PHYSICS

Artificial Gamma Radiation Approximates Cosmic Rays

New Simple Apparatus, Using old Cat-Stroking Principle, Expected to Generate Potential of 20,000,000 Volts

WITH production in Germany of artificial gamma rays of intensities that approach those of the mysterious cosmic rays, and with twenty million volts promised by a Princeton physicist's new apparatus, Prof. Arthur H. Compton, Nobel prizeman, foresees the possibility that man may be able eventually to tap the internal energy of matter and put it to work. A new idea of how the energy stores of our brilliantly radiating sun are supplied was also advanced by the University of Chicago professor, at a conference sponsored by the American Institute of Physics at New York.

An experiment by Dr. Walter Bothe, German physicist, was heralded by Prof. Compton as "remarkable" and as accomplishing what has long been "considered an impossibility." On his recent trip to Europe, Prof. Compton learned that Dr. Bothe has been able to produce artificial gamma rays by bombarding beryllium metal with alpha rays. These artificial gamma rays are an approach to artificial cosmic rays. They are the same kind of radiation as light and X-rays, except that they are much more penetrating. The beryllium metal from which they were obtained is the lightest metal that can be used practically, and the alpha rays that were used by Dr. Bothe in the bombardment are speeding hearts of helium atoms given off when radium and other elements disintegrate radioactively.

Amazing Result

The amazing result of Dr. Bothe's experiment, as explained by Dr. Compton, is that there is obtained from the bombardment of beryllium, through the giving off of the artificial super-gamma ray, much more energy than was supplied by the attacking helium atom heart. This is interpreted to mean that what happens is not the distintegration of the beryllium but an actual process of synthesis in which a heavier element, carbon, is formed and energy is liberated in the form of the artificial "soft" cosmic rays.

If that is so, the hope of obtaining energy from such artificial synthesis is due for a revival. There is hope also that one element can be changed into another and that the age-long wish for transmutation may be fulfilled.

The practical application of this possible new energy source is made difficult by the fact that only one in fifty thousand of the projectiles hurled at the beryllium hits its mark and the process is therefore dreadfully inefficient. Although there may be places in the universe where the synthesis proceeds at a much faster rate, the physicists are frankly not optimistic about making this energy source competitive with coal, oil and water power.

But conditions in the sun may be different, and the theory is advanced that solar energy that warms and lights our earth may be the result of synthesis in the sun rather than the present favorite theory of the conversion of matter into radiant energy. This idea carried to its logical conclusions may greatly affect all ideas of how the solar system and our earth originated.

In testing these latest physical theories and providing more powerful electrical tools, a new electrical generator developed at Princeton University by Dr. Robert J. Van de Graaff, now of the Massachusetts Institute of Technology, will be useful. A large generator to be built in an airship hangar near New Bedford, Mass., is expected to produce ten to twenty million volts. A model built at Princeton gave one and one-half million volt sparks that jumped three feet.

Simplicity marks this new method of producing previously unattainable direct current voltage. It operates on the ancient principle of static electricity, that is utilized when you obtain sparks from a cat's back or scrape your feet across a rug and then touch metal. In the large generator the operator will sit inside one of two fifteen-foot-diameter electricity-collecting spheres, and, although he will be charged with from five to ten million volts, they will not harm him because he will not be grounded.

Prof. Compton, as the result of his survey of present knowledge of the atomic nucleus, believes that "we may have to find some fundamental principles of the physical world which are as yet unknown" before the nucleus can be understood. He recalled that the Danish physicist, Prof. Neils Bohr, has suggested that perhaps the principle of the conservation of energy, long considered the foundation rock of modern science, is not obeyed when electrons are ejected from atoms.

Science News Letter, November 21, 1931

ENTOMOLOGY

Insects Active on Many Battlefronts Until Frost

DAMAGE to man's crops and trees, inflicted by enemies that never let up so long as they can crawl, is reported from a score of battlefronts in this country by the Bureau of Entomology of the U. S. Department of Agriculture. Until frost stills them, and even after frostfall, in greenhouses and other sheltered places, the war against giant man waged by swarming insects goes on unabated.

The fall armyworm is a foe that can be depended on to crop up somewhere every year. Its latest depredations, according to the Bureau of Entomology report, have been in the sugarcane and soybean fields of Louisiana, and in Michigan greenhouses. Another destructive caterpillar was the cabbage web-

DR. ROBERT J. VAN DE GRAAFF
Former National Research Council fellow, with the model of his high voltage generator.

worm, active on both Atlantic and Pacific seaboards.

The huge apple crop was made the objective of a mass attack of apple leafhoppers, all the way from New England south to Virginia and west to Illinois and Kentucky. These insects, in addition to specking the fruit, were a very decided nuisance to the pickers. Two troublesome invaders of shade trees were the birch skeletonizer and the boxelder bug. The latter is reported as very prevalent in both eastern seaboard and far western states.

Among the grain insects, the chinch bug is reported as going into hibernation in distinctly alarming numbers, in the east central states. Corn earworm persisted extremely late in the northern grain area. It not only damaged late sweet corn but also ate the mature field corn and did very considerable damage by entering greenhouses, where the larvae attacked practically all forcing plants.

One grain pest, however, was at least partially circumvented. In the eastern states, there was an unusually heavy emergence of the Hessian fly in September. In most places, this was too early to infest wheat sown after the fly-free date. The insects, having no thick-growing grain fields to which they could resort, turned to the scanty scatterings of volunteer wheat, and infested the stalks heavily.

Science News Letter, November 21, 1931

MEDICINE

Disease-Bearing Mosquitoes Able to Ride on Airplanes

PLANES from the tropics will probably carry on their sides, along with the fire extinguishers, spray guns for killing insects. This innovation is to be expected as a result of studies of mosquito transportation by airplanes, announced by the U. S. Public Health Service.

Because a certain type of mosquito carries the virus of yellow fever, which still occurs in parts of South America, the Public Health Service investigated the possibility of these insects getting a free plane ride into the United States and bringing the disease with them.

Certain types of airplanes do carry mosquitoes, Dr. T. H. D. Griffitts and J. J. Griffitts of the U. S. Public Health Service found. These investigators put stained mosquitoes on planes leaving San Juan, Porto Rico, and recovered a certain number when the plane reached Miami, 1,250 miles away, that same day.

"With conditions at airports such as would permit of many mosquitoes getting aboard, it might be expected that approximately one-fifth of the original number would be transported for a long distance—at least 1,250 miles—in one day with repeated landing and opening of doors, hatches and windows, and refueling, unloading and loading taking place," they reported.

Under normal average conditions about airports, heavy infestation of airplanes would not be likely, but even one infected or infective mosquito of the yellow fever type might be the means of starting an epidemic.

However, considering the small number carried by aircraft and the facility with which planes may be freed from mosquitoes, they concluded that while the danger exists, airplanes can be efficiently treated so as to destroy mosquitoes and thus to avoid retardation of air traffic progress.

Science News Letter, November 21, 1931

ARCHAEOLOGY

Stone Age Men Made Tools of Rock Crystal

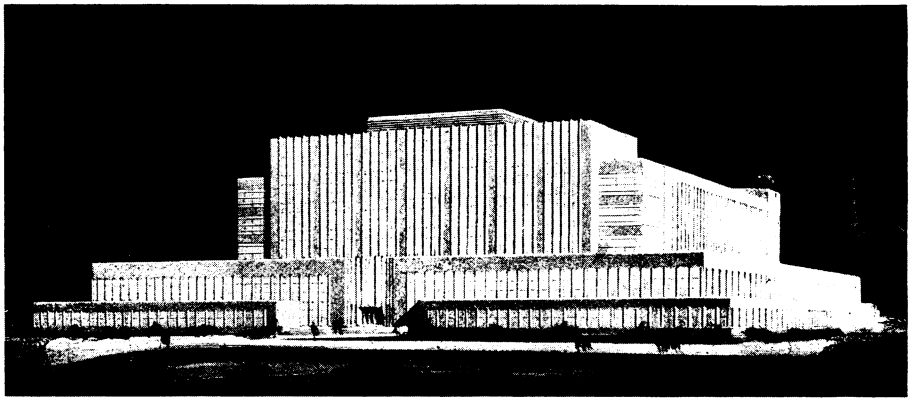
ROCK CRYSTAL, now used as a semi-precious stone, took the place of high-grade steel with the men of the Old Stone Age. They did not make many of their tools and weapons of it, but they apparently valued it and used it when they could.

At the meeting of the National Academy of Sciences at New Haven, Conn., Prof. George Grant MacCurdy of the Peabody Museum, Yale University, told of seven rock-crystal tools all found at the same level in one cave in France, by the expedition of the American School of Prehistoric Research. The tools were of the type known as Mousterian, used by Neanderthal man at one stage of his development.

The rock-crystal tools found by Prof. MacCurdy's associates are among the oldest of their kind, for Neanderthal man was the earliest race to make implements from this material. Though there are older Stone Age tools in plenty, their makers, whoever they were, were not masters of the art of working the hard and obdurate rock crystal, and contented themselves with flint and other "plain" stones.

Early California Mammals

That fossils of very early mammals have been found in California, extending the knowledge scientists have gained of the appearance and development of life on this planet, was reported to the



HOME FOR RESEARCH

A multitude of scientific researches on the many different kinds of wood will be housed in this unique building. Contained there also will be a permanent exhibition of the beauty of hardwoods used in interior finishing. The building is the new U. S. Forests Products Laboratory at Madison, Wis., drawn by the architect as it will appear when completed next summer. Although this headquarters of research is being erected for utilitarian purposes, it is planned to install wall panels and finish flooring of different woods in different rooms to display effectively the beauty and usefulness of many American forest species.