

Cosmic Rays May Cause Evolution

Biology

Following are additional reports of the Washington meeting of the National Academy of Sciences.

Cosmic rays may be the causes of evolution as well as the messengers of the creation of matter in the depths of space. So Prof. H. J. Muller, of the University of Texas, suggested when he announced to the National Academy of Sciences the most recent steps in his revolutionary experiments with X-rays as man-controlled tools for the making of new species out of old.

The mutations, or evolutionary jumps, which Prof. Muller produces by thousands with his X-rays, also occur in nature in smaller numbers, apparently spontaneously. It has been suggested, Prof. Muller said, that even these spontaneous mutations may be due to natural radiations resembling X-rays, which are found almost everywhere, though their force is usually rather feeble. Traces of radium in soil or water, and the larger amounts of weaker but more abundant radioactive elements which are present on earth, give off X-rays and other radiations of the same class. And the cosmic rays from the heavens, which Dr. R. A. Millikan announced earlier in the sessions as signals of matter's creation, are also possible shifters and rearrangers of the minute building-block genes in the germinal cells.

To test this cosmic ray theory of evolution, Prof. Muller hopes to conduct fly-breeding experiments protected from the powerful rays of heaven that can penetrate 200 feet of water or 18 feet of lead. Special food and water, free from radioactive matter, would be given to the flies. If a non-evolving race of insects should result, Dr. Muller's theory would be substantiated.

Mosaic fruit-flies have been evolved by Dr. Muller's associate, Prof. J. T. Patterson. He X-rayed the larvae, or young of the fruit-flies instead of the adult insects, and obtained patchwork evolution. The larval cells that were hit and changed by the X-rays divided and grew into patches of body-material quite different from the original type. The rest of the insect remained "as was," so that the resulting creature was a mosaic of bits of new-species tissue fitted into an old-species body.

New Science of Music

A science of music is at last being

developed, said Dr. Carl E. Seashore, of the University of Iowa. The man who has the largest responsibility for developing the anthropology of music as an applied science is the psychologist. The reason why scientific knowledge of the subject has been delayed is that psychology is still an infant science. But with equipment and knowledge now available, songs can be recorded just as they are sung, music can be described in psychological terms, and musical talent can be measured.

The phonograph as a means of collecting primitive music has had its day and is now superseded by the camera, Dr. Seashore pointed out. A musical score has been devised for recording the rendition of songs which shows at a glance the form of the pitch and duration of each note, and how the note is attacked and held and released.

About twenty factors in musical talent can now be objectively measured to show the extent of an individual's musical possibilities and his strong and weak points, Dr. Seashore reported.

Algae in the Canyon

Numerous fossil remains of plants, belonging to the lowly water forms known as algae, have recently been discovered in the ancient rocks near the bottom of the Grand Canyon of Arizona. Dr. David White, of the U. S. Geological Survey, told of his investigations among the Proterozoic rocks and the peculiar stony masses he found there, representing what were once great matted heaps of seaweed or similar plants on the bottom of a sea that existed nearly a billion years ago. At least five different types of deposits in these strata represent the plant life of those primal oceans, in Dr. White's opinion, and there is at least one additional type of stone which was influenced in its formation by either plant or animal life, with the probabilities in favor of a plant origin.

Evolution Controversy

A difference of opinion over the evolution of man himself developed during the session of the academy. Dr. J. W. Gidley, of the U. S. National Museum, reported his recent discovery of an arrow point buried in the soil of Florida, associated

with bones of animals that roamed America during the Ice Age, which is usually assumed to have ended 30,000 years ago. Dr. Ales Hrdlicka, also of the U. S. National Museum, doubting whether man existed on this continent so long ago, pointed out the relative scarcity of human remains and instruments found in America, as contrasted with their abundance in the caves of Europe, and the absence among the American stone implements of the graded series from early crude specimens to the later highly finished types.

Medals Awarded

Four gold medals of the National Academy were awarded this year. Dr. William Hammond Wright of Lick Observatory who announced new studies of Mars was given the Henry Draper medal for research in astrophysics. The Public Welfare Medal was presented Dr. Charles V. Chapin, health officer of Providence, R. I., and the Mary Clark Thompson Medal was given Prof. J. Perrin Smith of Stanford University for his paleontological work upon the ancient rocks of the Jurassic. Announcement was made of the award of the Agassiz Medal for oceanography to Prof. V. Walfrid Ekman, University of Lund, Sweden.

New Medal Established

A new medal that will be awarded in future years was announced at this meeting of the Academy. It is the Charles Doolittle Walcott Award, and is established in honor of the late secretary of the Smithsonian Institution by his widow, Mrs. Mary Vaux Walcott. According to the terms of the award, it is to be given "to encourage and reward individual achievement in advancing our knowledge of pre-Cambrian life and its history in any part of the world." It consists of a medal and the income accumulated for a period of five years, from the fund of \$5,000, and awarded by a joint committee of the Academy and other organizations.

Nine New Members

Two psychologists, two chemists, an anthropologist, an astronomer, an electrical engineer, a paleontologist and a geologist are the new members elected to the academy.

John August Anderson, astronomer at the Mt. (Turn to next page)

National Academy of Sciences Meeting—Continued

Wilson Observatory in California, represents the students of the stars, but his invention of a new type of earthquake recorder, in collaboration with his colleague, Dr. Harry O. Wood, has provided a simple means of detecting quakes.

An important chemical tool, hydrogen ion concentration determination, was developed in this country in part by Dr. William Mansfield Clark, of the Johns Hopkins University Medical School. He worked on the chemistry of cheese while in the bureau of dairy chemistry of the U. S. Department of Agriculture and later he was with the U. S. Hygienic Laboratory.

When it comes to the geology of the Appalachian Mountains, Dr. Arthur Keith, the geologist elected, can speak with authority, for that is one of his specialties. He is now with the U. S. Geological Survey.

It is to Charles Franklin Kettering, the electrical engineer of the group, that millions of farmer owe their thanks for having electrical illumination in their homes, for he perfected and put on the market the "Delco" lighting system. He developed the tetra ethyl anti-knock fuel

for autos and perfected the "Delco" ignition system for automobiles. Now he is a vice-president and director of the General Motors Corporation, and at the head of the General Motors research laboratory.

Dr. Alfred L. Kroeber, the anthropologist, is one of the leading authorities on the languages of the American Indian. He is professor of anthropology at the University of California.

Paleontology, the study of now extinct forms of animal life, finds its representative in Dr. Rudolph Ruedemann, state paleontologist for New York. He is a German by birth, and taught at the University of Strassburg before coming to the United States in 1892.

Problems of metabolism, or the functioning of the body, have engaged the attention of Dr. Philip Anderson Shaffer, professor of biochemistry at the Washington University Medical School, St. Louis.

The two psychologists are Dr. George Malcolm Stratton, of the University of California, at Berkeley, and Dr. Lewis Madison Terman, of Stanford University, California. Between them they represent two great

branches of psychology. Dr. Terman is the author of the Stanford Revision of the Binet-Simon tests, with which millions of persons have had their intelligence tested. Many other series of intelligence tests have been based largely on his work. Dr. Stratton is an experimental psychologist. One of his researches was concerned with vision, and in the course of his experiments he wore for days a pair of spectacles that made everything appear upside down.

As a foreign associate, the academy elected Sir Robert A. Hadfield, famed British engineer, chemist and metallurgist. He is the inventor of manganese steel, widely used in industry.

Dr. Joseph S. Ames, provost of the Johns Hopkins University was elected treasurer of the academy, while Dr. W. B. Cannon, of the Harvard University Medical School, and Gano Dunn, New York engineer, were elected to serve three years on the Council. Dr. George K. Burgess, director of the U. S. Bureau of Standards, was elected chairman of the National Research Council, succeeding Gano Dunn.

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Man and the Universe

Astronomy

J. H. JEANS, in a lecture before the Royal Society, published in *Nature*:

The total age of the earth far exceeds the 300,000 years or so of man's existence. The evidence of geology, and of radio-activity in rocks in particular, shows that it must be something like 2,000 million years, which is several thousand times the age of the human race. Old Mother Earth must regard man as a very recent apparition indeed; he has just appeared to burrow into her, burn her forests, put her waterfalls into pipes, and generally mar the beauty of her features. If he has done so much in the first few moments of his existence, she may well wonder what is in store for her in the long future ages in which he is destined to labour on her surface. For in all probability the life in front of the human race must enormously exceed the short life behind it. A million million years hence, so far as we can foresee, the sun will probably still be much as now, and the earth will be revolving round it much as now. The year will be a little

longer, and the climate quite a lot colder, while the rich accumulated stores of coal, oil, and forest will have long been burnt up; but there is no reason why our descendants should not still people the earth. Perhaps it may be unable to support so large a population as now, and perhaps fewer will desire to live on it. On the other hand, mankind, being three million times as old as now, may—if the conjecture does not distress our pessimists too much—be three million times as wise.

Looked at on the astronomical time-scale, humanity is at the very beginning of its existence—a new-born babe, with all the unexplored potentialities of babyhood; and until the last few moments its interest has been centered, absolutely and exclusively, on its cradle and feeding-bottle. It has just become conscious of the vast world existing outside itself and its cradle; it is learning to focus its eyes on distant objects, and its awakening brain is beginning to wonder, in a vague, dreamy way, what they are

and what purpose they serve. Its interest in this external world is not much developed yet, so that the main part of its faculties is still engrossed with the cradle and feeding-bottle, but a little corner of its brain is beginning to wonder.

Taking a very gloomy view of the future of the human race, let us suppose that it can only expect to survive for two thousand million years longer, a period about equal to the past age of the earth. Then, regarded as a being destined to live for three-score years and ten, humanity, although it has been born in a house seventy years old, is itself only three days old. But only in the last few minutes has it become conscious that the whole world does not centre round its cradle and its trappings, and only in the last few ticks of the clock has any adequate conception of the size of the external world dawned upon it. For our clock does not tick seconds, but years; its minutes are the lives of men.

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