

## SCIENCE NEWS

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## SCIENTIFIC EVENTS OF THE YEAR

*Physics*

ONE of the fundamental forces of nature—the binding energy between the cores of two hydrogen atoms—was measured by Drs. M. A. Tuve, N. P. Heydenburg and L. R. Hafstad, Carnegie Institution of Washington.

First synthesis of a naturally occurring radioactive element was achieved in atomic bombarding experiments on bismuth by Dr. J. J. Livingood, University of California.

Experimental evidence for the existence of the neutrino was found in research on cadmium, tin, indium and tellurium isotopes by Dr. Kenneth T. Bainbridge, Harvard.

Particles of 11,000,000 electron-volt energy for use in atomic disintegration experiments were produced by Professor E. O. Lawrence, University of California.

A high efficiency radio oscillating circuit said to have usefulness in television, radiotherapy, extremely high voltage x-rays and for experiments in atomic disintegration was developed by Dr. William Hansen, Stanford University.

Experiments with radio waves only six inches long which travel along hollow tubes were simultaneously announced by Dr. G. C. Southworth, Bell Telephone Laboratories, and Dr. W. L. Barrow, of the Massachusetts Institute of Technology.

A long-lived artificial radioactivity of a beryllium-aluminum alloy with a half life of at least 10 years was discovered by Dr. Edwin McMillan, University of California.

The lightest solid ever made by man or found on earth was produced in the form of a light isotope of lithium by Dr. L. H. Rumbaugh, Bartol Research Foundation.

Polaroid, a cheap polarizing transparent material which will eliminate the glare of night driving and also make possible 3-dimensional color motion pictures, was introduced by the Land-Wheelwright Laboratories of Boston.

An obsolete 130,000-pound electro-magnet at Annapolis, Md., was moved to Columbia University for use in experiments on atomic disintegration.

A small but powerful electromagnet which has produced 75,000 gauss and is capable of generating a field strength of 120,000 gauss, was reported by Dr. Francis Bitter, Massachusetts Institute of Technology.

Bearing self-recording electroscopes, small balloons released in cosmic ray experiments of Professor Robert A. Millikan, California Institute of Technology, set a new altitude record at 92,000 feet (17½ miles).

The first cosmic ray radio data obtained by small unmanned balloons of Cellophane were reported by Dr. Thomas Johnson, Bartol Research Foundation.

A new experimental check on the Einstein theory of relativity by studying the motions of binary stars was advanced by Professor Tullio Levi-Civita, University of Rome.

The human skin is more sensitive to small temperature differences than are the most sensitive thermometers, reported Dr. J. D. Hardy and T. W. Oppel, Russell Sage Institute of Pathology and New York Hospital.

Intense audible sounds were made to produce light in 14

different liquids by Dr. L. A. Chambers, University of Pennsylvania Medical School.

A fortress of science, partially underground, in which experiments on atomic disintegration will be performed, was projected by the Carnegie Institution of Washington.

To supply musicians, piano tuners and instrument makers with a standard pitch "A," the National Bureau of Standards broadcast this musical note for two weeks continuously on short wave radio.

A compact 1,000,000-volt electrostatic type generator was installed at Huntington Memorial Hospital, Boston, to produce radiation useful in cancer therapy.

Improved measurements of the magnetic moments of the proton and deuteron were made by Dr. I. I. Rabi, of the physics department of Columbia University.

New types of nuclear disintegrations produced by cosmic radiation were discovered through the investigation of Dr. Carl Anderson and Dr. Seth Neddermeyer, California Institute of Technology.

A test for tool-resisting prison bars by use of a small magnetic instrument was developed by R. L. Sanford, National Bureau of Standards.

Seven hours of treatment with intense sounds will age whiskey an amount equivalent to four years in the wood, reported Dr. L. A. Chambers, University of Pennsylvania.

A simple and rugged receiver of infra-red radiation was invented by the veteran Boston electrical engineer, Dr. Hammond Vinton Hayes.

A belated scientific finding from the 1935 stratosphere flight of Stevens and Anderson was the announcement that neutrons exist at altitudes of 12 miles in a report of Drs. L. H. Rumbaugh and G. L. Locher, of Franklin Institute's Bartol Research Foundation.

First rigorous proof of an extension of the long-puzzling "Waring problem" in mathematics was reported by Professor L. E. Dickson, University of Chicago.

New value for the charge on the electron ( $4.800 \times 10^{-10}$ ) electrostatic units was announced by Kellertrop of Upsala on the basis of improved oil drop technique, and agreeing within one part in 5,000 of the best value obtained by x-ray measurements.

First complete x-ray analysis of the atomic arrangement of an amorphous substance (glass) was obtained by Bertram Warren of Massachusetts Institute of Technology.

An absorption spectroscope capable of measuring a concentration of 1/10,000 of one per cent. of carbon dioxide in air was developed for plant growth researches by Dr. E. D. McAlister, of the Smithsonian Institution.

*Chemistry*

Artificial production by chemical methods of beri-beri-preventing vitamin B<sub>1</sub> was achieved by Dr. R. R. Williams and associates at Columbia University and the Bell Telephone Laboratories and Dr. J. K. Kline, of Merck and Co.

A process for preserving milk for several months by packing it under pressure with oxygen and shipping it refrigerated was developed by Theodor Hofius.

For the first time a chemical compound which contains

an enzyme as one of its components was discovered by Dr. Kurt G. Stern, of Yale.

Enzymes, the highly complex proteins that make digestion, body oxidations and other physiological processes possible, can be formed out of inactive proteins by suitable chemical changes and heating, reported Dr. J. H. Northrop, the Rockefeller Institute for Medical Research.

A synthetic substitute for wool was developed by Italian chemists from the casein found in milk, but tests in other countries indicate that the material lacks the strength and stretching characteristics of the natural material.

The first power alcohol plant in America started operations at Atchison, Kans., under the sponsorship of the Chemical Foundation and is producing ethyl alcohol for blending with gasoline as a motor fuel.

An experimental plant for making oil and gasoline from coal by the Bergius process was operated by the U. S. Bureau of Mines at Pittsburgh.

The oxygen in the air man breathes is heavier than the oxygen in the water he drinks by six parts in a million, it was shown by experiments of Dr. Malcolm Dole, Northwestern University.

The goal of military chemists for years was achieved by the invention of a smokeless as well as flashless powder by the E. I. du Pont de Nemours chemist, R. G. Woodbridge, of Wilmington, Del.

A chemical derivative of corn product wastes yields an explosive known as hexanitroinositol which is more powerful than nitroglycerin, reported Professor Edward Bartow, president of the American Chemical Society.

With tung oil chemists are now producing a "pre-shrunk" paint which has improved weathering properties, reported M. F. Taggart, South Bend chemist.

Mowing cotton like hay and digesting it chemically—rather than picking it in the present fashion—was advocated at the Dearborn Farm Chemurgic Conference by Professor Frank K. Cameron, of the University of North Carolina.

By passing sea water through tubes of a synthetic resin made from formalin and tannic acid, English chemists at Teddington converted it into fresh water.

A "waxing" process for bituminous coal which decreases its dirtiness was reported by the Mellon Institute for Industrial Research chemists, Dr. H. R. Fife and P. W. Edeburn.

Phthalic acid was combined with paints to reduce the action of ultraviolet light upon them.

A powerful antiseptic made from oat hulls was developed by Drs. N. M. Phatak and C. D. Leake, University of California Medical School.

A fertilizer has been produced from paper mill wastes by the Department of Agriculture chemists, Dr. M. Phillips, M. J. Goss, B. E. Brown and F. R. Reid.

#### *Astronomy*

A total eclipse of the sun, with a totality area extending from Algeria across Asia to Japan, was extensively observed on June 19.

Eclipse observations by the Harvard-Massachusetts Institute of Technology expedition showed several new coronal lines and indicated to Dr. Donald H. Menzel of

Harvard a close connection between high excitation in the chromosphere and the strength of the as yet unsolved coronal radiation.

Sunspots increased in number as the cycle progressed toward the next maximum which will probably occur in 1939.

The first modern study of the granulation on the surface of the sun was made by Professor Harry Plaskett at Oxford.

Motion pictures of solar prominences were made at the McMath-Hulbert Observatory, Mich., and shown by Dr. H. D. Curtis at the Harvard Tercentenary Conference.

A new theory of the origin of the solar system was advanced by Dr. R. A. Lyttleton of Princeton.

Ionized titanium gas was discovered in interstellar space by Dr. Walter S. Adams and Dr. Theodore Dunham, Mt. Wilson Observatory.

A method for rapid measurement of the velocities of faint stars was developed by Dr. B. J. Bok and Dr. S. W. McCuskey, Harvard.

Discovery of a giant red nebula around Antares through use of a Schmidt camera at McDonald Observatory, Texas, by Drs. Otto Struve, C. T. Elvey and F. E. Roach showed that nebulae shine by light reflected from a nearby star.

Stars shining through the Orion nebula were photographed in red light by Dr. Walter Baade, Mt. Wilson Observatory, permitting a measure of the size of dust particles composing the nebula.

The "coldest" stars yet discovered were found by Dr. Charles Hetzler, Yerkes Observatory, through use of new infra-red or heat sensitive photographic plates.

Three planetary nebulae in the Milky Way were discovered by Mrs. Muriel M. Seyfert, Harvard Observatory.

Either the universe is unexpectedly small or astronomy is confronted with a new principle of nature which leaves the question of size undetermined, Dr. Edwin Hubble, Mt. Wilson Observatory, concluded from a study of the red shift of spectral lines of extra-galactic nebulae.

The maximum age of the universe is twenty billion years as estimated by Dr. Bart J. Bok, Harvard Observatory, but probably it is much younger.

A perpetual interchange of energy between light rays and stars was suggested by Professor Arthur Haas, Viennese physicist, as accounting for the seemingly endless store of energy in the stars.

An unprecedented number of novae or "new stars" were observed: Nova Lacertae sighted in June; Nova Sagittarii found in October; and two Novae Aquilae, one discovered in September and the other in October. Nova Herculis, discovered in 1934, continued bright. Two supernovae, extraordinary explosions in distant galaxies, were seen; one in nebulae of the Virgo cluster by Mt. Wilson Observatory, another in a southern galaxy on Harvard photograph studied by Dr. W. J. Luyten, University of Minnesota.

A new minor planet, discovered in February by Professor E. Delporte of Belgium, and christened Adonis, is smallest object in astronomy's annals except meteorites and came closer to earth than any other heavenly object, except possibly one or two comets.

A new member of the family of Trojan planets was.

discovered by Dr. K. Reinmuth at the Heidelberg Observatory.

A comet discovered by Leslie C. Peltier of Ohio achieved naked eye brilliance, while other comets discovered were Kaho's comet, Jackson's comet in Aquarius.

Sudden changes in radio transmission were linked to simultaneous changes in terrestrial magnetism, earth currents, and ionosphere ionization, and the cause found in simultaneous solar eruptions, in a world-wide study of radio fadeouts by Dr. J. H. Dellinger, National Bureau of Standards.

The 200-inch glass disk for the world's largest telescope finished cooling at Corning, N. Y., and was shipped to Pasadena, Calif., for shaping of the reflecting surface.

The new observatory on Mt. Palomar, Calif., was begun, with construction of building for the 200-inch telescope, establishment of two-way radio telephone link with Pasadena, construction of an airport, and taking of astronomical photographs with a pilot telescope.

A two-and-one-half-ton battery of three star cameras began to photograph the Milky Way at the Wynnewood, Pa., observatory.

A process of evaporating aluminum upon telescope mirrors was developed by Drs. John Strong and E. Gaviola, California Institute of Technology, to replace costly and lengthy grinding now necessary in shaping such mirrors.

A guiding mechanism for telescopes using photoelectric cell and amplifiers to detect and amplify star light a billion billion times was devised by Drs. A. E. Whitford and G. E. Kron, of Washburn Observatory, University of Wisconsin.

#### *Earth Sciences*

The year was one of violent climatic contrasts: The Midwest and Northwest suffered from the coldest and snowiest winter on record, followed by the hottest summer and the worst drought; destructive floods visited the East and South.

The U. S. Coast and Geodetic Survey and the Jesuit Seismological Association investigated twenty-four earthquakes on which observatories in the United States, Canada and the Philippines transmitted data through Science Service.

Discovery of several great submarine canyons off the Atlantic and Gulf coasts was reported by Professor Francis P. Shepard, University of Illinois.

Dr. C. S. Piggot, of the Carnegie Institution of Washington, perfected a "bottom sampler" for bringing up cores of ocean bottom material from great depths.

Quantitative treatment of convection in the interior of the earth was initiated by Dr. C. L. Pekeris.

The U. S. Submarine Barracuda carried an expedition into the Caribbean to measure gravitational anomalies.

A new method for determining age of rocks by their helium content was announced by Dr. William D. Urry, Massachusetts Institute of Technology.

Critical measurements of electrical resistance of various rock formations were made by R. H. Card, American Telephone and Telegraph Company.

Electrical prospecting methods were introduced in the anthracite mining region.

First dinosaur fossils ever discovered in California were found by a high school student, Allan Bennison, and were

collected and studied by C. J. Hesse and S. P. Welles, University of California.

Fossil remains of a dragonfly nearly 2½ feet long were found in the Permian of Kansas by Dr. Frank M. Carpenter, Harvard Museum of Comparative Zoology.

A "missing link" of the tapir family is represented by fossils found in Wyoming and reported on by Dr. Erich Maren Schlaikjer, Brooklyn College.

A fossil fish head nearly six feet long, found near Cleveland, was mounted and placed on exhibition at the Cleveland Museum.

A full-size relief model of a Baluchitherium, largest land mammal that ever lived, was prepared at the American Museum of Natural History.

Notable fossil finds were reported from Arizona by the National Park Service, from Texas by the University of California, from Georgia by the Georgia State Geological Survey, from Wyoming by Princeton University and the University of Wyoming, and from interior Asia by the Institute of Evolutional Morphology and Paleozoology of Moscow, U.S.S.R.

The U. S. Weather Bureau undertook a systematic examination of all proposed methods of long-range forecasting.

The U. S. Weather Bureau arranged to test air movements during hurricanes, by launching large numbers of sounding balloons in the hurricane area in the South.

A laboratory in which winter weather can be artificially produced was established in the U.S.S.R.

As winter closed in, renewed drought and dust storms in the West again became menacing.

#### *Biology*

First stages in embryonic development of rabbit ova were started by treatment of unfertilized ova with chemicals and heat, in the laboratory of Dr. Gregory Pincus, Harvard University.

Fruits without seeds were formed by unpollinated flowers when growth-promoting acids were applied to their ovaries, in experiments by Dr. Felix G. Gustafson of the University of Michigan.

Dr. Ross G. Harrison, of Yale University, showed that the polarity of protein molecules brings about proper relationship of various parts of the animal body during early embryonic development.

Production of a genuine unicorn bull, through transplanting the horn buds to the center of the head, was announced by Dr. W. Franklin Dove, University of Maine.

Transplanted salamander hearts lived and continued beating in experiments by Drs. W. H. Wright and H. H. Collins, University of Pittsburgh.

Successful transplantation of a leg from one white rat to another was accomplished by Dr. J. V. Schwind, Loyola University School of Medicine, Chicago.

Foreleg bones of rats grew in the animals' brains, when transplanted in embryo stage by Dr. R. A. Willis, Alfred Hospital, Melbourne, Australia.

Visual purple, an eye pigment essential to vision, was regenerated under controlled conditions by Professor Selig Hecht, Columbia University.

Elaborate apparatus for rearing animals and plants totally free of any kind of microorganisms was perfected at Notre Dame University by Professor J. A. Reyniers.