SCIENCE NEWS

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SCIENCE REVIEW OF THE YEAR

Physics

A NEW value for the atomic weight of hydrogen at 1.0081 instead of 1.0078 was determined by Professor M. L. E. Oliphant, A. E. Kempton and Lord Rutherford, at the Cavendish Laboratory, University of Cambridge, on the basis of atomic bombardment experiments.

By squeezing materials with pressures as high as a million pounds to the square inch while twisting them, Professor P. W. Bridgman, of Harvard University, is duplicating in the laboratory some conditions found within the earth which may account for the synthesis of strange compounds at ordinary temperatures.

The National Advisory Council on Applied Physics was formed to promote the wider use of physics in industry.

Preliminary stages of a new theory of physics which will link relativity with the quantum theory in explaining atom happenings were devised by Professor Albert Einstein and Dr. N. Rosen, of the Institute for Advanced Study at Princeton, N. J.

Controversy continued over the new theory of relativity announced by Sir Shah Sulaiman, Indian justice and mathematician, which seeks to link the concepts of Newton and Einstein; criticism was advanced by D. R. Hamilton, Princeton mathematician, and the critique in turn was challenged by Sir Shah.

General agreement among scientists that a considerable amount of the incoming cosmic radiation is of an electrified particle nature was announced during 1935, but whether the initial rays are chiefly photons or particles is still a topic of debate.

A new yardstick for measuring the earth's velocity, relative to the rest of the universe, may be the variation in cosmic ray intensity, according to a theory advanced by Professor Arthur H. Compton, University of Chicago.

The magnetic field of the earth is lopsided, Dr. R. A. Millikan and H. Victor Neher, California Institute of Technology, determined from a precision sea-level survey of cosmic ray intensities made on ten different ships sent on voyages all over the world. Professor M. S. Vallarta, Massachusetts Institute of Technology, gave a theoretical interpretation of this phenomenon.

High altitude experiments on Mexican mountain tops gave Dr. Thomas H. Johnson, Bartol Research Foundation, further verification for the concept that the earth has a magnetic shadow.

Important observations of cosmic rays were made at the top of Pike's Peak by Drs. C. D. Anderson, R. A. Millikan and S. H. Neddermeyer.

A new explanation of the origin of cosmic rays which considers the rays as free particles in space which have been increasingly accelerated on their unimpeded journey to measurement on the earth was announced by Professor E. A. Milne, Oxford University, England.

By a technique comparable with determining a hurricane's force by the amount a ship might be blown off its course, Professor W. F. G. Swann and Dr. W. E. Danforth, Bartol Research Foundation, are using cosmic rays to study the strength of magnetism within a magnet.

By bombarding the light element lithium with protons, Professor C. C. Lauritsen and coworkers, California Institute of Technology, produced 16,000,000 electron volt gamma rays, six times as piercing as the strongest of those produced by natural terrestrial sources.

Synthetic radiosodium, hailed as a possible substitute for radium in the treatment of cancer by radiation therapy, was made in increased amounts by Professor E. O. Lawrence, University of California.

A giant x-ray tube for use with the great 7,000,000 volt electrostatic generator is being developed by Professor Robert Van de Graaff, of the Massachusetts Institute of Technology.

Using a vacuum rotor, Dr. J. W. Beams, University of Virginia, created forces 7,000,000 times as great as gravity for use in separating isotopes.

Evidence that the base of the stratosphere varies from 4.7 miles to 7.5 miles above the earth within a day was obtained by sounding balloon investigations carried on by investigators of the Massachusetts Institute of Technology at St. Louis, Mo.

Samples of the air 13 miles above the earth were obtained by the stratosphere balloon *Explorer II* and in England with smaller sounding balloons.

Three-dimensional x-ray pictures were produced by Dr. O. Russo, State Roentgen Institute, Moscow.

Further research on rockets at Clark University indicated a way to permit rocket flight in the stratosphere without the necessity of carrying liquid to burn the rocket fuel.

A new record for the "coldest cold" was set at only five one-thousandths of a degree above absolute zero by Professor W. J. De Haas, University of Leyden.

That temperatures of 1,700 degrees Fahrenheit 150 miles above the earth are needed to explain the results of radio reflection experiments from the ionized layers there, was found by Professor E. V. Appleton, University of London.

Another radio reflecting layer high above the earth at an altitude of 35 miles, called the D layer, was discovered by the Indian scientist, Mitra P. Syam.

High velocity air currents in thunderstorms help to produce lightning by separating positive and negative ions in the atmosphere; found by Dr. Ross Gunn, Naval Research Laboratory.

Enormous voltages are not necessary to lightning, according to high speed photographs taken by Drs. B. F. J. Schonland, D. J. Malan and H. Collins, of South Africa, who note the stroke proceeds by series of steps.

A new instrument developed by Dr. Harry H. Hall, Cruft Laboratory, Harvard University, analyzes the quality of sound in four seconds instead of several days as required by older methods.

A world-wide survey of natural radioactivity was proposed by Dr. V. I. Vernadsky, USSR Academy of Sciences, as an aid in determining the distribution of rocks of various geologic ages and in locating helium deposits.

A new type of alternating current bolometer for measuring minute amounts of radiation, which overcomes the handicaps of sensitive galvanometers used previously, was developed by Professor P. H. Moon, of the Massachusetts Institute of Technology.

Chemistry

The heavy isotope of neon, mass 22, was concentrated to 99 per cent. purity by Dr. Gustav Herz, of Berlin.

Work by Professor F. W. Aston, University of Cambridge, has indicated some 20 new isotopic varieties of chemical elements, bringing the total number of known isotopes to 247 stable varieties among 79 of the 92 elements.

First definite proof of the existence of a super-heavy element beyond No. 92 in the periodic table was obtained by Dr. Aristid V. Grosse, University of Chicago.

With an improved mass spectrograph Professor A. J. Dempster, University of Chicago, obtained, for the first time, evidence of the existence of isotopes of gold and platinum.

Because atomic weights depend on the proportions of the various isotopes of the element present, further work in this once-important chemical field was held useless by Professor Harold C. Urey, Columbia University.

By "boiling down" 75 tons of water over a period of a year, ten drops of precious liquid containing a high concentration of the rare hydrogen isotope of mass three was obtained at Princeton University.

Heavy water, made of ordinary hydrogen combined with the heavy isotope of oxygen, was announced by J. B. M. Herbert and M. Polanyi, University of Manchester, England.

Using heavy water molecules as "tracers," Professor George von Hevesy and E. Hofer, of the University of Freiburg, Germany, showed half the amount of any drink of water is still in the human body after nine days.

Evidence of "lost" chemical elements no longer present on the earth was found by Professor George H. Henderson, Dalhousie University, Halifax, from study of halos in mica formed by radioactivity.

New discoveries about the chemical structure of vitamin B, by Dr. R. R. Williams and his coworkers at Columbia University led to hope that it may be synthesized.

Huge reserves of carbon dioxide gas, from which "dry ice" is made, were discovered near Imperial Valley in California.

A chemical method of plasticizing rubber in place of more expensive mechanical chopping and crushing was developed by Ira Williams and C. C. Smith, E. I. du Pont de Nemours and Company.

A new process of purifying potash, developed by chemists of the U. S. Bureau of Mines, holds the hope of freeing America from the necessity of potash imports in event of war.

A mixture of di-phenyl and di-phenyl oxide, chemical cousins of the synthetic geranium perfume, is being used to replace water in steam boilers for increased efficiency, as reported by C. G. Brown, G. A. Gaffert, P. H. Konz and D. S. Ullock, University of Michigan.

Astronomy

Nova Herculis, the star that flared up to extraordinary brilliance, just before Christmas, 1934, was studied intensively, while it remained visible to the unaided eye until April, then it faded, and later became brighter again.

A new outpost of the universe, a faint nebular galaxy of stars, three sextillion miles (500,000,000 light years) from earth, with recession velocity of 50,000 miles per second was discovered at Mount Wilson Observatory.

Professor I. S. Bowen, California Institute of Technology, brought forward clear proof of how the formerly mysterious nebulium lines are practically all radiations of very common elements excited in peculiar but now understandable ways to emit radiations that they do not emit under conditions existing at the earth's surface, thus finally resolving an 80-year-old enigma.

Electronic tides high in the atmosphere, supposedly caused by the moon, were investigated through effects on radio by Dr. Harlan T. Stetson, Harvard College Observatory.

X-rays from the sun that never reach the earth were deduced from radio observations by Dr. Ernst A. W. Müller, Siemens Halske Co., Berlin.

Cosmic rays were suggested as the cause of the night light of the sky by Dr. Joseph Kaplan, University of California at Los Angeles.

An age of 10,000 billion years for the universe was estimated by Sir James Jeans, British astronomer.

Streamers from the sun for distances up to 500,000 miles were discovered by Dr. Philip C. Keenan, Yerkes Observatory, and called signposts to sun-spots.

A peculiar radio disturbance in the illumined part of the earth every two revolutions of the sun was noted by Dr. J. H. Dellinger, of the National Bureau of Standards.

Discovery of a dwarf star that may be one of the sun's half dozen nearest neighbors was made by Dr. W. J. Luyten and E. G. Ebbighausen, University of Minnesota.

Omega Centauri, one of the most renowned of all globular clusters, was found to be three times as large as previously estimated, as a result of measurements by Drs. Harlow Shapley and A. R. Sayer, Harvard University.

An expansion-speed of the universe, which nearly doubles previous values, was deduced by Sir Arthur Eddington.

Thousands of faint galaxies in the Horologium region were located by Dr. Harlow Shapley of Harvard Observatory.

The properties of transmutations suggest that the internal temperatures of stars are 1,000,000,000 degrees Centigrade, Dr. T. E. Sterne, Harvard, computed.

Solar activity increased and the largest sun-spots groups in five years were observed.

The world's second largest stony meteorite, 700 pounds, was found in southwestern Kansas.

New comets were discovered by Professor G. Van Biesbroeck, Yerkes Observatory, and by Drs. Cyril Jackson and E. L. Johnson, Johannesburg, South Africa.

An asteroid with large eccentricity and high angle of orbit, with period of revolution around the sun of six years, was discovered by Dr. Edwin P. Hubble, Mount Wilson Observatory.

Hidalgo, little object that looks like an asteroid and travels like a comet, was rediscovered.

Comas-Sola comet was rediscovered by Dr. Hamilton M. Jeffers, Lick Observatory.

Dunlap Observatory of the University of Toronto, with a 74-inch diameter reflecting telescope, world's second largest, was completed.

A new telescope mirror shaping method using aluminum deposition was developed by Dr. John Strong and Professor Enrique Gaviola, California Institute of Technology.

Hayden Planetarium of the American Museum of Natural History was opened.

Casting and annealing of the disk for the mirror of the 200-inch diameter telescope of California Institute of Technology was completed at Corning, N. Y.

Dome of the McDonald Observatory on Mount Locke, Texas, joint project Universities of Texas and Chicago, was completed.

An aluminum instead of a silver coating was given the mirror of the 100-inch telescope on Mount Wilson.

The International Astronomical Union met at Paris.

Astronomical results were published in Turkish for the first time.

Earth Sciences

The entire northeastern part of the United States felt, on November 1, an earthquake that centered near Lake Nipissing, in northern Ontario.

A series of destructive earthquake shocks damaged Helena, Mont., during the last ten days in October.

A local earthquake was felt at the Grand Canyon of Arizona on January 15.

A total of 25 earthquakes was recorded by seismographs in the United States.

Disastrous earthquakes, killing thousands of people, visited Formosa a few days before Easter, and northern India on May 31.

Correlation between the position of the moon and the occurrence of deep-focus earthquakes was demonstrated by Professor Harlan T. Stetson, working at Harvard College Observatory.

Mauna Loa, Hawaii's loftiest active volcano, erupted a stream of lava on November 23, but caused only minor damage.

Vesuvius was in eruption, emitting streams of lava.

A volcanic crater in the Pinacate region in Sonora, Mexico, just across the U. S. boundary, was reported in eruption in January.

An expedition of the Carnegie Institution of Washington studied volcanoes in Central America.

The U. S. Weather Bureau's hurricane service was reorganized, with three stations at San Juan, P. R., Jacksonville, Fla., and New Orleans, La.

A total of 5 hurricanes was recorded from southern waters.

Florida was twice swept by destructive hurricanes.

The record-breaking Great Drought apparently ended; precipitation decidedly above normal caused serious delays both in spring planting and in fall harvesting; and there were serious floods on some of the Plains rivers.

Dust storms again raged in the west, during early spring.

A persistent fog over almost the entire east and midwest held up all air traffic for nearly a week in January.

Two villages were destroyed by an ice-avalanche in northern Russia, with a loss of 88 lives.

The establishment of a central governmental map-making body, combining the work of a number of scattered bureaus, was recommended by the Science Advisory Board.

A remarkable series of educational films illustrating geological processes was made, as a cooperative enterprise of the U. S. National Park Service, the University of Chicago, and Erpi Picture Consultants, with the aid of CCC workers.

Preparations were made for digging a ship canal across northern Florida.

The Great Geyser of Iceland, prototype of all geysers, resumed eruptions, after a quiescent period since 1914.

Mysterious Easter Island and "Robinson Crusoe's Island" in the Juan Fernandez group were set aside as national parks by the Chilean government.

An expedition from the Hawaiian Academy of Science climbed Mauna Kea, the highest peak in the islands, and spent a week at its summit.

Soviet expeditions penetrated the Arctic Ocean north of Russian territory, discovering a number of islands and breaking a path through to Bering Strait.

Lincoln Ellsworth, noted explorer, made several new discoveries in Antarctica, but appeared to be lost in an attempt to cross the frozen continent by airplane.

Seismic soundings by the Byrd Expedition determined the thickness of the ice sheet over parts of Antarctica.

A large air photo map, comprising the entire state of Connecticut, was completed.

The American Geographical Society of New York completed the first of a series of Northern Labrador map sheets that embrace 5,000 square miles.

The one to one millionth map of Hispanic America by the American Geographical Society of New York, the largest mapping enterprise by a non-governmental organization, was brought to a conclusion after 15 years of work.

Addition of daily airplane flights to 15,000 foot altitude at about 20 locations allowed the U. S. Weather Bureau to combine air mass analysis with other methods of weather forecasting as recommended by the Science Advisory Board.

Mammoth and Dixon Caves in Kentucky were demonstrated to be part of the same cave complex, by Dr. E. R. Pohl, technician of the Emergency Conservation Work.

Lunar tides in the solid earth, altering the distance between Europe and America by as much as 63 feet in a year, were shown to exist by Professor H. T. Stetson, astronomer, and Dr. A. L. Loomis, physicist, working in the latter's private laboratory at Tuxedo, N. Y.

A device for taking sample cores of seabottom was developed by the Carnegie Institution of Washington, the Geological Society of America and the du Pont Powder Company.