

GENERAL SCIENCE

Scientific Achievements of 1930 Pass in Review

List of More than 200 Accomplishments Presents Notable Advances in All the Fields of Science

NOTABLE advances in all fields of science have been made during the past year.

The most outstanding event in astronomy was the discovery of the ninth planet of the solar system, Pluto, and this event alone is sufficient to give 1930 a special place in history. The discovery of the absorption of light in inter-stellar space is another important astronomical achievement.

The beginning of the conquest of Addison's disease by the hormone of the adrenal cortex gland is 1930's addition to the list of medical conquests through the advancing knowledge of endocrinology, which has in past years given insulin for use in diabetes and liver for use in pernicious anemia.

Man-made tools found this past year in close association with the remains of extinct ground sloths in a Nevada cave may indicate a greater antiquity of man in America than previously supposed.

The world mental hygiene congress held during the year ushered in a new era for the treatment of the mentally diseased.

An airplane climbed over eight miles into the air, a loftier height than man has hitherto achieved, and the Atlantic was crossed westward by airplanes and airship, one airplane making the difficult Paris to New York flight.

While the world's largest bridge across the Hudson River at New York was being erected, plans were laid for a longer span across the Golden Gate at San Francisco.

Among the many important developments of science during 1930 were:

Aeronautics

The highest altitude ever reached by man was attained by Lieut. Apollo Soucek, Naval flyer, when he climbed to 43,166 feet, more than eight miles.

The largest wind tunnel in the world and a covered body of water nearly half a mile long to serve as seaplane testing basin neared completion at the Langley Memorial Aeronautical Laboratory of the National Advisory Committee on Aeronautics, Langley Field, Va.

The difficult east-west crossing of the Atlantic was successfully made by Captain Dieudonné Coste and Maurice Bellonte in the Question Mark, flying from Paris to New York in 37 hours, 18 minutes.

An expanding rubber leading edge for airplane wings, called "airplane over-shoes," to prevent the formation of ice on the wings, was invented by Dr. William C. Geer, of Cornell University.

Captain Frank M. Hawks took just 12 hours, 25 minutes, 3 seconds to cross the continent from Los Angeles to Valley Stream, Long Island, setting a new record; the time included three stops of 15 minutes each.

The U. S. Bureau of Standards at Washington developed a radio landing beacon which enables planes to land safely in darkness or fog.

The world's largest airplane, the German DO-X, made successfully its first long distance flights, but was badly damaged by fire in Spain.

A new refueling endurance flight record was set by Forest O'Brine and Dale Jackson in the Greater St. Louis at 647 hours, 28 minutes, 30 seconds.

The Curtis Tanager, with its automatic wing slots and floating ailerons, won the \$100,000 prize of the Guggenheim Safe Aircraft Competition.

The world record for duration without refueling was established by two Italian flyers, U. Maddalena and F. Cecconi, at 67 hours and 13 minutes; they also made the record for distance in closed circuit, 5,088.27 miles.

Dr. Hugo Junkers completed and put into operation his huge flying wing, a plane carrying more than three tons.

An unofficial world record for a duration flight in an engineless plane, was made by Jack Barstow at Point Loma in California, when he glided for 15 hours, 13 minutes in a sailplane.

The British airship R-101, the world's largest afloat, was destroyed by explosion in a storm in France.

Six world records were smashed at one time by the Italian flyer Domenico Antonini in a 6,000 hp. Caproni when he flew for 1 hour, 31 minutes, 39 seconds, reaching 10,597 feet, more than two miles, with a load of 22,046 pounds;

Boris Sergievsky in a seaplane powered with two 575 hp. engines reached the highest altitude, 26,929 ft., more than five miles, ever attained by a seaplane carrying pay load and also made the greatest speed for a load-bearing seaplane, 165.75 m. p. h.

A non-stop flight of 3,400 miles from Cardington, England, to Montreal, Canada, was made by the airship, R-100.

An unofficial world speed record for air-

ships was set by the R-100 at 81. m. p. h.

The first attempt to come to earth on a glider launched from an airship, was successful when Lieut. R. S. Barnaby descended from the airship Los Angeles in this way.

Lieut. Apollo Soucek, repeatedly winner of altitude records, set a new maximum altitude for seaplanes at 39,140 feet, nearly seven and a half miles, not an official record.

With a flight from Ireland to the United States, Capt. Charles Kingsford-Smith and crew in the Southern Cross completed a trip around the world.

Captain Wolfgang von Gronau and three companions made the first east-west seaplane crossing of the Atlantic by way of Iceland and Greenland.

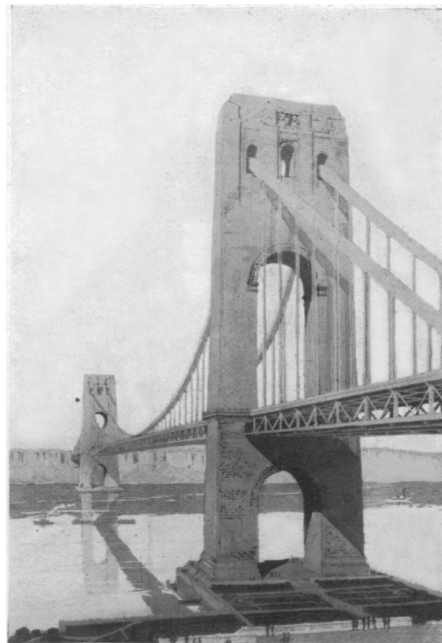
A non-stop flight from New York to Bermuda and return was made by Roger Q. Williams in the Columbia, the plane which Chamberlin and Levine flew to Germany, in 17 hours and 2 minutes, setting a record.

Anthropology and Archaeology

Excavations in the Gila Valley, Arizona, by the Los Angeles Museum, revealed very old cremation burials and traces of a link with cultures of Mexico.

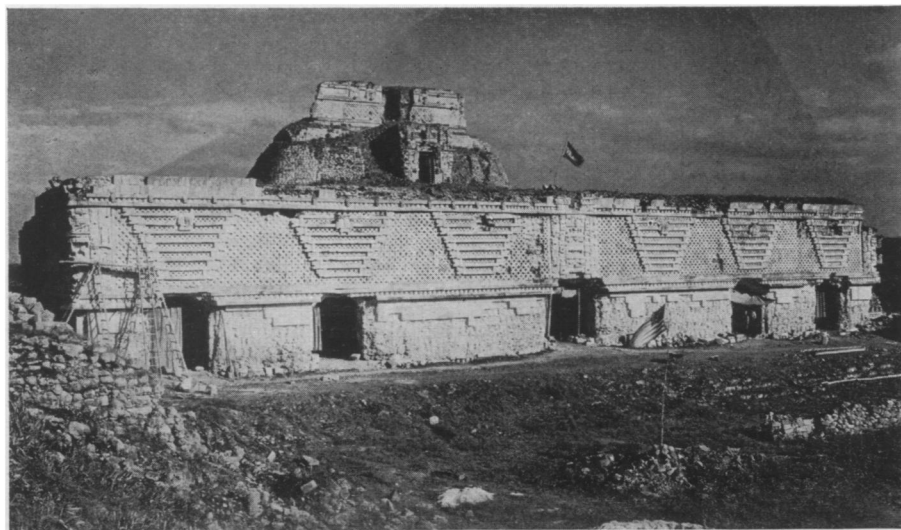
A melting pot of prehistoric Pueblo and Plains Indian cultures was found along the Canadian River in Texas by Dr. J. Alden Mason of the University of Pennsylvania Museum.

An elaborate system of canals built by



LARGEST SUSPENSION SPAN

In the world neared completion across the Hudson river at New York during 1930.



MAYAS UNDERSTOOD FALSE PERSPECTIVE

It is shown by this nunnery in the ruined city of Uxmal, Yucatan, which was studied by archaeologists during 1930. The building is not square and level, yet it appears so.

Indian engineers in Arizona about 1200 A. D. was photographed and surveyed by an airplane expedition directed by Neil M. Judd, archaeologist of the U. S. National Museum.

In an almost inaccessible region of the Kuskokwim River, Dr. Ales Hrdlicka, of the Smithsonian Institution, found 3,000 living Eskimos belonging to the old, original type, quite unlike the present Eskimo.

The oldest settlement ever discovered in the Arctic was unearthed by Henry B. Collins, Jr., of the Smithsonian Institution.

Indian artifacts lying under a layer of ground sloth refuse were found by M. R. Harrington of the Southwest Museum, and were widely regarded as important evidence concerning early American inhabitants.

Six pyramids in a row were unearthed along the "Pathway of the Dead," at the ancient Toltec city of Teotihuacan by Mexican archaeologists.

Remains of a prehistoric culture not Aztec were found on the west coast of Mexico by Prof. C. O. Sauer of the University of California.

A prehistoric city known to have been one of the vassal-kingdoms of the Aztecs was explored by Mexican archaeologists.

Graves of distinguished members of the Tarascan tribe, prehistoric Mexican Indians, were found by an expedition from the Mexican National Museum.

Evidence that the Maya understood the false perspective was found at Uxmal buildings by the Tulane University Expedition; additional buildings and 19 important date stones were discovered at Uxmal.

Highly accurate predictions of eclipses of the sun and the moon were made by the Mayan Indians eight centuries before Christ, Dr. Herbert J. Spinden, of the Brooklyn Museum, discovered.

A Greek archaeologist, excavating at Ithaca, discovered a fountain which he considers definite evidence that this site was the Homeric city.

Excavations at Corinth continued by T. Leslie Shear of Princeton with discoveries shedding light on Corinth's trade relations.

Evidence of 1,000 years of Biblical history,

from 1600 B. C. to 587 B. C., was found in a single mound at Tell Beit Misrim, in Judah, it was reported by Prof. William F. Albright.

The oldest known culture in the world originated by the so-called "Japhethite" peoples of nearer Asia, was reported by Prof. E. A. Speiser of the University of Pennsylvania.

A library containing important cuneiform tablets, even bilingual dictionaries and one in an unknown language, was found in northern Syria by the French Archaeological Mission to Ras Shamra.

A temple built by Nebuchadnezzar was found and other discoveries were made at Ur of the Chaldees by the expedition of the University of Pennsylvania Museum and the British Museum.

Meteorological balloons were first used in aerial photography of archaeological excavations by the Megiddo Expedition of the Oriental Institute clearing the mound of the ancient Armageddon in Palestine.

A tomb containing mummies of two Egyptian princesses was examined by the expedition of the Metropolitan Museum of Art, and a fine copy of the Book of the Dead was brought to America.

The greatest collection of Ptolemaic mummies ever found in one tomb was unearthed in a mastabah, or flat-topped tomb structure, at Meydum, the great national burying ground of the aristocracy of ancient Egypt.

The discovery of a tomb, called the largest private tomb found in Egypt, was made near the Sphinx at Giza by Prof. Selim Hassan Effendi of the Egyptian University.

Steps were taken which will enable American archaeologists to restore the ancient city of Persepolis, once a Persian capital.

In a cave on the west coast of Algeria where they were probably buried alive while asleep, a group of 39 prehistoric skeletons were found by archaeologists of the Beloit College-Logan Museum expedition.

Excavating at ruins of a city destroyed by the Mongol Genghis Khan, Russian archaeologists unearthed three successive cities, and found evidence of widespread trade relations in the Middle Ages.

Important scripts dating back to the first

Han dynasty were found by the Sven Hedin Asiatic expedition.

Evidence of a cultured prehistoric race living in the far north of Mongolia which may have been the people called by the Greeks the "dwellers behind the north winds," was discovered by the Russian explorer, Prof. Peter Kozlov.

A second skull of *Sinanthropus* was recovered from material taken out of the limestone caves at Choukoutien, about 40 miles from where the original "Peking Man" skull was found in 1929.

Archaeological discoveries in China, including oldest stone sculpture ever found in the country, were reported from the first excavations ever conducted entirely by Chinese.

Astronomy

A new planet, the first to be discovered since 1845, was found photographically with a 13-inch telescope at Lowell Observatory in approximately the place predicted by the late Prof. Percival Lowell, founder of the observatory, who died in 1916. The planet, which is farther from the sun than any other yet discovered, was later named Pluto.

The discovery of seven comets was announced during the year, though one was not confirmed and another was a return of a periodic visitor. The first and fourth were discovered by Drs. Schwassman and Wachmann, of the Hamburg Observatory, Germany, though the former was independently found by L. C. Peltier, an amateur astronomer of Delphos, Ohio. The second was discovered by Beyer, also at Hamburg; the third by Wilk, of Cracow, Poland; the fifth by D. L. Forbes, of Rondebosch, South Africa; the sixth was the re-discovery of Tempel's second comet by Dr. George van Biesboeck, of the Yerkes Observatory and the seventh was by Nakamura, of the Kyoto Imperial University, in Japan. Efforts of American astronomers to find Nakamura's comet, which Japanese dispatches said had been observed by Sibata, of the same observatory, were unsuccessful, however.

Inter-stellar space, especially in the plane of the Milky Way, is not transparent, but filled with diffuse material that absorbs a considerable amount of light from distant stars, thus making the previous estimates of their distances too large, it was indicated by researches of Dr. R. J. Trumpler, of the Lick Observatory, supported by independent work of Dr. Piet van de Kamp, of the Leander McCormick Observatory.

A faint group of nebulae was found to be apparently speeding away from the earth at the rate of 7,200 miles a second, the highest astronomical speed yet recorded, by studies of Dr. Edwin P. Hubble and Milton L. Humason of Mt. Wilson observatory; but it is supposed that the effect is really an illusion, due to curvature of space.

The eccentric little planet Eros, which aids astronomers in determining the earth's gravitational power and the sun's distance, approached closer to the earth than it has at any time since its discovery in 1896.

Many stars are spinning at the rate of 40 miles a second, 150 times the speed of the earth at the equator, it was discovered by Dr. Otto Struve and Dr. C. T. Elvey of the Yerkes Observatory in collaboration with a Russian astronomer, Dr. G. Shajn.

An unusually large display of Leonid

meteors was visible on the early morning of November 17, suggesting the possibility of a brilliant shower in November 1932, 1933 or 1934.

The largest meteoric stone whose fall was observed and which has been recovered intact, an 820-pound meteorite, fell near Paragould, Ark.

Long range forecasting of weather may be made possible through the discovery by Dr. C. G. Abbot, secretary of the Smithsonian Institution, that there is a close correspondence between changes in the sun's radiation and in temperature at Washington, D. C.

The theory that stars have a structure similar to that of an egg, a dense yolk in the center, surrounded by a lighter material, was advanced by Prof. E. A. Milne, Oxford University, England.

A new theory of the construction of the universe, that it constitutes a huge system made by the condensation of a loose swarm of smaller clusters of stars which were originally like the spiral nebulae, was proposed by Dr. Harlow Shapley, director, Harvard College Observatory.

The surface of the moon is apparently covered with volcanic ash, researches with polarized light conducted by Dr. B. Lyot of the Paris Observatory indicate.

The theory that the earth may have a comet-like tail sometimes visible as a faint patch of light called by astronomers the "Gegenschein," was advanced by Dr. E. O. Hulburt, of the U. S. Naval Research Laboratory.

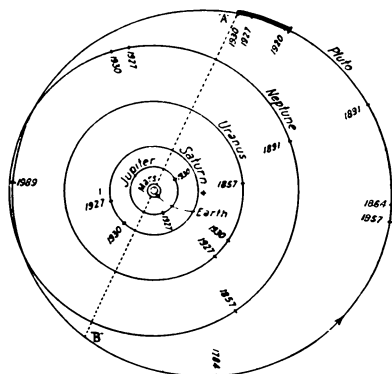
On April 28 the United States saw its first total eclipse of the sun since 1925 when the shadow of the moon just touched the earth on a path which passed through California, Nevada, Idaho, and Montana.

A total eclipse of the sun on October 21 was witnessed by two parties of astronomers from tiny Niuafoou Island in the Pacific.

The length of Neptune's day was found by Dr. J. H. Moore of Lick Observatory to be about 16 hours.

A new 50-foot interferometer, a giant instrument for the measurement of the diameter of stars, was completed at Mt. Wilson Observatory in California.

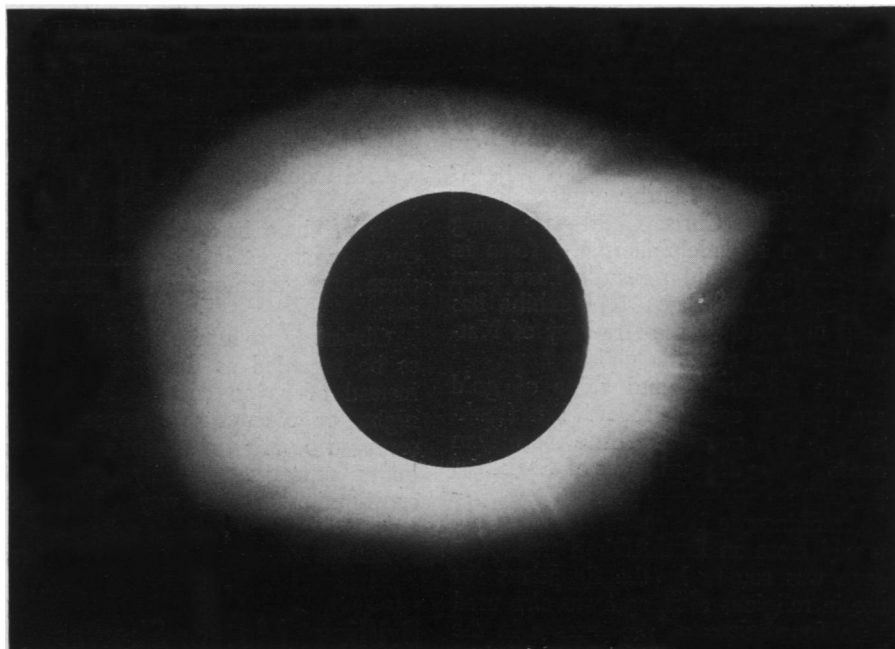
Arsenic and germanium are both present in some meteorites that fall to the earth, it was discovered by Dr. Jacob Papish and Zaida M. Hanford, Cornell University chemists.



Astronomical Society of the Pacific

WHERE PLUTO TRAVELS

The new planet was discovered during the past year and its orbit calculated from positions on old photographic plates which were revealed by careful examination.



LATEST PICTURE OF THE SUN IN ECLIPSE

Taken during the past fall at Niuafoou Island in the South Pacific ocean.

America's first planetarium, in which the observer may at will see a facsimile of the heavens as they look at any time and from any place, was opened on May 10 at Chicago.

A daily broadcast of cosmic data, including number of sun spots, solar radiation constant, and data on magnetic disturbances, was inaugurated by Science Service with the cooperation of the International Scientific Radio Union.

Biology

Quarantine restrictions on Florida fruit and vegetable shipments, designed to prevent the spreading of the Mediterranean fruit fly, were wholly removed on November 15.

The plant breeder who originates a new variety of plant propagated by asexual or vegetative means was given, by act of Congress, the right to a patent of his living product.

The world's largest fish hatchery was completed near Lonok, Arkansas, for the propagation of the warm-water nest-building fishes, such as bass and bream.

A new instrument, a modification of the interferometer, was devised by Prof. K. W. Meissner of Frankfurt, Germany, making it possible for the first time to see a plant grow.

A swarm of locusts appeared across northern Africa, from Egypt almost to Gibraltar, and extended into the Near East and Balkans.

That the fungus of black stem rust is capable of producing hybrids and thus multiplying the strains which attack wheat, was discovered by Dr. J. H. Craigie of the Dominion Experimental Farms at Winnipeg.

Two sets of human identical triplets were reported by Alfred E. Clarke and Daniel G. Revell, biologists of the University of Alberta, Canada.

Animals can manufacture the growth-promoting vitamin A in their bodies from carotin, it was found by Dr. Thomas Moore, Cambridge, England.

A herd of 30 musk-oxen was transplanted from Greenland to Alaska by the U. S. Department of Agriculture in an effort to re-establish them in the latter country.

Dr. J. Markowitz and Dr. H. E. Essex of the Mayo Foundation were successful in keeping alive the internal organs of an animal for 12 hours after the animal had died.

Man lowered himself farther into the ocean depths than ever before when William Beebe and Otis Barton descended 1,426 feet in a steel sphere off the coast of Bermuda.

Chemistry

The existence of rotating molecules in solid compounds was reported by Prof. Linus Pauling, of the California Institute of Technology, and Dr. Sterling B. Hendricks, of the Fixed Nitrogen Laboratory, U. S. Department of Agriculture; this discovery has an important bearing on the heat capacities of solids.

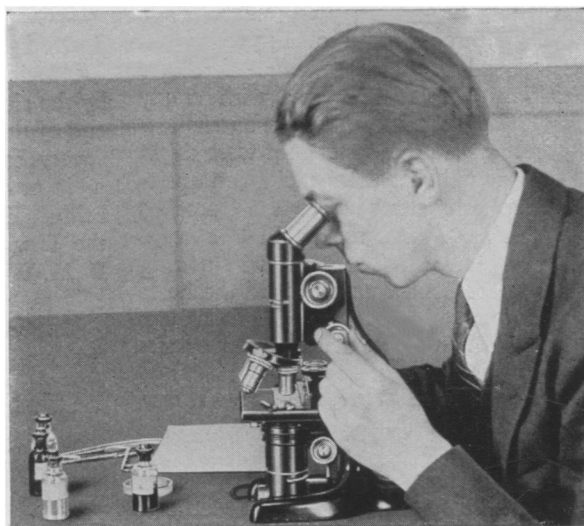
The magnetic susceptibility of samarium sulphate octohydrate was announced by Simon Freed, of the University of California, arousing great interest among chemists because the discovery indicates the possibility of electronic isomers in the solid state.

The chemical puzzle of the structure of the crystal of the silicates was solved by William L. Bragg, Victoria University of Manchester, England, and Linus Pauling, of the California Institute of Technology.

A new gas for use in electric refrigerators, non-poisonous and non-inflammable, which is a compound of carbon, chlorine and fluorine, was the invention of Thomas Midgley, Jr.

Carotin, the stuff that makes some foods yellow, is important for nutrition as well as the green chlorophyll, because vitamin A is associated with this color in vegetables, butter, and egg yolk, it was discovered by S. M. Hauge and J. F. Trost of the Purdue University Agricultural Experiment Station.

(Turn to page 414)



Now you can use your microscope Comfortably »

With the new B & L Inclined Eyepiece Holder you can observe a specimen with the stage of your microscope in horizontal position without the usual strain upon the neck. You can enjoy the advantages of the tilted position when observing liquid specimens or other objects that can only be viewed successfully with the stage horizontal. The Inclined Eyepiece Holder fits into the body tube in place of the regular eyepiece holder. Its prism construction is such that standard body tube length (160 mm) is maintained, thus retaining the advantage of parfocality of objectives and allowing the total magnification of any eyepiece and objective combination to remain unchanged. Any standard eyepiece can be used with this holder.

Send for descriptive folder.

BAUSCH & LOMB OPTICAL CO.
644 St. Paul St., Rochester, N. Y.



BAUSCH & LOMB

MAKERS OF ORTHOGON EYEGLASS LENSES FOR BETTER VISION

(Continued from page 411)

Bacteria obtained from brewer's malt may now be pressed into the service of the chemist to eat away the cell walls of plant tissue and liberate the vegetable oil, according to a method developed by John Woods Beckman, Oakland industrial chemist.

A device for removing carbon monoxide from the exhaust gases of an automobile by means of a catalyst was demonstrated by the inventor, Dr. J. C. W. Frazer of Johns Hopkins University.

The richest source of helium yet discovered, a natural gas in southeastern Colorado containing 7 per cent. of helium, was reported by F. F. Hintze, of the University of Utah.

Crystals of rubber were obtained for the first time in the chemical laboratories of the U. S. Bureau of Standards.

The U. S. Pharmacopoeial Convention, which meets once in ten years to decide on the contents of the Pharmacopoeia or standard for drugs and chemicals, met in Washington in May.

Engineering

After a third attempt, Prof. Georges Claude was successful in obtaining power from the temperature difference in the ocean water at the surface and in the depths of the tropical seas off the Cuban coast.

The two longest steel arches in the world were closed; the Kill Van Kull bridge at New York with a 1,675-ft. span and the Sidney harbor bridge, Australia, 1,650-ft.

An elevated Monorailway 30 miles long carrying a propeller-driven car which travels 120 miles per hour was completed near Glasgow, Scotland.

Application of the hydrogenation of crude oil, which greatly increases production of gasoline was extended.

The city gas business was further invaded by natural gas and its by-products, propane and butane, and petroleum refinery gas; natural gas being piped as far as 1,000 miles to centers of population.

Construction progressed on the world's largest hydro-electric power plant, the Dneprostroy project in Russia, which will have an ultimate capacity of 750,000 hp. and on the largest hydro-generators, 77,500 kilovolt-ampere capacity, and turbines, 84,000 hp. capacity.

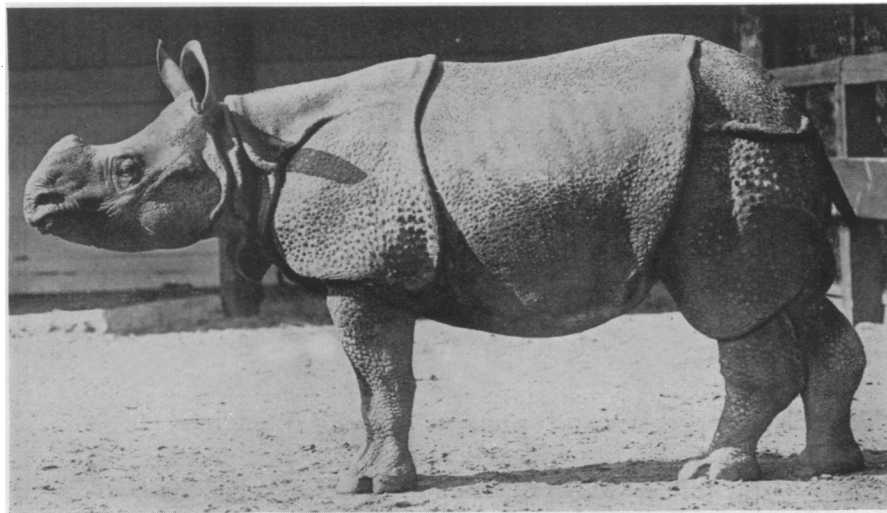
Final work was done on the new Welland canal, a mammoth structure built by Canada to pass sea-going lake grain vessels up and down the 326.5-foot difference in elevation between Lake Erie and Lake Ontario.

Plans were made and bonds authorized for the \$35,000,000 Golden Gate Bridge at San Francisco, the center suspension span of which will be 4,200 feet, the longest in the world.

U. S. Department of Interior began preliminary field work on the construction of the 730-foot Hoover Dam, world's highest, a part of the Boulder Canyon project on the Colorado river.

The Detroit-Windsor vehicular tunnel, connecting Canada and the United States beneath the Detroit river, was opened to traffic.

An experimental boiler designed to operate at pressures ranging from 3,500 to 4,500 pounds per square inch and a temperature of 833 degrees Fahrenheit was built.



THE RAREST RHINOCEROS IN THE WORLD

And one of the rarest of all large animals, is now at home in the Carl Hagenbeck Zoo at Stellingen, Germany. It is the only armored rhinoceros that has ever been brought to the Occident. It comes from a protected range in the lower Himalayas, in Sikkim, Assam and Nepal. It is estimated that only 300 specimens of this animal are left alive. The armored rhinoceros resembles the one-horned Indian rhinoceros in most respects, except that its hide is studded all over with a multitude of little bony plates, making it proof against any kind of missile except a steel-jacketed bullet.

A severely streamlined railway car driven by a 400 hp. airplane engine and propeller sped more than 100 miles per hour on a straight track in Germany.

Construction progressed on the Ft. Lee 3,500-ft. span suspension bridge across the Hudson river at New York and the 1,500-ft. Mid-Hudson suspension span at Poughkeepsie.

The application of welding to steel building construction was greatly extended, the number of such buildings being increased 50 per cent.

The world's longest concrete arch bridge was built at Brest, France, with three spans, each of 612 feet.

The *Europa*, new German ocean liner, entered service and became speed queen of the North Atlantic by bettering the record of her sister ship, the *Bremen*.

The U. S. Bureau of Standards prepared for the construction of a National Hydraulic Laboratory provided for by Congress at a cost of \$350,000.

Coolidge Dam across the Gila river canyon near Globe, Ariz., a dam of unusual construction making use of multiple domes, was dedicated by the ex-president for whom it was named.

The first roller-bearing locomotive was built and put in service.

The Keenan Steam Tables and Mollier Diagram, which for the first time tabulate and graphically present the properties of steam at the higher temperatures and pressures at which it is now being used in large power plants, was published by the American Society of Mechanical Engineers.

Chicago's Merchandise Mart, said to be the largest building in the world, was completed.

The U. S. Patent Office issued 49,599 patents and accepted 117,790 applications during the fiscal year ending in June.

Construction advanced on the world's largest high pressure turbine-generator, a 110,000 kilowatt steeple compound unit to operate at 1,200 pounds per square inch

pressure in the River Rouge power plant near Detroit.

The highest boiler pressure ever used in America, 1,800 pounds per square inch, was employed in a 6,000 kilowatt power plant nearing completion at Lockland, Ohio.

A radio telephone service was installed between New York and Buenos Aires, making possible the connection by radio phone of four continents—North America, South America, Europe and Africa.

The first completely welded ocean-going cargo vessel was launched at Charleston, South Carolina.

The world's first floating power plant, the *S. S. Jacona*, with a generating capacity of 20,000 kilowatts, was placed in service along the New England coast as a source of emergency power.

A new field gun mount, enabling a 75 millimeter cannon to be trained at any point in a complete circle and elevated to any angle up to the vertical, was developed by the U. S. Army.

Work began on the Rogue river concrete arch bridge in Oregon, the first bridge in America to use elastic piers.

Plans were announced for the restoration of a canal built by George Washington around Great Falls on the Potomac river as a part of the Washington Bicentennial Celebration of 1932.

Progress in the design of windowless buildings lighted and ventilated entirely by artificial means was made and plans were announced for the construction of a \$1,500,000 windowless factory at Fitchburg, Mass.

Photographic films taken by the Andrée polar balloon expedition more than 30 years ago were found with the explorers' remains and developed and printed successfully in spite of deterioration by age and exposure.

Geology and Geography

The decennial census of the United States was made, showing the population to be 122,775,046.

The most severe drought and hot season recorded by the Weather Bureau gripped practically the whole of the United States from June until mid-autumn, causing severe damage to crops and range lands and bringing new records for low water in the rivers.

A landslide destroyed part of the city of Lyons in France, taking many lives and destroying much property.

Great deposits of fossil mammal and bird bones were found in Wyoming.

Fossils of a redwood species were discovered on St. Lawrence Island in Bering Straits, bridging the gap between previously known occurrences in Asia and North America.

Huge deposits laid down in Pre-Cambrian times were found in the Grand Canyon of Arizona.

The Polish Academy of Science announced the discovery of the complete body of an Ice-Age rhinoceros, with muscles and skin complete and in place, in the frozen soil of the district of Starunia, Poland.

SPENCER SCIENTIFIC AND EXPERIMENTAL WORKS
4503 Wolf Street, Denver, Colorado
Optical Engineering and Designing
Repairing and Special Work
Assistance in Experimental Work
Instruction in Technical and Scientific Subjects
Astronomical telescopes, reflectors, prisms, gratings, lenses, standard flats, gauges, optical instruments, supplies, patterns, castings agate work, crystal specialties, testing, and used equipment.

A New Optical Disc---for Student Use



No. 3676

Send for circular
No. 3676 Student's Optical Disc,
with lenses, mirrors, and instructions ... \$10.00

See our exhibit at Amer. Asso. for Advance.
of Science Meeting Booth Nos. 1 and 2

Diagrams made on note book paper.
Disc tilted any angle by means of swivel
mounting.

All essential mirrors and lenses are supplied for performing 13 experiments on reflection, refraction, focal length, index of refraction, and images by small apertures.

W. M. WELCH MANUFACTURING COMPANY

General Offices: 1515 Sedgwick St.,
Chicago, Ill.

Scientific Apparatus Factory and Warehouse:
1516 Orleans St., Chicago, Ill.

Furniture Factory:
Manitowoc, Wis.

The bodies of S. A. Andrée, pioneer aerial explorer of the Arctic, and his two companions were found, with Andrée's diary and other important historic documents, on White Island, Fridtjof Nansen Land.

The rebuilding of a submarine was begun for use by an Arctic expedition planned by Sir Hubert Wilkins.

Seismological reports of 29 earthquakes were collected and epicenters located by Science Service with the cooperation of the U. S. Coast and Geodetic Survey and the Jesuit Seismological Association; these included 15 violent shocks, six of which were destructive on land in Italy, Japan, India, Persia, Guatemala and Chile.

Medicine

A hormone from the cortex of the suprarenal glands was isolated by Drs. W. W. Swingle and J. J. Piffner of Princeton University and used by Drs. Leonard G. Rowntree and C. H. Greene of Mayo Clinic to treat hopeless victims of Addison's disease, in the same way that insulin affects the coma of diabetes. Drs. F. A. Hartman and Dr. K. A. Brownell of the University of Buffalo also obtained an extract of the same gland.

The filterable virus germ which causes multiple sclerosis, or "creeping paralysis," was discovered with the aid of a special ultramicroscope at a magnification of 1,800 diameters by Sir James Purves-Stewart and Kathleen Chevassut of the Westminster Hospital, London.

An artificial lung, or respirator, was invented by Drs. Philip Drinker and L. A. Shaw of the Harvard School of Public Health, to keep alive patients whose breathing muscles are paralyzed in infantile paralysis or who are victims of gas poisoning.

A new method for studying the microscopic growth of living tissue in a warm-blooded animal was developed at the University of Pennsylvania School of Medicine.

An enzyme which has both protective and curative action on Type III pneumonia in mice, and possibly also in man, was extracted from a bacillus found in the soil of New Jersey cranberry bogs.

Vitamins in sufficient amounts will prevent infection of animals, and possibly man, with leprosy, it was reported by Dr. J. Shiga, dean of the Imperial Medical Faculty, Seoul, Korea.

Fever produced by short radio waves was found helpful in the treatment of paresis by Prof. T. W. Richards of Princeton.

The National Institute of Health was created by act of Congress replacing the Hygienic Laboratory of the U. S. Public Health Service.

Cancer studies were reported by numerous investigators. Drs. Walter B. Coffey and John B. Humber of San Francisco announced a method of treating cancer by injection of a glandular extract. Drs. Shigemitsu Itami and Ellice McDonald of the University of Pennsylvania reported they were unable to cure cancer in mice by this method. Dr. Frederick S. Hammett of Philadelphia found that the application of partly oxidized sulfur compounds caused tumors in mice to disappear.

Experiments proving that the common cold is caused by a filterable virus were reported by two groups of investigators: Dr. Gerald S. Shibley, Katherine C. Mills and Dr. A. R. Dochez of the Columbia Univer-

sity College of Physicians and Surgeons and the Presbyterian Hospital of New York; and Drs. Perrin H. Long and James A. Doull of the Johns Hopkins Medical School.

An extensive outbreak of psittacosis, popularly known as parrot fever, occurred in the United States and many other countries. In this country 169 cases with 33 deaths were reported. Investigators of the U. S. National Institute of Health made an extensive study but did not find the *Bacillus psittacosis* which a French scientist, E. Nocard, had reported as the causative germ in 1892. They concluded that the disease was caused by a filterable virus. They did find an organism which might be the cause of the disease, but it was not *B. psittacosis* or any other member of that germ family.

A phenol compound, tri-ortho cresyl phosphate, was found by the U. S. Public Health Service to be the adulterant which caused thousands of cases of partial paralysis from drinking bootleg Jamaica ginger, known as "ginger Jake."

A new chemical method of standardizing ergot, widely used in childbirth, was devised by Dr. M. I. Smith of the National Institute of Health, formerly the U. S. Hygienic Laboratory.

A large increase in the number of cases of infantile paralysis, almost reaching epidemic proportions, occurred during the fall of 1930.

The time required for blood to clot, vitally important in surgical operations, is shortened by feeding the patient vitamin D, it was discovered.

Study of the chemical changes taking place in the brain was made possible for the first time through a technical procedure developed by Dr. Abraham Myerson of Boston, whereby blood is taken from the artery leading to the brain and from the vein which drains the brain and the chemical contents of the two samples compared.

New hope for recovery of child victims of serious burns was given by treatment, making use of a tannic acid solution, devised by Dr. Edward C. Davidson of Detroit.

Radio waves, shorter than those commonly used for sending messages, are able to weaken materially the poison elaborated by the diphtheria bacillus, it was discovered by Drs. Wacław T. Szymanowski and Robert Alan Hicks of the Western Pennsylvania Hospital Institute of Pathology.

A new method for measuring the heart's output of blood by determining the amount of acetylene gas taken up by the lungs in a certain time was devised by Dr. Arthur Grollman of the Johns Hopkins University.

An international birthday party, with the celebrations round the world united by radio, was given in honor of the 80th birthday on April 8 of the "dean of American medicine," Dr. William Henry Welch.

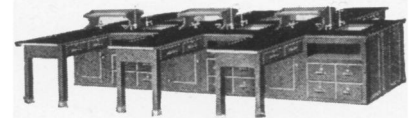
The three hundredth anniversary of the first use of cinchona bark, from which quinine is obtained for the treatment of malaria, was celebrated.

To study the problems of the American child, scientists from all over the country at call of President Hoover met in a White House Conference on Child Health and Protection, at Washington, Nov. 19 to 22.

The flarimeter, an instrument which will disclose whether a person has heart disease in advance of serious developments by measuring shortness of breath, was demonstrated by Dr. P. V. Wells of Newark, N. J.

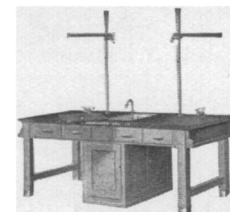
Kewaunee Laboratory Furniture Saves Time

Kewaunee Laboratory Furniture saves extra steps and unnecessary movements by having faucets, cocks, drains, cupboards, shelves and drawers conveniently arranged. Drawers slide smoothly, doors open easily, everything is handy and always in working order. That's why more and better work can be accomplished in a Kewaunee equipped laboratory.



Lincoln Science Desk No. D-503

Leading universities, colleges, schools and manufacturers have selected Kewaunee Laboratory Furniture for their laboratories.



Combination Chemistry and Physics Table No. D-591

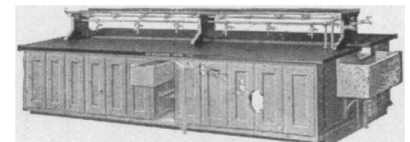
Their investigations show that Kewaunee equipment brings them greater efficiency, maximum utility, every modern convenience, longer service without upkeep expense

and the most attractive furniture. The cost is moderate.

WRITE FOR KEWAUNEE BOOK

If you are a buyer of Laboratory Furniture you should have the Kewaunee 455-page book of Laboratory Furniture on your desk. It contains illustrations of 500 pieces of laboratory furniture, also laboratory floor plans and pictures of actual installations. This book is sent on request. Write for it today on your institution's letterhead.

It will be a pleasure to show our exhibit at the N. E. A. Convention, Detroit, Mich., February 21-26, 1931



Chemistry Table No. D-794

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS

C. G. CAMPBELL, Pres. and Gen. Mgr.
206 Lincoln St., Kewaunee, Wis.

Chicago Office: 14 E. Jackson Blvd.
New York Office: 70 Fifth Avenue

Offices In Principal Cities

BOOKS PUBLISHED BY THE OPEN COURT PUBLISHING CO.

ON

LOGIC

THE LOGIC OF DISCOVERY

By

Robert D. Carmichael

University of Illinois

The main aspects of the process of discovery are skilfully discussed in a manner to interest the non-technical reader. Three of the chapters have previously been published in *The Monist*, *Scientia* and *The Scientific Monthly*.

Cloth, \$2.00

By the same author

A DEBATE ON THE
THEORY OF RELATIVITY

with an introduction by William Lowe Bryan, Indiana University. Favoring the Theory: R. D. Carmichael, Univ. of Illinois and Harold T. Davis, Indiana University. Opposing the Theory: Wm. D. MacMillan, Univ. of Chicago and Mason E. Hufford, Indiana University.

Cloth, \$2.00

LOGIC AND NATURE

By

Marie C. Swabey

New York University

"A strong case for primordially of logic."—Prof. Cassius J. Keyser, Columbia Univ.

"Marked by a fine capacity for logical analysis and reasoning . . . It holds the attention continuously."—Prof. Robert MacDougall.

Price, Cloth, \$4.00

SUBSTANCE and FUNCTION

And Einstein's Theory of Relativity

By

Ernst Cassirer

Translated by W. C. and Marie C. Swabey

"A logical discussion of the concepts of things and relations; a metaphysical treatment of relational concepts and the problem of reality; and an epistemological examination of the theory of relativity . . . A work deserving the closest study on the part of logicians, natural scientists and philosophers . . ." *Isis*.

Pp. 465, Price, Cloth \$3.75

MATHEMATICS

THE RHIND MATHEMATICAL PAPYRUS

Two Volumes

Price, \$20.00 the Set

Volume I. By Arnold Buffum Chace with the assistance of Henry Parker Manning, and with the bibliography of Egyptian mathematics by Raymond Clare Archibald. Volume II. By Arnold Buffum Chace, Ludlow Bull, and Henry Parker Manning, with a bibliography of Egyptian and Babylonian mathematics (supplement) by Raymond Clare Archibald, and a description of the mathematical leather roll in the British Museum, by S. R. K. Glanville. Thirty-one photographic plates, 109 facsimile plates, 109 facing pages of text, 12 pp. of bibliography.

A HISTORY OF MATHEMATICAL NOTATIONS

By

Florian Cajori

Vol. I. Notations in Elementary Mathematics.

Vol. II. Notations Mainly in Higher Mathematics.

Price, Cloth, \$6.00 each

"The quality of Prof. Cajori's achievement is such as to make one realize the gratitude due him from the world of mathematics."—*Mathematical Gazette*.

THE CARUS MATHEMATICAL MONOGRAPHS

1. CALCULUS OF VARIATION

Prof. G. A. Bliss

2. ANALYTIC FUNCTIONS OF A COMPLEX VARIABLE

Prof. D. R. Curtiss

3. MATHEMATICAL STATISTICS

Prof. H. L. Rietz

4. PROJECTIVE GEOMETRY

Prof. J. W. Young

\$2.00 each

A new barbituric acid derivative, the sodium salt of isoamylethylmalonylurea, was discovered and found to be valuable to the surgeon in producing a state just short of deep sleep.

Calcium gluconate, formerly only a laboratory curiosity, was discovered to be an effective medicine.

Physics

A new theory of the universe, assuming that it is non-static and consisting of matter dissipating through radiation, was propounded by Dr. Richard C. Tolman, of the California Institute of Technology.

The theory that cosmic rays are not rays at all but high velocity particles was advanced by two German physicists, Dr. Walter Bothe of Berlin and Dr. Werner Kolhoerster of Potsdam, as a result of experiments they have conducted with a specially built adaptation of the electron counter, but researches of Dr. R. A. Millikan on the intensity of cosmic rays near the north magnetic pole, provide evidence against the theory.

The theory that cosmic rays consist of high-velocity particles, like tiny bullets, was supported by experiments conducted by Dr. L. F. Curtis of the U. S. Bureau of Standards in which he used two electron counters.

Dr. R. A. Millikan found that measures of the intensity of the cosmic rays provide a good means of determining the amount of atmosphere above a point on the earth, so that the cosmic ray electroscope may be used as a form of barometer.

The final value for the most accurate measurement ever made of the constant of gravitation was announced after seven years' work by Dr. Paul Heyl, physicist of the U. S. Bureau of Standards, to be the fraction 6.670 over 100,000,000.

Artificial gamma rays, which may take the place of radium in the treatment of cancer, are produced by a giant vacuum tube operating at 700,000 volts, at the California Institute of Technology.

The theory that the sun is lighted like a giant electric bulb by electricity under pressure of ten million volts flowing from inside the sun and heating its atmosphere to incandescence, was advanced by Dr. Ross Gunn, U. S. Naval Research Laboratory.

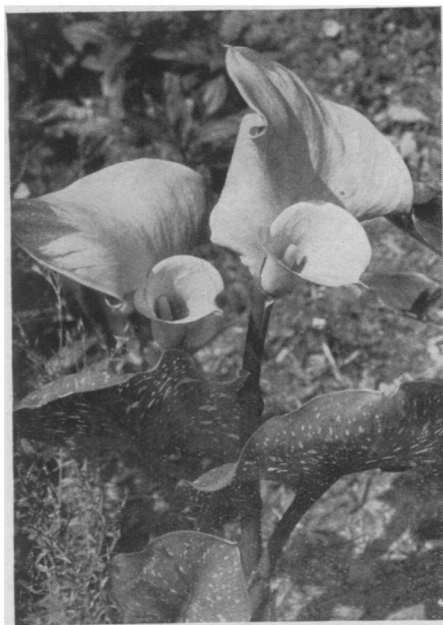
A new physical concept, the paradoxical one that two separate particles of matter can be completely identical was enunciated by Prof. Gilbert N. Lewis, of the University of California.

That space is not empty but filled with electrons of minus or negative energy, was suggested by Dr. P. A. M. Dirac of Cambridge, England.

The possibility that the whole universe is fading away so that in some timeless future no matter will remain, only radiation, was indicated by calculations made by Dr. Louis S. Kassel, of California Institute of Technology.

A new type of clock controlled electrically by a vibrating crystal, thus dispensing with a pendulum, has been developed under the direction of Dr. W. A. Marrison, of the Bell Telephone Laboratories.

A moulded compound, including silicon carbide or carborundum, which has the quality of preventing the flow of electricity at low voltages while allowing it to pass at high



A YELLOW CALLA LILY

Of unusual development in the garden of Charles H. Hamilton, of Pasadena. The two broad leaves that subtended the flowers were as yellow as the spathes themselves. The offspring of these plants were carefully watched, but the new character proved to be non-hereditary.

potentials, was developed at the laboratories of the General Electric Company.

The method by which the diameters of stars have been measured through the interference of light waves was applied to the extremely accurate measurement of terrestrial distances in an instrument developed by Stuart H. Chamberlain of Michigan State College.

A device for measuring the intensity of ultraviolet rays by means of an ultraviolet-sensitive photoelectric cell connected with a condenser, which as it discharges operates a counter, was developed in research laboratories of the Westinghouse Lamp Co.

Alternating electric current is more dangerous at low voltages than at high, it was discovered through experiments on rats at Johns Hopkins University: with the ordinary house potential of 110 volts, 100 milliamperes will cause death.

Electric current direct from sunlight was made possible through the invention by Dr. B. Lange, of the Kaiser Wilhelm Institute for Silicate Investigation, of a new type of cell containing copper oxide between two layers of metallic copper.

Dr. Ernest O. Lawrence of the University of California, with his associate, Dr. N. E. Edlefsen, devised a method for increasing the speed and energy of the protons or hearts of hydrogen atoms so that it may be possible when the method is further perfected to use them as atomic projectiles for smashing the hearts of other atoms, transmuting them into other substances or releasing enormous quantities of atomic energy.

A method of taking photomicrographs by long wave ultraviolet light through an ordinary glass lens, was discovered by Dr. A. P. H. Trivelli, of the Eastman Kodak Co., and Leon V. Foster, of the Bausch and Lomb Optical Co.

An electric photoflash lamp, a German invention, for taking flashlight photographs without noise or smoke was introduced in the United States, the light being made by aluminum foil ignited electrically in a bulb full of oxygen.

Psychology and Psychiatry

Slow motion pictures enabled Dr. Knight Dunlap and G. H. Mowrer of Johns Hopkins University to analyze the motion of a chicken's head in walking and to find that the head jerks forward only, serving to give the fowl clearer vision.

The First International Mental Hygiene Congress met at Washington from May 5 to 10 with 2,000 specialists in attendance.

Diseases suffered during childhood set a definite mark on personality, Dr. H. W. Newell of Richmond, Va., found by a study of identical twins.

A psychiatric service to assist judges in determining sentences of convicted offenders was recommended by the committee on psychiatric jurisprudence of the American Bar Association.

Mental disease shortens life to a startling degree, it was found by Dr. Neil Dayton and Dr. Carl Deering, of Boston, who discovered that the individual's expectation of life is reduced two-thirds by psychoses.

Statistical methods applied to psychiatry by Prof. Thomas V. Moore, of the Catholic University of America, in an effort to chart exactly the symptoms of various mental diseases, determined the existence of 41 different symptoms.

Genealogical studies at the German Research Institute for Psychiatry, Munich, reported by Prof. E. Rudin, showed that among families having one parent afflicted with manic-depressive insanity, at least a third of the children will be similarly afflicted, and another third will be otherwise mentally abnormal.

A service whereby the job-seeker may take tests and obtain an authentic credential to present to prospective employers was inaugurated by the Psychological Corporation of New York City.

In a study of motormen involved in traffic accidents, Dr. O. M. Hall, of the Personnel Research Federation, found that practically half had health defects, chiefly abnormal blood pressure and hernia, and 39 per cent. had personality defects.

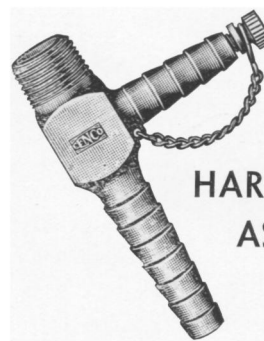
Recognitions and Awards

For his researches on light, particularly the discovery that monochromatic light when scattered by shining on certain transparent substances is partly changed to other colors, Sir Chandrasekhara Venkata Raman, professor of physics at the University of Calcutta, was awarded the Nobel Prize in physics.

The 1930 Nobel Prize in medicine was awarded to Dr. Karl Landsteiner of the Rockefeller Institute of Medical Research for the discovery that human blood is of four different types and that blood of one type does not always mix with blood of another type.

The Nobel Prize in chemistry was awarded to Prof. Hans Fischer of Munich for his achievement in the laboratory production of hemin, one of the components of hemoglobin, the red coloring matter of blood.

“no bigger
than a hose
nipple”
—but—
The most efficient
filter pump made



THE
CENCO
HARRINGTON
ASPIRATOR

New laboratories are steadily adopting the Cenco-Harrington filter pump because while it is the smallest and neatest aspirator yet produced, it is likewise the most efficient.

It is no more in the way than an ordinary hose nipple, to which use it is easily adapted, and improves the workmanlike appearance of laboratory desks.

At a water pressure of thirty pounds the Cenco-Harrington filter pump will reduce a 2000 cc. volume to the vapor pressure of water in two minutes with a water consumption of eighteen pounds per minute. Compare this performance with that of any of the larger and less convenient types of aspirator. Price, \$1.50 each; specify water pressure in ordering.

CENTRAL SCIENTIFIC COMPANY
LABORATORY SUPPLIES
Apparatus and Chemicals
NEW YORK - BOSTON - CHICAGO - TORONTO - LOS ANGELES



Spruce and Fir

PEOPLE who complain that they "can't tell one evergreen from another" often have special difficulty distinguishing between spruces and firs. This is the more embarrassing, since the two genera are often found together on the same mountainside or in the same city park.

However, there are a number of comparison-characters that make them easy to tell apart.

In the first place, firs and spruces are alike, and are distinguished from pines and larches, by having only one needle in a given place, instead of bearing their needles in clumps. They are also alike, and set off from the pines, in having short needles. Pines have long ones.

But the needles of the spruces are stiff and sharp-pointed, so that if you grab a spruce branch you get a handful of prickles. Fir needles are soft, curved, and never have sharp points.

Again, the needles of spruces are borne up on little raised pedestals that stick out a millimeter or two on the twigs, while fir needles have their bases flush with the twig. A twig of spruce that has lost its needles is rough and prickly; a naked fir tree is smooth.

Perhaps the surest way of telling the two trees apart is to find the cones. Spruces usually have small cones (though not always), and the cones invariably hang down. Firs usually have large, round-ended cones, that quite as invariably stand up. When a spruce cone "sheds," it falls off in one piece, but when a fir cone ripens it "sheds" by letting go of its scales separately, leaving the central axis or cone-stem standing up bare and alone, like the spike on an old-fashioned candlestick.

Science News Letter, December 27, 1930

The Daniel Guggenheim gold medal for notable achievement in aeronautics was awarded to Dr. Ludwig Prandtl, professor at the University of Gottingen, Germany, for "pioneer and creative work in the theory of aerodynamics."

The distinguished flying cross of the Navy was given to all members of the Alaskan Aerial Survey expedition which mapped nearly 13,000 square miles of wild country during 1926.

The Collier trophy for the outstanding contribution to aviation was given to the National Advisory Committee for Aeronautics for its cowling for radial air-cooled engines.

Dr. George H. Whipple of the University of Rochester and Dr. George R. Minot of Harvard University Medical School shared the first \$10,000 Popular Science annual award given in recognition of their discovery of a successful treatment of pernicious anemia by the liver diet.

The Harmon Trophy for the outstanding achievement in aeronautics was awarded to Carl B. Eielson who piloted Sir George Hubert Wilkins across the Arctic.

The National Academy of Sciences' public welfare medal was given posthumously to Stephen T. Mather, organizer of the U. S. National Park Service.

The National Academy of Sciences' Daniel Giraud Elliot Gold Medal was awarded to Dr. Henry Fairfield Osborn of the American Museum of Natural History in recognition of his scientific monograph describing the ancient titanothera, a prehistoric creature somewhat resembling the rhinoceros.

The William H. Nichols Medal for 1930 was presented by the New York Section of the American Chemical Society to Samuel E. Sheppard of the Eastman Kodak Company for his "outstanding achievement in the chemistry of photography."

The Willard Gibbs medal was awarded to Dr. Irving Langmuir, of the General Electric Co., for "fundamental work on atomic hydrogen and on surface relations and also on electrical discharge phenomena; also for his contributions of great importance to nearly all branches of physical chemistry, including high vacuum technique, electronics, ther-

mochemistry and catalysis, and lastly for his presentation of a theory of atomic structure."

The John Fitz Medal was awarded Rear Admiral Watson Taylor, U. S. N., retired, for his engineering achievements, the most notable of which is his utilization of the bow wave in ship propulsion.

The Franklin Medal, awarded by the Franklin Institute, was given this year to Sir William Bragg, director of the Royal Institution of Great Britain.

In recognition of his demonstration that protons act like waves, Prof. Arthur J. Dempster, of the University of Chicago, was awarded the \$1,000 prize given annually by the American Association for the Advancement of Science, for an outstanding paper presented at its meeting.

The Hoover Medal was awarded for the first time, the first recipient being President Herbert Hoover.

The American Pharmaceutical Association gave its Ebert Prize for 1930 to Marvin R. Thompson of the University of Maryland for his work on the pharmacology of ergot.

Dr. R. R. Spencer of the U. S. Public Health Service was awarded the American Medical Association's gold medal for original work in preparation of a vaccine for Rocky Mountain spotted fever.

Science News Letter, December 27, 1930

**KEEP ABREAST
IN YOUR SUBJECT**

**EARN CREDIT
TOWARD A DEGREE**

While teaching, use the
HOME STUDY

courses for *Teachers* in Rural, Primary, Grade and High Schools—or for *Supervisors* and *Principals*, which the University gives *by correspondence*. 450 courses in 45 subjects yield credit toward either a Bachelor's degree or Teaching Certificate.

Write for booklet giving full information.
The University of Chicago
577 Ellis Hall Chicago

CONVENIENCE COUPON

for New or Renewal Subscription to Science News Letter

Send this coupon to Washington while you are thinking of it.

**Science News Letter,
21st and B,
Washington, D. C.**

Please { start
renew my subscription to Science News Letter. I am enclosing remittance as checked below:

2 years, \$7
 1 year, \$5

Name _____

Street _____
Address _____

City and _____
State _____

If this subscription is a renewal, check here