts of the globe, and after analyzing the multitude of experiments made in nearly every center of physics since Dr. Millikan's 1925 report, Dr. Compton says: "Cosmic rays may be satisfactorily explained if we suppose that the cosmic rays consist of electrons originating some hundreds of miles above the surface of the earth in the upper atmosphere. It seems very difficult to reconcile with our data any of the alternate hypotheses that have been suggested."

If further interpretations of the Compton survey and experiments of the future uphold this conclusion, the cosmic rays become earthly and lose their

cosmic nature. They also will be recognized as very energetic electrical particles or electrons and not electromagnetic radiations in the same family as light, X-rays and the penetrating rays from radium.

There have been two schools of physicists during these exciting years when cosmic rays have been a favorite experimental subject. One has held with Millikan and the other with Compton.

Three lines of evidence converged in pointing to an origin for the cosmic rays in the upper ionized region of the earth's atmosphere, where also originate the aurora borealis or northern lights and where the radio waves are reflected. These are: variation with latitude upon the earth, variation with altitude and variation between day and night.

Dr. Compton's survey, in which electroscopes were taken into the arctic and the antarctic near the magnetic poles and to many places in between, revealed a markedly less intensity of cosmic rays near the equator. As latitudes increased north and south, the rays increased. This

PSYCHOLOGY

Sleep Comes From Relaxed Muscles, Not Tiring Work

SLEEP depends largely on the tone of the muscles. When the muscles are relaxed, there is a lessening of the impulses from them to the brain, so that it becomes difficult to stay awake. This relaxation and consequent sleepiness normally takes place regardless of whether or not tiring work has been done.

These conclusions were reached in the course of studies of efficiency reported by Dr. Nathaniel Kleitman of the University of Chicago to the National Academy of Sciences meeting at Ann Arbor.

Dr. Kleitman's studies of perform-

ance showed that there is a gradual increase in muscular relaxation during the day. On going to bed this relaxation becomes still greater, which precipitates sleep.

The body temperature shows a curve similar to that of muscular relaxation, rising up to noon or afternoon and then decreasing for the rest of the waking period. Since body temperature is an indication of change in muscle tone, Dr. Kleitman assumes that the decrease in efficiency in the afternoon, paralleling the decrease in temperature, is due to greater muscular relaxation.

Dr. Compton's idea. In high mountains of Tibet and Peru experiments were made, and the balloon flights of Piccard, the Belgian, and Regener, the German, gave additional support.

In fact, Piccard in last summer's record altitude ascent in his aluminum gondola took ion counters that allowed him to tell whether the rays were bombarding him from above or from the sides. At the earth's surface few rays come sideways. At some ten miles up Piccard found no difference between the number of rays passing horizontally and those passing vertically. This supports strongly Dr. Compton's idea that the rays were originating in the thin air where the balloon was floating.

Day and night conditions, particularly at high altitudes, show changes in cosmic ray intensities, and this fits in with Dr. Compton's magnetic theory.

What in the ionosphere or the upper air gives birth to the electrons Dr. Compton did not suggest. He feels there is still the possibility that a portion of the rays may consist of electrons coming from outer space. He did say, however, that we know they have some important message for us. He said:

"Perhaps they are telling us how our world has evolved, or perhaps they are bringing news of the innermost structure of the atomic nucleus."

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