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THE SYMPOSIUM ON COSMIC RAYS

COSMIC RAYS originate within the galaxy of stars which contains the sun and the earth, according to the report of Professor Arthur H. Compton, of the University of Chicago, at the symposium on cosmic rays at the University of Chicago.

Calculations show, Professor Compton indicated, that if the cosmic rays come from beyond the galaxy the northern hemisphere of the earth (the forward moving face of the earth) ought to receive one half per cent. more cosmic rays than does the southern hemisphere.

For three years Professor Compton's sensitive instruments for detecting cosmic rays have been aboard the *S.S. Aorangi* traveling back and forth between Vancouver, B. C., and Tasmania. The cosmic ray intensity received aboard the ship shows no such variation of one half per cent. The probable error of the readings is appreciably less than one half per cent. Professor Compton concludes that the evidence so far is most consistent with the view that cosmic rays rotate with our galaxy and do not come from outside.

Hesotrons—the newest kind of atomic particle found in cosmic rays and having a mass some 100 to 200 times as great as an electron—appear to be created by the bombardment of the upper atmosphere of the earth by the charged cores of hydrogen atoms (protons) coming in from outer space, according to Dr. Thomas H. Johnson, of the Bartol Research Foundation of the Franklin Institute. He explained that most of the mesotrons (extremely piercing component of cosmic rays on earth) appear to come from the westerly direction just as do positively charged particles found in the cosmic rays. He therefore concludes that impact of protons on the air in the stratosphere creates most of the mesotrons.

Dr. Victor F. Hess, who won the Nobel Prize in 1936 for first discovering cosmic rays twenty-four years earlier, described a small, almost undetectable 27-day cycle of cosmic-ray intensity which he explains as due to the magnetic field of the sun. The period of rotation of the sun is also 27 days.

THE MESOTRON

WHILE a hundred distinguished physicists gathered at the cosmic ray symposium at the University of Chicago, the meeting has been—in many ways—an honor for a Japanese 6,500 miles away.

Through the score and more of profound, prepared addresses, summarizing the known knowledge about cosmic rays, one word has appeared again and again. That word is mesotron and that is where Professor Hideki Yukawa, of Osaka University, comes in.

It was he who first suggested, in 1935, a kind of then-undiscovered particle which has since come to be called the mesotron. Two years later the mesotron was discovered by Drs. Carl Anderson and Seth Neddermeyer, of the California Institute of Technology, and almost simultaneously by Drs. J. C. Street and E. C. Stevenson, of Harvard University.

Professor Yukawa is not an expert in experimental cosmic ray investigations. He is a theoretical physicist with a fertile mind who had an excellent idea. What he started out to do, when he suggested mesotron particles—then unnamed—was to create a better explanation of the nuclear forces which bind atoms together. He conceived a kind of particle that would have the electrical charge of an electron, a mass about 100 to 200 times as great and—most important—the ability to disintegrate spontaneously. In the interchange of energy between two elemental particles the mesotron was conceived to help in the transfer and then die spontaneously by disintegration.

At this time the "Yukawa particle" passed unnoticed among most physicists. It came into prominence only when "heavy electrons" were found as a new and important constituent of cosmic radiation. Then it turned out that the "Yukons"—as they were sometimes called after Yukawa—were virtually a blue print supplied in advance to interpret the new discovery. For a year the terms Yukons, heavy electrons, X particles, and barytrons battled for acceptance in the scientific literature until finally Dr. Anderson suggested the present name mesotrons that has found general acceptance.

Mesotrons appear to give a reasonable explanation for the extremely piercing component of cosmic rays which are detected deep down in mines. They appear to be generated within the earth's own atmosphere by the impact of cosmic rays coming at the earth from outer space.

ECONOMIC CONDITIONS IN THE STONE AGE

THERE is nothing new in our economic roller coaster with its ups and downs taken at top speed. Europeans in the Stone Age had to get used to quick economic changes and made the revolutionary change from a hunting life to agriculture abruptly, according to a paper read by Professor V. Gordon Childe, the archeologist of the University of Edinburgh, at the meeting of the Pacific Division of the American Association for the Advancement of Science.

The economics of the New Stone Age in northern Europe, over 4,000 years ago, are being emphasized in archeological studies. In the oldest Swiss lake dwellings of the New Stone Age, the people lived on meat of domestic animals mainly. Only thirty per cent. of their meat bones, left for archeologists to explain, are bones of wild game animals. But later on, nearly half the meat eaten by the lake dwellers was game, showing a back step in economic progress. The earliest pottery at these lake dwellings is pronounced "a magnificent product" by Professor Childe, while later people turned out coarse stuff.

Abruptness with which the New Stone Age developed in northern Europe, calling for a break with the hoary tradition of Old Stone Age hunting life, is seen by Professor Childe as evidence that the idea of farming economy was a foreign importation. This mode of life was worked out, he says, in the Fertile Crescent of the Near East, where

American excavators are now probing the origins of settled existence, beneath cities over 5,000 years old.

Professor Childe is convinced that trade and specialization of industry in Europe began no later than the dawn of the New Stone Age.

"Flint was systematically mined in Belgium and southern England," he said, "and the miners must have lived by bartering their products with neighboring groups. Axes were made from a specially suitable rock at Penmaenmawr in North Wales and exported as far as Wiltshire and Astrim. But the commodities thus traded were in fact luxuries; the consuming communities could have got along without them."

The village of Skara Brae in Orkney, Scotland, which Professor Childe unearthed, reveals to a modern world that New Stone Age people could be self-sufficing, but also the penalties of isolation. These remote villagers lacked timber, but they made their furniture, even to beds and dressers, out of stone, and built relatively large huts. They neither raised crops nor hunted or fished regularly, but lived mainly by breeding cattle and sheep. No trace of imported articles has been found in this exhibit village of a prehistoric adjustment to economic problems.

VITAMIN CONTENT OF BREAD

A LOAF of white bread which has the vitamin B_1 content of a whole wheat loaf, some five times as much as ordinary white bread, was predicted to the food conference at the Massachusetts Institute of Technology by Charles Frey, Alfred Schultz and Lawrence Atkin, all of the Fleischmann Laboratories.

Vitamin B_1, or thiamin, is an important factor in nutrition, but it is not stored in the body to any significant extent and thus must be contained in basic foods. Cereal products, mainstay of the national diet, are suitable for this, but these products, especially bread, have been increasingly deprived of their natural vitamin content in recent years.

The problem of restoring this loss, sometimes as great as ninety-three per cent., has been tried along many lines, but the latest and most practical employs a new yeast. This yeast contains enough thiamin to produce a loaf of white bread with the vitamin content of a whole wheat loaf, but without any loss of palatableness. Although made by a new process, the yeast offers no new technical problems since its baking properties have not been altered. Possibility of such a loaf at a low cost increase would be a boon to low income groups.

Research aimed at irradiating yeast to convert its natural ergosterol to vitamin D and to include milk solids to supplement cereal protein and minerals in the "staff of life" were also described.

RADIO SCIENTISTS FIND HOLES IN TROPICAL STATIC

RADIO listeners plagued with the roar of summer static may find some encouragement in the results reported by Dr. G. W. Kenrick and Peter J. Sammon, of the University of Puerto Rico, to the meeting, in San Francisco, of the Institute of Radio Engineers.

Observations conducted in the tropics during the past few years have used radio direction finders of special design to locate static's origin much in the same way that we may trace the course of ships. Most of the static received in the United States in winter is found to come from Central and South America, while the instruments used are sensitive enough to detect some coming from Africa and other far-off continents.

Static fades just as the signals received on the same wave-lengths fade. Under some conditions these effects cause sudden drops in the static intensity usually at periods near sunrise and sunset. At the University of Puerto Rico, automatic recorders measure this static intensity day and night, and Dr. Kenrick showed examples indicating a sudden drop in static intensity persisting for minutes or even hours. Examples were also shown of use of static to study the path of hurricanes which may sometimes be traced by associated atmospherics. It was pointed out, however, that this static was usually feeble compared to that originating in thunderstorms in the tropical Americas and, during summer, in the United States.

Dr. Kenrick also showed results obtained in his studies of radio signal intensities and the upper atmospheric layers responsible for long distance radio. In the tropics these layers behave differently than in the North, but despite the small changes in temperature found in Puerto Rico, signal changes due to this radio roof seem even greater than in the rigorous climate of the northern United States.

ITEMS

THE average person grows up a trifle lopsided, with a right arm bigger than his left. Comparatively few children or adults with equal-sized right and left arms were found, when Professor Clarence R. Van Dusen, of the Michigan State College, measured arms of nearly 100 small children and 77 grown-up college men. While the right is most likely to be longer, sometimes bigger left arms were found. So far as full length of arm goes, children are more apt to have longer right arms than adults, Professor Van Dusen says in a report to *Human Biology*. In adults the more frequent occurrence is a bigger right forearm, that is, longer, wider with the palm broader. The use that a right arm gets in every-day living may play some part in one-sided development. But Professor Van Dusen considers it probable that a tendency toward a mightier right may be a normal growth process attributable to heredity.

JAWBONE and shoulderblade of a small mammal that lived during the Age of Dinosaurs have recently been found in a coal mine in South Manchuria, and are described by H. Yabe and T. Shikama in a report to the Imperial Academy at Tokyo. The creature must have been quite small, no larger than a squirrel, for the jawbone is only a little more than an inch long. The teeth are primitive and simple in structure, from which circumstance the animal has been named *Manchurodon simplicidens*. The stratum in which the fossils were found belongs to the Jurassic geologic period, with an age estimated at between 120 and 150 million years.