SCIENCE NEWS

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COSMIC RAYS

COSMIC rays do not bombard the earth with equal intensity from all directions, but their strength increases with the distance north and south of the earth's equator, Dr. A. H. Compton, of the University of Chicago, will report in the forthcoming issue of the *Physical Review*, the journal of the American Physical Society.

This is the first report from an extensive world-wide survey during which many physicists are making observations in remote localities. Dr. Compton transmitted this initial report from the Tasman Sea, during travel to new observing stations after research at Hawaii, New Zealand and Australia.

The definite differences in the intensity of the cosmic rays at different latitudes shown by Dr. Compton's report are likely to upset present ideas of the origin and nature of the cosmic radiation. Dr. Robert A. Millikan, of the California Institute of Technology, has consistently found that the intensity of the cosmic radiation is independent of the latitude at which the observations are made. Dr. Compton's report does not confirm Dr. Millikan's findings. Dr. Millikan has suggested that the cosmic rays may be due to the synthesis of heavy elements out of hydrogen and helium in the depths of the universe. This theory is based upon his findings that cosmic radiation bombards the earth equally from all directions.

Dr. Compton reports that so far as the measurements have gone they indicate "uniform variation with latitude, showing a minimum at or near the equator and increasing intensity toward the north and south poles." At sea-level, the difference between intensity at latitude 45 degrees and zero degrees is roughly 16 per cent., whereas at an elevation of 9,000 feet the difference is about 23 per cent. This would indicate, Dr. Compton says, that it is the least penetrating part of the cosmic rays which varies most rapidly with latitude. No significant variations with longitude have been noted. Observations recorded in Dr. Compton's report include those made from Mount Evans in this country, from the Jungfraujoch in Switzerland, as well as the measurements made by Dr. Compton and associates during this present extensive trip.

DOUBLE WEIGHT HYDROGEN ATOMS

A PLENTIFUL supply of newly discovered double-weight hydrogen atoms exists in the apparatus used commercially to break down water into oxygen and hydrogen gases by passing electricity through it. This has been determined through joint research by Dr. E. W. Washburn, of the National Bureau of Standards, and Dr. Harold G. Urey, of the department of chemistry of Columbia University.

The existence of a hydrogen isotope of atomic weight two, twice the ordinary hydrogen atom of mass one, was discovered last year by joint research between the same two institutions. This was hailed as an important development bearing upon the constitution of matter and the way in which elements are distributed in nature.

Ways of separating the heavier atoms of hydrogen, which are relatively rare, from the light atoms of hydrogen, which are plentiful, were investigated. It was recognized that when hydrogen gas is formed by electrolysis of water, the two kinds of hydrogen atoms or ions do not have an equal chance to get into the hydrogen gas that is formed. The heavy, or double-weight, hydrogen atoms would be likely to be held back in the water, while the lighter isotope one hydrogen would be most likely to pass off.

To test this theory of the concentration of isotope two hydrogen, a water electrolysis experiment was begun at the Bureau of Standards. This test is not yet complete. But it was possible to take advantage of water electrolysis processes operated commercially over a period of a year by plants producing oxygen and hydrogen gas for industrial use. As every schoolboy knows, water consists of two parts hydrogen and one part oxygen, and electricity breaks it up into the two gases. Residual water from two such plants was broken down into hydrogen and oxygen gases at Columbia University and examined with the spectroscope. As was expected, larger amounts of the isotope two hydrogen were found than of the isotope one variety.

Plans are under way for the concentration of large quantities of the double-weight hydrogen from the old water of electrolysis plants in order that this unusual kind of hydrogen may be thoroughly investigated.

DEATHS FROM PELLAGRA

DEATHS from pellagra, often called the "hard-times disease" because it is caused by a typical hard-times diet which lacks certain vitamins, have, surprisingly, decreased during the recent hard times. A decline in the pellagra death-rate during 1930 and 1931 is reported in the forthcoming *Statistical Bulletin* of the Metropolitan Life Insurance Company.

Figures of the U. S. Public Health Service for forty-two states also show a decline in pellagra deaths during these two years. Public health officials point out, however, that patients do not usually die of pellagra during the first or second year they have the disease. Consequently many cases may have developed within the last year or so which have not yet shown up in the mortality figures. Likewise, more is known about how to prevent or to treat the disease now than during previous "hard times." For example, several state health departments in the South are distributing free yeast, which is one good preventive of pellagra.

"The facts do not show that the higher mortality rates always come when business is at a low ebb," the insurance company's statisticians point out. The pellagra death-rate declined during the World War when employment was general and high wages prevailed. After 1924, when the lowest death-rate for the twenty-one-year period

from 1911 to 1931 was recorded, the pellagra deaths began increasing.

"But in 1930 and 1931, in the face of wide-spread economic disturbances, deaths from pellagra declined quite in line with the general death-rate," the report concludes.

Pellagra may be prevented by vitamin G, found in fresh lean meat, milk, yeast and certain vegetables. Except for yeast, these are expensive foods and among the first to be dropped from the diet when finances run low. The typical hard-times diet of the poor in the South, meal, molasses and salt pork, is entirely lacking in the anti-pellagra vitamin.

Digestive and nervous disturbances, skin irritations, extreme weakness, convulsions and even insanity are characteristic of the disease.

ELECTRICALLY INDUCED FEVER

THE growth of radiothermy, the new method of treating disease by electrically inducing fever in patients, was described by Dr. Willis R. Whitney, director of research for the General Electric Co., before the International Electrical Congress at Paris.

Dr. Whitney called radiothermy one of the newer applications of the vacuum tube. Radio broadcasting is only one use for the principles involved in the generation of an electromagnetic field from vacuum tubes.

"Tubes of the radio type can be used to produce electromagnetic waves as long as 1,000 meters and as short as one ten-thousandth of a meter," he said. "It is not difficult to believe that within this range invisible assets await only further research to disclose them."

The treatment of arthritis, boils and carbuncles by radiothermy was named as an application of this method. Radio heating has also been substituted for malaria, which was given paresis patients to induce a curative fever in them.

In the beginning of the research to find out what the high frequency waves could be used for, first liquids, then jellies and finally insects and animals were used instead of human patients.

"Small insects, such as fruit flies, when submitted to fields of a few watts of radio energy, apparently died instantaneously," Dr. Whitney said, "and the deposition of moisture from their bodies on the walls of the tube near them indicated that death was due to overheating. When the same insects were exposed to the field in the dormant condition produced by a surrounding temperature of zero degrees Centigrade, it was possible by careful manipulation to revive them and to make them fly about in zero air exactly as though midsummer temperatures prevailed."

ITEMS

IN spite of wide-spread unemployment and wage reductions, 1932 has been so far "the best of all health years" for a large section of the industrial population of the United States and Canada. Health conditions from the first of the year to the end of May have been better than ever before for the same period of the year, statistics collected by the Metropolitan Life Insurance Company show. During this period the death-rate among the company's industrial policy-holders reached the unprecedentedly low figure of 9.2 per 1,000. The death-rate for May alone was 8.5 per 1,000, the lowest, with the exception of May, 1931, ever recorded for this month. The low rates are due chiefly to large drops in the death-rates for three important diseases, tuberculosis, pneumonia and influenza.

MILLIONS of years ago California and Oregon were forested with trees unlike those now found there. A Carnegie Institution of Washington expedition has found on the slopes of the Venezuelan Andes the living close relatives of ancient trees of western America. Professor Ralph W. Chaney, of the University of California, and Dr. Erling Dorf, of Princeton University, by traveling into South and Central America were able to see a picture of what the ancient forests of America's west coast must have looked like millions of years ago before there were human eyes to see them. Their discovery upholds the theory that forests that once existed in North America were pushed south as the climate became increasingly cold and dry.

THERE is an island in the Kara Sea, north of the line where Europe and Asia join. Professor V. Vyse, Russian geographer, has made this declaration as the result of his studies of data on water temperatures, ice drift, bottom contours and other phenomena brought back by the Soviet ice-breaker *Sedov*. This is not Professor Vyse's first prediction of this kind. Before the *Sedov* exploratory cruise in 1930, he based a similar declaration on similar data for another location; and the island was found there as he said it would be. It was named Vyse Island, in his honor.

COMPETITION with the cork oak, classic cork-producing tree of southwestern Europe, may be offered by the "velvet tree," native to wastelands in Japan, China and Russian Asia. Professor E. E. Kern, of the Institute of Plant Industry, has been investigating its possibilities, and finds that though the cork it produces will not do for bottle stoppers, it is quite satisfactory for insulation and other purposes. The tree belongs to the same botanical family as the citrus fruits. It is known as Phelodendron, which is Greek for "cork tree." It reaches a height of about fifty feet, and attains an extreme age of 300 years. Cultivation improves the quality of its corky bark.

DIFFERENT butterfly species seem to have their own individual taste in perfume. The perfume exuded by the scent scales of common American species of butterflies covers a wide variety of delightful odors resembling some of the more fragrant flowers, according to a report by Austin H. Clark just issued by the Smithsonian Institution. Sandalwood, red clover, milkweed, crushed violet stems, dried sweet grass, violets, musk, mignonette, and sweet briar are among the flower fragrances imitated by the butterflies. Unlike fashions in the human world, it is the male who wears the perfume. Females of the same species whose males exude the delicate pleasant odors give off a powerful nauseating smell.