

ods of decay depending upon how it is produced. Dr. J. D. Cockcroft of Cambridge's Cavendish Laboratory described the making of nitrogen thirteen both by bombarding carbons with protons and with deuterons. In both these cases the "half life period," or the time that it takes for half of the newly manufactured nitrogen to disintegrate, is ten and a half minutes. But if this nitrogen isotope is made by the method discovered by the Joliot's of Paris, bombarding boron with alpha particles, it has a decay period of fourteen minutes.

"This proves that some nuclear component or condition as yet unknown

must exist," Dr. Cockcroft said in an interview.

Wide support was given in the conference for the existence of two particles of matter, the neutrino and the negative proton, which physicists have not yet discovered, although their existence has been suspected.

Experiments looking toward the use of neutrons in medicine, somewhat in the same way as radium rays and X-rays are now used, are being made by Prof. J. C. McLennan, emeritus professor of physics of Toronto University now resident in England, it was revealed at the conference.

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are responsible for most of the cosmic ray effect or ionization found at sea level or underneath the sea. This is in accord with Dr. Millikan's previous findings and is opposed to the ideas of some other cosmic ray observers.

The resistance of the atmosphere to incoming electrons, suggested by some as composing the cosmic radiation, would require energies of a billion electron volts on the basis of encounters outside the nucleus of the atoms and five billions of electron volts on account of the encounters within the nuclei of atoms, Dr. Millikan told the conference. Nuclear electron encounters were seen as producing only very soft secondaries consisting of both photons and electrons.

Dr. Millikan also reported that:

Nearly all the non-field sensitive part of the ionization of the atmosphere above sea level is due to photons of energy below 500 million electron volts.

In the equatorial belt of the earth a small part of the ionization is due to incoming secondary electrons of energies as high as ten billion volts.

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PHYSICS

Annihilation of Matter Seen As Cause of Cosmic Rays

MATTER being annihilated in the heated interiors of the stars and flashing "new star" novae as the origin of the cosmic rays was suggested by Dr. R. A. Millikan when he reported to the International Conference on Physics the first details of the very high altitude survey of cosmic rays made by the California Institute of Technology research team consisting of Dr. I. S. Bowen, Dr. Millikan and Dr. H. Victor Neher.

"The only source of the observed cosmic ray energies now in sight," Dr. Millikan reported, "is the annihilation of matter. But the softest components of the cosmic rays have energies corresponding to the partial annihilation or atom building hypothesis, while the energies of the hardest correspond to the complete annihilation of atoms."

Thus, in his latest interpretations, Dr. Millikan sees the cosmic rays as both the "death cries" and "birth cries" of matter. These mysterious penetrating radiations are seen as the signals of both tearing down and rebuilding of the stuff of the universe.

The process of annihilation and atom building conceivably take place, Dr. Millikan suggested, because of the ease with which hydrogen particles cluster at the extreme heat of interstellar temperature. Or they may happen because of the extremely high temperatures found in novae as suggested by Dr. Fritz Zwicky, one of Dr. Millikan's colleagues at California Institute of Technology.

Another outstanding conclusion by Dr. Millikan is that photons or radiation of the same kind as ordinary light



FOUND NEAR "FOUNTAIN OF YOUTH"

Florida's "Fountain of Youth" at St. Augustine failed to bring eternal youthfulness to these Indians of Ponce de Leon's day. But archaeologist J. R. Dickson, formerly with the University of Illinois, has found that this Indian graveyard he is unearthing contains an array of strong-framed skeletons with remarkably good teeth. The graveyard, discovered recently, has revealed over 90 burials. Mr. Dickson calls them some of the earliest Christianized Indians in the United States, because many lie with arms crossed as in prayer, and because the graves lack the offerings and equipment for a future world that the prehistoric Indians placed with the dead.

lege to determine those that are equipped to give proper service.

It is a stupendous task; but with the support of the public—employers and employees—the economic saving will amount to millions of dollars, many lives will be spared, and thousands of potential cripples will be restored to perfect health.

The American College of Surgeons has taken the leadership in a program of personal health so that the people may have the advantage of each and every discovery in the prevention of disease and in the cure of illness.

The approved hospitals, now avail-

able in every community, are urged to furnish the facilities of a diagnostic clinic to all scientific doctors in their district. The family doctor may take his patients to these Health Inventories for periodic health examinations, and there have the advantage in making his diagnosis of all up-to-date scientific apparatus and trained aids that are a part of every hospital approved by the American College of Surgeons. Thus a comprehensive audit of every patient's condition will be insured and the interests of the independent practitioner—the family doctor—will be protected.

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These are responsible for the east-west and the longitude effect found in earth's equatorial belt.

The part of the ionization that is sensitive to the earth's magnetic field increases rapidly with increasing latitude from Panama to Spokane because incoming secondaries of energies decreasing from eight to two billion get through the field's blocking effect in rapidly increasing numbers with increasing latitude, adding greatly in northern latitudes to the underlying ionization of the upper air produced by incoming photons.

Dr. Arthur H. Compton of the University of Chicago reported that there seem to be two kinds of cosmic ray bursts, an ordinary sort and a rare type about four times larger than the usual kind.

"This is very difficult to explain by any known nuclear process and the ordinary explanation would involve an element of atomic weight 1000," Dr. Compton explained.

Dr. Compton was led to this conclusion by cosmic ray measurements made this past summer in the American Rocky Mountains with Dr. G. S. Brown, Dr. H. A. Rahmel, and Prof. R. D. Bennett of Massachusetts Institute of Technology.

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ASTRONOMY

Complete Huge Disc Intended For 200-Inch Telescope

THE world's largest block of glass—originally intended for the proposed 200-inch reflecting telescope of California Institute of Technology—has now been completed. Officials of the Corning Glass Works announced that the 20-ton piece of glass will be removed from the annealing ovens to make way for another twin glass disc.

Over half as wide as the average city lot and more than two feet thick, the great glass block, shaped like a slice of pineapple as it comes from the can, has served as a valuable "trial horse" for future work. Having learned by experience the problems incidental to the pouring and casting of such a large piece of glass, engineers of the glass works are now spurring work on a second disc the same size.

Would Require Grinding

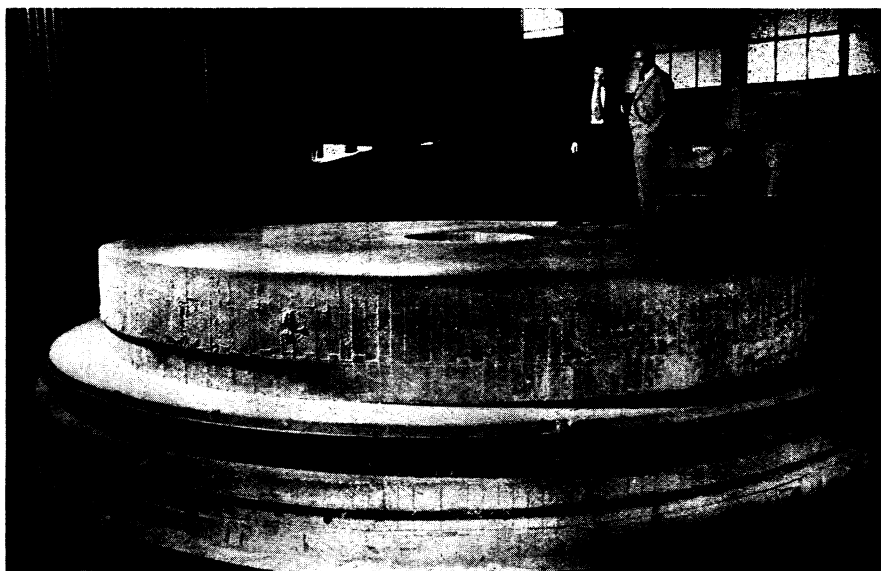
The present block of glass, it is claimed, would make a satisfactory telescope mirror but a great amount of grinding would be necessary because of the unfortunate accident which occurred at the pouring last March. At that time ceramic material used to produce a honeycomb back on the disc floated to the surface and had to be removed. The present block, therefore, is solid glass throughout. It is simpler, declare the Corning scientists, to pour and cast a second disc.

It would have been extreme good fortune indeed if the first disc cast had been chosen for the 200-inch tele-

scope mirror. Astronomers recall that when the French optical firm was casting the disc for the great 100-inch mirror of the Mt. Wilson instrument, three castings were made. After tests the best one of these was chosen. It happened to be the first cast.

The pouring of the second 200-inch disc—17 feet across—should occur before the end of the year, it was announced.

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A GIANT IN GLASS

Twenty tons is the weight of the great block of glass originally intended for the new 200-inch telescope of the California Institute of Technology. Seventeen feet across and twenty-seven inches thick, the comparative size of the disc can be judged by the men standing on it. They are Dr. J. C. Hostetter, research director of the Corning Glass Works and Dr. George V. McCauley, physicist in charge of making the mirror.