SCIENCE NEWS

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SOME ADVANCES IN THE SCIENCES DURING 1931

Physics

A SUCCESSFUL though inefficient method of tapping the energy of the atom nucleus to obtain synthetic cosmic rays was discovered by Dr. W. Bothe and Dr. H. Becker, of the University of Giessen, Germany, who bombarded metallic beryllium of atomic weight nine with alpha rays to obtain carbon atoms of atomic weight thirteen and of less energy.

The energy of the mysterious inner core of the atom is probably in quanta, or definite small amounts or parcels, just as it is on the outside, Drs. J. C. Chadwick, J. E. R. Constable and E. C. Pollard, of the University of Cambridge, discovered through a bombardment of atom nuclei with fast moving alpha particles from polonium.

X-rays can be made to produce a weak radioactivity in lead, causing its atoms to fly to pieces in a manner similar to the disintegration of spontaneously radioactive radium, according to experiments made by Professor G. I. Pokrowski, of Moscow.

New evidence for the theory that even atoms behave as though they were immaterial waves was secured when Dr. Thomas H. Johnson, of the Franklin Institute, Philadelphia, fired a stream of hydrogen atoms at the surface of a crystal of lithium fluoride and by observing the spread of the reflected atoms measured their wave-length.

Construction of a high voltage generator which it is hoped will generate as much as 20,000,000 volts to be built up through the use of static electricity on silk belts was begun by Dr. Robert J. Van de Graaff, of Princeton and the Massachusetts Institute of Technology, who completed a model giving 1,500,000 volts.

A verification of the famous Michelson-Morley experiment was performed at the Zeiss works at Jena by Dr. G. Joos, showing no ether drift through the atmosphere because of the motion of the earth.

A unification of the laws of gravitation and those of electromagnetism into a single mathematical theory, based on the famous "principle of least action," was proposed by Professor Cornelius Lanczos, of the University of Frankfurt.

An X-ray tube built to withstand voltages as high as 2,600,000 was made of alternate rings of paper, rubber and aluminum by Drs. F. Lange and A. Brasch, of the University of Berlin.

Dr. Gustaf Stromberg, of the Mount Wilson Observatory, demonstrated that light which has been on its way from the distant nebulae for some 70 million years is still traveling at the same speed as does light on the earth.

Tracks made by cosmic rays in a cloud of vapor were made visible by Dr. L. M. Mott-Smith and G. L. Locher, of the Rice Institute, Texas, who conclude from a study of the paths that the rays must be composed of bullet-like particles.

The completion of what is probably the world's most powerful microscope, capable of magnifications up to 17,000 diameters, was announced by Dr. Royal Raymond Rife, of San Diego.

Helium was turned from a gas into a liquid for the first time in the United States by a group of physicists at the National Bureau of Standards which included Dr. H. C. Dickinson, Dr. F. G. Brickwedde, W. Cook, R. B. Scott and J. M. Smoot.

A new theory which supplements the science of thermodynamics in fitting it to unexpected fluctuations at variance with the regularities covered by the second law of thermodynamics, was proposed by Professor G. N. Lewis, of the University of California.

The rate of expansion of the universe was derived from the fundamental equation of the modern quantum theory by Sir Arthur Eddington, British astronomer, who thus linked the size of the universe and the mass of the electron and made the reality of the astronomically observed recession of the nebulae more plausible.

X-rays were produced without the use of X-ray tubes by M. G. Reboul, of the Physics Laboratory, Montpellier, France, by driving electric currents through solids like magnesia, alum and yellow oxide of mercury, which have high electric resistance.

A computing machine for solving complex mathematical problems in the form of differential equations was made by Professor V. Bush, of the Massachusetts Institute of Technology.

Evidence that electrons move about at high speeds in solid bodies was obtained by Dr. Jesse W. M. DuMond and Dr. Harry A. Kirkpatrick, of the California Institute of Technology, through use of the Doppler effect.

An extension of the uncertainty principle to past events was announced by Professor Albert Einstein, Professor Richard C. Tolman and Dr. Boris Podolsky.

That the universe may be contracting and expanding in cycles of many millions of years without running the risk of a heat death through the operation of the second law of classical thermodynamics was indicated by studies on model mathematical universes by Dr. Richard C. Tolman, of the California Institute of Technology.

A gigantic burning glass, made of nineteen lenses each two feet in diameter and nineteen smaller ones, was designed by Dr. John A. Anderson, of the Mount Wilson Observatory, and Russell W. Porter, to concentrate the energy of the sun's rays as much as 200,000 times so that a temperature of nearly 10,000 degrees Fahrenheit may be obtained.

A new laboratory for the study of magnetic forces at low temperatures was added to the University of Cambridge, England, as the gift of the Royal Society of London.

Astronomy

A brilliant display of Leonid meteors, greater than any shower since the famous one of 1866, was observed in

November of this year; astronomers predict another great shower in 1932.

The largest American-made telescope mirror, 69 inches in diameter, third largest in the world, was completed for the Perkins Observatory, from a two-and-a-half-ton glass disc cast at the National Bureau of Standards, Washington, ground to a curve correct to a millionth of an inch by J. W. Fecker, of Pittsburgh.

A new record for apparent heavenly speed was discovered by astronomers at the Mount Wilson Observatory when they found a faint nebula seemingly receding from the earth at more than eleven thousand miles per second.

At the Harvard College Observatory it was found that the Large Magellanic Cloud contains some 214,000 stars, each at least 100 times as bright as our sun, along with a gaseous nebula so brilliant that about 15,000,000 suns would be required to rival it.

The tiny planet or asteroid, Eros, which paid its closest visit to the earth, reaching a point only 16,200,000 miles away, was found by astronomers at the Union Observatory, Johannesburg, South Africa, to be shaped like a long spindle.

The star Antares was observed as a disc, not as the point of light that a star usually presents, when Professor K. Nakamura, of the Kwasan Observatory, Kyoto, Japan, watched it reappear from behind the moon at occultation on January 15.

The star known as xi Ursae Majoris, in the Great Bear constellation, which appears to the naked eye as a single body, is in reality four bodies, arranged in two pairs. This was discovered by Louis Berman working at the Lick Observatory.

The greatest double star yet measured, 184 times as massive as the sun, was described by Dr. J. A. Pierce, Dominion Astrophysical Observatory, Victoria, B. C.

A variable star which flashes out brightly every 100 minutes, the most rapidly flashing star known to astronomers, was discovered by H. van Gent, of the Leyden Observatory, Holland, working at the Union Observatory, Johannesburg, South Africa.

Five eclipses, three of the sun and two of the moon, occurred during the year, none of particular scientific interest.

The weight of Neptune's satellite was calculated by three Mount Wilson Observatory astronomers—Dr. Seth B. Nicholson, Dr. Adrian van Maanen and Howard C. Willis—as not greater than one tenth or less than four one-hundredths the earth's mass.

Sun-spots were few in number this year as the sun approached the minimum of the 11-year cycle; long-distance radio reception was proportionately improved.

Observation of the sun's corona, without the aid of an eclipse, with the use of a very sensitive polarimeter was reported by M. B. Lyot, astronomer at the Meudon Observatory, near Paris.

Twenty years of research on the relation between solar radiation and weather on the earth were summarized by Dr. C. G. Abbot, indicating a possibility of future long-range forecasting of weather.

The height of the Aurora Borealis was measured by Professor J. C. McLennan, Dr. Hugh Wynne-Roberts and Dr. H. J. C. Ireton, of the University of Toronto, and found to be only 50 to 75 miles from the ground.

An amateur astronomer, Masani Nagata, a foreman in a California melon patch, discovered with the aid of a small telescope a comet which was subsequently named after him.

A new comet, so bright that it might have been found with the naked eye, was discovered by Percy M. Ryves, an English amateur astronomer at Zaragoza, Spain.

Neujmin's comet made its first return to the neighborhood of the earth, and was the second one of Saturn's "family" of comets to be observed more than once.

Encke's comet, returning to the neighborhood of the sun on its regular visit which it makes every three and one quarter years, was observed photographically, June 21, by Señor Bobone, of the Cordova Observatory, Argentina.

Chemistry

Discovery of the last missing chemical element, ekaiodine, number 85, was announced by Professor Fred Allison, Edgar J. Murphy, Professor Edna R. Bishop and Anna L. Sommer at the Alabama Polytechnic Institute, who used the same method in claiming detection of element number 87 a year ago.

Discovery of element 87 was claimed by Professor Jacob Papish and Eugene Wainer, of Cornell, who used the x-ray spectrograph.

Hydrogen atoms twice as heavy as, but otherwise identical with, ordinary hydrogen atoms, were detected by Professor Harold C. Urey and Dr. G. M. Murphy, of Columbia, and Dr. F. G. Brickwedde, National Bureau of Standards.

Commercial production of a new synthetic rubber-like substance, with grease-resisting properties, was begun by the E. I. du Pont de Nemours and Company. Acetylene, formed from calcium carbide, is combined with hydrochloric acid and polymerized to give chloroprene.

Dr. Fred Allison and Edgar J. Murphy, of the Alabama Polytechnic Institute, discovered in using magneto-chemical analysis, that gold, platinum and five other chemical elements are mixtures of atoms chemically the same but different in weight.

"Autosynthetic cells" which resembled closely living matter were produced in the laboratory by Dr. George W. Crile, of Cleveland.

Mechanical molecule models which enable the chemist to observe visually vibrations like those of the atoms and thus to obtain information regarding the motions were constructed by Dr. C. F. Kettering, director of the General Motors Research Laboratories, Professor D. H. Andrews, of the Johns Hopkins University, and L. W. Shutts.

A rich deposit of pitchblende, at LaBine Point on the Great Bear Lake of Canada, bearing probably $7,000 worth of radium to the ton, was found by Gilbert LaBine and Shirley R. Cragg.

A new essential to life, in addition to the twenty amino acids known as the chemical building blocks of necessary food proteins, was found in the casein or protein of milk by Dr. W. C. Rose, of the University of Illinois.

That the chemical para-ethoxy-phenyl-thio-carbamide is intensely bitter to some persons, but tasteless to others was discovered by Dr. Arthur L. Fox, du Pont chemist. Professor L. H. Snyder, of the Ohio State University, and Dr. A. F. Blakeslee, of the Carnegie Institution of Washington, working independently, found the "taste blindness" to para-ethoxy-phenyl-thio-carbamide to be a recessive hereditary trait.

Amylase, a digestive ferment of the pancreas that acts on the starch in foodstuffs and makes it available for the energy needs of the body, was isolated in pure crystalline form by Professor H. C. Sherman, of Columbia University, and his two associates, Professor M. L. Caldwell and L. E. Booher.

A crystalline form of vitamin D, called "calciferol," was prepared by a group working at the National Institute for Medical Research, London.

Protein crystals of great digestive power were isolated from trypsin, a digestive ferment secreted by the pancreas, by Drs. John H. Northrop and M. Kunitz, of the Rockefeller Institute for Medical Research, helping to clear up the mystery of the chemical mechanism of digestion.

Methyl, the atomic grouping found in poisonous wood alcohol, was isolated as a free radical for a small fraction of a second by Professor F. Paneth and W. Hofeditz, of the University of Königsberg, Germany.

Sir Robert Hadfield, father of modern alloy steels, found that analyses of seventy-nine specimens of steels and alloys belonging to Michael Faraday show that Faraday anticipated present developments of stainless and other special alloy steels.

Geology and Geography

Two severe droughts occurred in the United States during 1931; the northwest part of the country had the driest growing season on record, but later the drought moved to the southeast and that part of the country had the driest fall on record. The upper Mississippi Valley, however, had the wettest fall on record, the rainfall for November being 300 per cent. of normal.

The year 1931 was the warmest throughout the United States ever known to the U. S. Weather Bureau officials.

The ice season in the North Atlantic was the most extraordinary ever recorded by the U. S. Hydrographic Office, as up to June 11 no icebergs were sighted south of latitude 48 in the waters of the eastern slopes of the Grand Banks.

Five destructive hurricanes took toll during the year.

Seismological reports of fifty-four earthquakes were collected and epicenters located by *Science Service* in cooperation with the U. S. Coast and Geodetic Survey and the Jesuit Seismological Association; these included eleven destructive shocks of which five were severely destructive in populated regions of Mexico, Jugoslavia, the Balkans, Nicaragua and Transcaucasia.

A rock fall changed the familiar contours of Niagara Falls.

The age of the earth is at least two thousand million years, a National Research Council committee estimated by reviewing evidence given by radioactive minerals.

The world's largest meteorite yet discovered, a mass of iron and nickel weighing some seventy to eighty tons and measuring nearly fourteen feet long, was reported found by a Johannesburg land surveyor in the Tanganyika region of Africa.

One of the largest mastodons ever discovered in America was found near Cromwell, Indiana, by a ten-year-old boy, Donovan Harper, when he stubbed his toe over one of the molar teeth which weighed eight and one fourth pounds.

The world's first complete collection of skeletal remains of the Plesippus, a little-known ancient horse living more than a million years ago was unearthed in Idaho by Normal H. Boss, of the U. S. National Museum.

Fossil plants on St. Lawrence Island are direct evidence that the island is a fragment of the old land bridge which presumably linked Asia and America long ago, it was reported by Dr. Ralph W. Chaney, of the Carnegie Institution of Washington.

The Trans-Asia Expedition, led by Georges-Marie Haardt and using tractors in transportation, pushed its way from Beirut into Chinese Turkestan.

The giant airship *Graf Zeppelin*, under the command of Dr. Hugo Eckener, made a flight over the Arctic region, changing Arctic maps.

Engineering

The George Washington bridge across the Hudson River, a suspension bridge containing the longest clear span in the world, 3,500 feet, was completed.

Two steel arch bridges, the largest of their kind in the world, were completed this year—one, the Bayonne bridge across the Kill Van Kull and connecting Staten Island with New Jersey, is 1,652 feet one inch long; the other, the Sydney harbor bridge in Australia, is 1,650 feet.

A natural gas pipe line nearly 1,000 miles long was completed from Texas to Chicago.

A new ribbon type of microphone, which will exclude the grind of a camera and pick up only the desired sounds, was introduced by Harry F. Olson, of R. C. A. Photophone.

The Diesel engine was adapted to a racing automobile by C. L. Cummins, of Columbus, Indiana, in a car that would burn crude oil and would run at 100 miles per hour for 1,200 miles without refueling.

The final design was accepted and construction was begun on a hydraulic laboratory for research on floods, dam construction, irrigation and other hydraulic problems at the National Bureau of Standards.

The invention of a new rotor type of windmill, which will harness the power of the moving air, ventilate buildings, generate power from the tides and draw smoke from stubborn chimneys, was announced by S. J. Savonius, of Helsingfors, Finland.

Stroboscopic motion pictures enabling one to see photographs of rapidly whirling machinery as though it were moving at a visible rate were made.