

# Science Strides Forward in 1928

General Science

A new and larger looking-glass for the heavens, sight by radio and sound by film, elemental creation discovered in outer space and signaled to earth by cosmic rays, 5,000,000 volts of electricity, ancient civilization discovered and the center of our universe located, flying made safer by new airplane designs, artificial fevers attacking other diseases; these advances in science and many others occurred in the year 1928.

The progress of science is continuous, but each year some researches and discoveries culminate and come to general attention.

Some of the principal science achievements and events of 1928 were:

## Aeronautics

The voyage of the Graf Zeppelin, with passengers and mail, from Friedrichshafen, Germany, to Lakehurst, N. J., established the practical value of trans-Atlantic transportation lines.

The airplane Southern Cross, piloted by Capt. Charles Kingsford-Smith and Capt. C. T. Ulm, with Lt. Com. Harry W. Lyon as navigator and James Warner as radio operator, flew from Oakland, Cal., to Sydney, Australia, a total distance of 7,800 miles, in approximately 88½ hours flying time.

A trans-continental non-stop flight was made in 18 hours and 58 minutes.

Charles B. D. Collyer and John Henry Mears completed a trip around the world by airplane and steamer in the record time of 23 days, 15 hours and 8 seconds.

Capt. Arturo Ferrarin and Maj. Carlo del Prete, flying a Savoia-Marchetti S-64, established a world's airline distance record of 4,466 miles in a flight from Rome to Brazil.

Capt. Dieudonné Costes and Lt. Com. Joseph le Brix, French aviators, completed on April 14, 1928, a 35,000-mile trip around the world begun October 14, 1927, flying their Breguet XIX biplane the entire distance except for the trip across the Pacific Ocean.

Capt. Arturo Ferrarin and Maj. Carlo del Prete gained the world's closed circuit distance record of 4,763.7 miles.

Johann Risztics and Wilhelm Zimmerman, flying a Junkers W-33 established a world's duration record of 65 hours and 25 minutes.

Adj. Louis Crooy and Sgt. Victor Gronen, flying a DH-9, established a world's duration record of 60 hours and 7 minutes, refueling in flight and returning to point of departure.

Eddie Stinson and George Haldeman, flying a Stinson-Detroiter, established a world's endurance record of 53 hours, 36 minutes, 30 seconds.

Major Arturo Ferrarin and Major Carlo del Prete, flying a Savoia-Marchetti plane established a world's duration record of 58½ hours.

Harry J. Brooks, flying a Ford monoplane, established a world's airline distance record of 972 miles for light airplanes weighing 440-771 pounds.

M. Maurice Finat, flying a Caudron C

109, established a duration record of 24 hours and 36 minutes for light airplanes.

Major de Bernardi, flying a Macchi 52 seaplane, established a world's speed record of 318.62 m.p.h.

Peter Hesselbach remained aloft in his glider, Darmstadt, for 4 hours and 5 minutes, thus establishing an American glider record.

Juan de la Cierva flew his autogiro from London to Paris.

The rigid airship U. S. S. Los Angeles was successfully landed on the deck of the airplane carrier U. S. Saratoga.

The airship Italia, under the command of Gen. Umberto Nobile, was wrecked after successfully crossing the North Pole; Lieut. Lundborg of Sweden rescued Gen. Nobile from the ice floe where members of the Italia crew were stranded.

Röald Amundsen, arctic explorer, who set out in search of survivors of the wrecked airship Italia, was lost.

Eventual propulsion of aircraft by motors operating on heavy oil fuel and self-igniting on the Diesel principle was forecast by experiments with new type engines by the Junkers aircraft concern.

A "foolproof" airplane, designed by Albert A. Merrill of the California Institute of Technology and constructed by him in association with Dr. A. L. Klein and Dr. Clark Millikan, was demonstrated in Los Angeles.

A new altitude meter for airplanes was developed by Dr. E. F. W. Alexanderson of the General Electric Co.

By simply enclosing the ordinary air-cooled engine in cowling to reduce wind resistance, airplane speed can be increased about 10 miles per hour, experiments by the National Advisory Committee for Aeronautics showed.

An automatic slotted wing device was invented in England by Handley Page to safeguard airplanes against stalling, nose-dives and tail-spins.

By a new process of electric welding, a new hollow-bladed propeller, made of special steel, was produced and put into use in navy airplanes.

Nine different types of aeroplane engines were approved as airworthy by the Department of Commerce during the year.

A device allowing an airplane to pick up a small consignment, such as a mail bag, from the ground while in flight was invented.

A device that stimulates actual flying conditions and produces for the novice aviator the psychological effect of an airplane in motion was developed at the Wright Field Experimental Flying Station by Lieut. Albert I. Hegenberger.

Contracts to build for the U. S. Navy two airplanes, the ZRS-4 and the ZRS-5, each with almost twice the capacity of the German Graf Zeppelin, were signed by the Goodyear Zeppelin Corporation.

A widespread investigation of the lightning hazard to aviators was announced by the Daniel Guggenheim Fund for the Promotion of Aeronautics in conjunction with government air services.

A corporation called Transcontinental Air Transport was formed by leading railroads, airplane operators and builders for the purpose of creating joint air-rail services.

In military aviation, the accident rate

for accidents due to engine trouble was reduced to one-third of the prevailing rate for the two previous years.

Air mail was more generally used as a result of lower postage.

## Anthropology and Archaeology

The joint archaeological expedition of the University of Pennsylvania and the British Museum uncovered at Ur, in Mesopotamia, a great royal tomb containing vast treasures and the bones of the wives and servants of the monarch, who were slain at his funeral.

Discovery of a tomb at Ophel, which may be the site of the tombs of the Kings of Judah, was announced by J. W. Crowfoot, director of the Palestine Exploration Fund.

Ruins of a great city of the ancient Hittites, with walls 13 feet thick, were surveyed by a party of the Oriental Institute of the University of Chicago.

Inscriptions from the desert of Sinai, the oldest known specimens of the Phoenician alphabet, were deciphered by Professor Romain Butin of the Catholic University of America.

The Field Museum-Oxford University Joint Expedition to Mesopotamia discovered at Kish in Mesopotamia a large temple deeply buried and dating back to the oldest Sumerian kingdom, before 3500 B. C.

Excavations made at Tell Beit Mirsim, the site of the Biblical Kiriath-Sepher, by the American School at Jerusalem and the Xenia Theological Seminary, St. Louis, revealed four strata of occupation from about 2000 B. C. to the time of the Babylonian exile and shed new light on the lives and customs of the Israelites.

Excavations at Beisan, by the expedition to Palestine of the University of Pennsylvania Museum, revealed a Canaanite fort-tower, a fragment of hieratic writing, the first discovered at Beisan, and other ruins and relics dating from 1500 B. C. to about 1200 B. C.

Prof. J. H. Breasted of the University of Chicago completed the translation into English of the oldest known scientific book, an Egyptian medical papyrus dating back to 1700 B. C.

Translation of the "Mathematical Papyrus" in Russia, which has long baffled Egyptologists, revealed that the Egyptians knew Euclid's mathematical methods fifteen centuries before the Greek scientist organized the subject.

Ten statues of women with funerary equipment, but robbed in ancient times of their jewels, belonging to the cemetery of the Cheops family, were found by Prof. Reisner of Harvard near the Egyptian Sphinx.

The ancient Egyptians frequently treated their dead roughly, as by breaking bones to make the bodies fit in small coffins, Miss Ann R. Bolan, of the Field Museum at Chicago, found by X-ray studies of mummies.

Excavations at Mohenjo-daro, in the Punjab of India, by Sir John Marshall, revealed traces of a prehistoric culture similar to that stretching from the Adriatic to Japan and dating from 3300 B. C. to 2700 B. C.

The Swedish expedition to Greece found three rock-cut tombs near Mycenae, containing funeral offer- (Turn to next page)

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ings dating back to the fourteenth century B. C. and many fine bronzes.

A fragment of a thick skull found at Nemea in Greece in a house dating about 2000 B. C. represents the oldest skeletal remains that have ever been found in Greece.

Ruins of Butrinto, scene of incidents in Virgil's *Aeneid*, were dug into by the Italian Archaeological Mission to Albania, and remains of successive civilizations that occupied the site were discovered.

The excavation of the Circus Maximus at Rome, a task which may take ten years, was started.

The Wallraf-Richarz Museum of Cologne, excavating along the lower Rhine, came upon many relics of ancient Roman and Frankish occupation.

That trepanning of skulls and other major operations were performed in Sweden 5,000 years ago was shown by excavations at Gothland, by Dr. Gustaf Nihlen, of Stockholm.

Reconstruction of a prehistoric village in Scotland, under the direction of Prof. V. Gordon Childe, revealed evidence of gruesome human sacrifices and an inscription in an unknown alphabet.

An arrow point, found in an undisturbed Pleistocene deposit under a golf links in Florida by Dr. J. W. Gidley, of the U. S. National Museum, indicates that man lived in America at least 50,000 years ago, he reported.

The peak of America's native population, in prehistoric times, was reached about 1200 A. D., when there were probably 50,000,000 or even more Indians in the new world, was the conclusion announced by Dr. H. J. Spinden, of Harvard University, following a study of factors influencing population trends.

A survey of burial and ceremonial mounds built by early Indian inhabitants in Indiana was undertaken by the Indiana Historical Society and Historical Bureau.

Indian earthworks in Illinois, investigated by George Langford, of Joliet gave new details of the daily life of the prehistoric mound builders.

Excavation of an Indian mound at Joliet, Illinois, under the direction of Dr. Fay-Cooper Cole of the University of Chicago and W. M. Krogman, in charge of field work, yielded 100 skeletons all pronounced prehistoric, and various weapons and implements.

Ruins of an Indian village in Colorado destroyed by fire more than 2,000 years ago were excavated by Dr. Frank H. H. Roberts, Jr., of the Smithsonian Institution, and evidence was revealed that the Basket Maker Indians were not wiped out of existence suddenly but merged their identity with the Pueblos who succeeded them.

Remains of the highest stage of culture attained by Eskimos in Alaska were unearthed by Henry B. Collins, Jr., of the Smithsonian, at St. Lawrence Island, and were pronounced at least 300 years old.

Excavation and repair of the Temple of the Warriors, Chichen Itzá, Yucatan, was completed, and a beautiful turquoise plaque buried beneath the altar was discovered by Earl Morris, of the Carnegie Institution of Washington, in the course of the excavations.

A stucco-covered pyramid which is probably pre-Mayan was discovered and excavated at Uaxactun, Guatemala.

Remains of what may be the oldest Christian church in America were discovered in the Mexican state of Tlaxcala.

One of the lost books of Bernadino de Sahagun, containing priceless records of ancient Mexico, was discovered in the Vatican library.

Maya hieroglyphs carved on a slab over 1200 years ago, giving the exact Mayan date of the spring equinox, afforded a new check on Mayan dates, the translation being by Enrique Juan Palacios, of the Mexican Ministry of Education.

An earthquake in Mexico shook open an ancient tomb and revealed its hidden treasures to archaeologists.

### Astronomy

Plans to construct the world's largest telescope, with a concave mirror 200 inches in diameter, were announced by the California Institute of Technology, in cooperation with the Mt. Wilson Observatory.

The Bureau of Standards constructed, by a new method, the disc for a huge telescope mirror of optical glass almost a foot thick, nearly six feet in diameter and almost two tons in weight, to be used in the first all-American-made telescope for Ohio Wesleyan University.

The year's first comet was discovered on Washington's birthday by a German astronomer, Dr. K. Reinmuth, of Heidelberg.

The year's second comet was discovered on St. Patrick's day by a Frenchman, M. Giacobini, of the Paris Observatory.

The third comet of the year was discovered by David L. Forbes, an astronomer at Capetown, Africa, on November 21, when it was observed in the constellation of Corvus, the crow.

The nucleus of our galaxy of stars was located by Dr. Harlow Shapley, of the Harvard College Observatory, who announced that it is about 47,000 light years away from the earth and extends for about fifty degrees along the Milky Way in the constellations of Sobieski's Shield, Ophiuchus, Sagittarius, Scorpion, the Southern Crown, the Altar, the Rule, and the Centaur.

The presence of free oxygen in the atmosphere of Mars is best evidence for the existence of life there, Prof. H. N. Russell of Princeton declared.

Nova pictoris, the "new" star which flashed out in May, 1925, continued to behave in a very different manner from usual novae, leading astronomers to the view that it might be due to an actual collision of two stars.

The Carnegie Institution of Washington has published the "San Luis Catalogue of 15,333 Stars," marking the completion of the first division in its general catalogue of all stars out to the seventh magnitude.

Evidence was brought forward at the Royal Observatory of Rome that our sun is a pulsating or variable star.

By using plates sensitive to infra-red light, a German astronomer, Dr. G. Blunck, succeeded in photographing the sun's corona, a feat hitherto possible only during a total eclipse.

The earth's rate of rotation changes slightly every day, Dr. Benjamin Boss, of the Dudley Observatory, Albany, New York, announced.

Further confirmation of the Einstein theory was announced, as the result of measurements made on photographs taken during the total solar eclipse of 1926.

The presence of a hitherto undiscovered planet, tentatively called "planet O," was announced by Prof. W. H. Pickering, of Mandeville, Jamaica, from a study of its

supposed perturbations on known planets, but observations with the biggest telescopes failed to confirm it.

Strange bands in the spectra of the light of certain stars may indicate that they are surrounded by meteors and comets, like the solar system, which may serve as fuel to keep the stars going, Dr. Harlow Shapley, of the Harvard College Observatory, declared.

Max Adler, Chicago philanthropist, gave that city a planetarium which will show the stars as seen from any part of the world at any time and the first to be given any city in the United States, though it will not be completed for a year or more.

On photographs made at the Lowell Observatory, Flagstaff, Arizona, of the spectrum of the Northern Lights on July 7 a very prominent line in the red region of the spectrum appeared for the first time, thus opening up a new scientific mystery, reported Dr. V. M. Slipher, director of the observatory, who recorded the phenomenon.

Moving pictures of the planet Jupiter, the first pictures of the kind ever made, were produced by Prof. W. H. Wright, of the Lick Observatory, and Dr. C. E. K. Mees, of the research laboratory of the Eastman Kodak Co.

A prize of 5,000 francs was offered in France for the best paper on a means for reaching another planet; the new projected mode of travel is called "astronautics."

### Biology

A moving picture record of the living rabbit's egg which discloses many new phenomena, hitherto unknown, was obtained by Dr. W. H. Lewis and Dr. P. W. Gregory.

The parathyroid gland plays a large part in the control of sex of unborn offspring, Dr. Simon B. Chandler, of the Loyola University School of Medicine, Chicago, found.

A new vitamin, needed by young trout for normal growth, was discovered in raw liver by a group of biologists at Cornell University, and received the provisional name "Factor H."

Insects neither male nor female but containing characteristics of both sexes were produced in X-ray experiments by Prof. James W. Mavor, of Union College, Schenectady, working in a London laboratory.

Successful crossbreeding of Alaskan reindeer with native caribou and the production of fawns of materially increased weight, was accomplished by the U. S. Biological Survey.

A case of a mare mule which not only bore two healthy colts but had a grandchild was reported by A. H. Groth of Texas A. and M. College.

Canada undertook a census of the animals remaining in her musk-ox herds.

The attempt of the Soviet Government to save from extinction the wisent, Europe's representative of the bison family, failed, since careful searches of the 1,100 square-mile reserve made by naturalists showed no trace of a single living animal.

The first milk a cow produces after giving birth to her calf should be fed to the calf because it contains substances that ward off diseases, Dr. Theobald Smith, noted bacteriologist, reported.

The Carnegie Institution of Washington has completed an eugenical study concluding that laws for deportation of public charges becoming such from hereditary defectiveness should be extended and enforced.

Tuberculosis in live- (*Turn to next page*)

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stock has declined, due to the cooperation of the Bureau of Animal Industry with local authorities; 11,300,000 cattle were tested during the past year.

The work of eradicating cattle ticks from Southern states gradually reclaimed more territory from the pest.

A hybrid of the radish and cabbage was produced by Dr. Georgii D. Karpenchenko of the Botanical Institute at Detskoe Selo, in Russia.

Each species of tree has a definite pattern according to which sap and gases within its trunk are localized, and the gas body within each tree is continuous, studies by Dr. D. T. MacDougal of the Desert Laboratory, Tucson, Arizona, disclosed.

Zinc and boron are needed by plants, Miss A. L. Sommer and Prof. C. B. Lipman found at the University of California.

Borax, in a concentration of one and one-half parts to a thousand of water, was discovered by Prof. Robert Matheson and E. H. Hinman of Cornell University to be a poison for mosquito larvae.

Experiments with enormous cages, constructed of copper wire screening under the supervision of Dr. W. H. Larrimer on a farm maintained by the U. S. Bureau of Entomology near Toledo, Ohio, indicated that while it will be impossible to eradicate the corn borer, it can be controlled sufficiently to reduce commercial losses to a negligible amount.

A comparatively new bacterial disease known as "halo spot" destroyed large acreages of beans in the regions of Montana, Wyoming, and Colorado.

The \$1000 annual prize of the American Association for the Advancement of Science, for outstanding research during the preceding year, was awarded to Prof. H. J. Muller of the University of Texas, for his work on producing new varieties of fruit flies by X-ray treatment.

Scientists the world over celebrated the 80th birthday of Hugo de Vries, foremost student of evolution since Darwin's time.

### Chemistry

Gluconic acid, a chemical hitherto obtainable only at a price of \$100 a pound, was produced at 35 cents a pound by chemists at the Color Laboratory of the U. S. Department of Agriculture, using a species of mould growing on a glucose solution.

Edible fats and fatty acids for soap making were made from paraffin through catalytic methods developed by the chemists of the German Dye Trust.

A magnetic theory of catalytic action in which molecules and atoms are conceived as having two poles like a bar magnet was advanced by Dr. Karl Krauch, German chemist.

Wall board is being manufactured from corn stalks in a special semi-commercial plant set up at Ames, Iowa by the U. S. Bureau of Standards in cooperation with Iowa State College.

A commercial plant for making paper out of cornstalks was built in Illinois, the first of its kind.

The process for converting wood waste into an edible carbohydrate suitable for hog food devised by Dr. Freidrich Bergius, German chemist, was improved to the point of semi-commercial production.

The U. S. Bureau of Chemistry and Soils has evolved two methods of making from corn cobs insulating briquettes to be used as a substitute for cork, especially in small

refrigerating units.

A successful substitute fabric has been developed to replace goldbeater's skin in the making of gas cells for airships, and several months' use in the "Los Angeles" shows the new material to be cheaper and fully as good.

Anthraquinone, a basic raw material in the manufacture of dyes, was made by cheaper methods involving the use of catalysts or solution in furfural as a result of research by Dr. A. O. Jaeger of Pittsburgh.

New methods of making artificial rubber were announced in Germany, though the process was not divulged.

A new explosive, known as "radium atomite" and claimed to be superior to T. N. T. or dynamite, was demonstrated to army engineers by Capt. H. R. Zimmer, of Los Angeles.

Synthetic sugar, from fructose and glucose, was made by two Swiss chemists, Prof. Ame Pictet and Hans Vogel.

"Bios," a vitamin that promotes the growth of yeast, was obtained in pure crystalline form by Dr. W. Lash Miller of the University of Toronto.

Experiments by dairy experts of the U. S. Department of Agriculture demonstrated that milk exposed to sunlight develops undesirable flavors and odors, whereas milk kept in the dark does not.

"Sunshine pills," consisting of synthetic Vitamin D, made by exposing ergosterol from yeast to ultra-violet rays, were placed on sale in Germany and England as a substitute for cod-liver oil.

An ultra-violet irradiated food was placed on the market, a commercial application of the discovery that ordinary foods exposed to ultra-violet rays promote the formation of healthy bones and teeth in children and young animals.

A new way to preserve ether for as long as eight months without spoiling or deteriorating was devised by S. Palkin and H. R. Watkins.

A new system of chemical shorthand was developed by Louis A. Leslie of New York and Dr. C. A. Jacobson, professor of chemistry at West Virginia University.

The 1928 Nobel prize for chemistry was awarded to Dr. Adolf Windaus of Goettingen, Germany, for his part in experiments proving that ultra-violet light, either in sunlight or artificially produced, will activate ergosterol and confer on it antirachitic properties.

The Nobel prize award for chemistry, 1927, went to Prof. Heinrich Wieland, of Munich, Germany, in recognition of experiments on the complex compounds known as the bile acids.

### Engineering

A method of utilizing for power the difference in temperature between the depths and surface of tropical seas was devised and successfully demonstrated by Georges Claude, the French physicist and inventor.

Busses carrying 26 passengers, with sleeping accommodations, dining and toilet facilities were placed in operation.

A new stereoscopic apparatus for making contour maps from overlapping photographs was purchased by the government and is expected to revolutionize topographic mapping in mountainous countries.

The Army Air Corps photographed areas in the United States approximating 35,000

square miles for the War Department and other governmental bureaus.

Radio acoustic sound ranging, making possible the locating of ships even in darkness and fog, was developed.

A new world's speed record for automobiles was made at Daytona Beach, Fla., by Capt. Malcolm Campbell, an Englishman, who was later killed when his car overturned.

Diesel type engines light enough for automobile and airplane use approached the point of commercial practicability.

Two condemned buildings in Washington were burned to the ground by scientists of the Bureau of Standards in order to test fireproof safes under actual conflagration conditions.

A gearless auto that changes speed automatically was described to the Society of Automotive Engineers by a French engineer, D. Sensaud de Lavaud.

An instrument defined as a "breathing device" which experts believe will save the lives of men submerged in sunken submarines has been devised by Lieut. C. B. Momsen, Chief Gunner C. L. Tibbals, both diving experts, and F. M. Hobson, engineer in the Naval Bureau of Construction and Repairs.

Pulverized coal was applied to the propulsion of sea-going vessels, the initial installation being the U. S. Shipping Board vessel Mercer.

Radio equipment for communication between the front and rear ends of long freight trains has been installed by the Baltimore and Ohio Railroad for demonstration on that system.

The St. Francis dam, which impounded a large part of the water supply of Los Angeles, burst on March 12, causing a destructive flood.

Deposits of potash large enough to be of economic importance were discovered at two localities in Texas and one locality in New Mexico.

### Geology and Geography

A blow to theories of land in the Arctic was dealt by the flight of Wilkins and Eieleson over the unknown polar region which no land was sighted.

Four ships carried the Byrd Antarctic expedition far south to the Bay of Whales, from which base attempts will be made by aeroplane to explore the Antarctic region.

Polar explorations in the dirigible "Graf Zeppelin" which successfully made a round trip from Germany to the United States, were announced by a German organization known as Aeroarctic.

An expedition to study the birthplace of the icebergs, between Greenland and Baffin Land, was sent out by the U. S. Coast Guard on the U. S. S. Marion under command of Lieut. Comm. Edward H. Smith.

The non-magnetic yacht Carnegie, of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, set out on a three year cruise to all parts of the world to make new observations of electrical and magnetic conditions as well as other scientific researches, under the command of Capt. J. P. Ault.

A new volcano was discovered in eastern Ecuador by Joseph H. Sinclair, leader of an expedition sent out by the American Geographical Society.

The Mayon volcano, after being quiet for 28 years, became (*Turn to page 389*)

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active and destroyed Libog and several neighboring villages in the Philippines.

Vast fields of pumice and volcanic ash, floating on the surface of the south Pacific Ocean between the Fiji and Tonga groups of islands, revealed the existence of a new submarine volcano.

Falcon Island in the South Pacific, famed for its sudden disappearances, showed its head above the waves again.

A wheeled boat, able to travel on land and water, was used in an exploration of the volcanic islands of Alaska by Dr. T. A. Jaggar of the Hawaiian Volcano Observatory.

Roy Chapman Andrews returned to America at the close of the 1928 season of the Central Asiatic Expedition, bringing much fossil material with him.

The discovery by two high school boys of Fillmore, Utah, of an unfossilized skull of an extinct camel, found in a lava cave some twenty miles southwest of their home, revolutionizes our ideas of the course of events in recent geological time, stated Prof. Alfred S. Romer, of the University of Chicago, who examined the skull.

The greatest geyser now active in the world and the greatest of all history, except the old Excelsior Geyser which has been extinct since 1888, became active in Yellowstone National Park.

New knowledge of the origin and history of the Grand Canyon of the Yellowstone was obtained as a result of the geological research of the Princeton Summer School of Geology and Natural Resources.

A new national park, Bryce Canyon, was established on September 15.

New fossil footprints were found on the north rim of the Grand Canyon of Arizona.

Fossil seaweed found in the rocks along the Penobscot River demonstrated that the ancient Cambrian Sea once flowed over the region of Maine.

Plans were laid for the first international census of agriculture, to be taken in 1929 and 1930.

More than 1,000 square miles of Alaskan wilderness were surveyed by the new airplane-packhorse method by the U. S. Geological Survey.

Twenty-one earthquakes, of unusually severe character, in various parts of the world, were located by experts of the U. S. Coast and Geodetic Survey, in cooperation with Science Service, within a few hours after they occurred, in many cases anticipating by several days actual reports from the damaged area.

A new electrical seismograph, for recording distant earthquakes, was invented by Dr. Frank Wenner, of the U. S. Bureau of Standards, and was proved satisfactory in numerous tests.

Severe landslides occurred at Santos, in southern Brazil, early in March.

### Medicine

A new minimum death rate for tuberculosis was reached in 1928, the Metropolitan Life Insurance Company announced. The new rate is 72.1 per 100,000.

Yeast exposed to ultra-violet rays, either from sunlight or an artificial source, has its fertility vitamin E, destroyed, Dr. B. M. Strong of the school of medicine at Loyola University, Chicago, found.

Vitamin D, which prevents rickets in young animals, may also play an important part in the development of the egg, Dr.

Alfred F. Hess, of New York, announced.

The presence of copper in the diet is a preventive of anemia, Dr. E. B. Hart, of the University of Michigan found.

Teeth, shining by fluorescent light in the dark under the influence of ultra-violet rays, reveal by dark spots the regions where decay will develop, Dr. H. C. Benedict, of the Northwestern University school of dentistry, found.

An instrument for measuring a person's sensitivity to sunburn was invented by Dr. Robert C. Burt, of Pasadena, Calif.

Dr. Hideyo Noguchi, of the Rockefeller Institute, died of yellow fever as a martyr to his researches on that disease, leaving research which may show that the disease has two forms.

Eleven lepers were released by the U. S. Public Health Service, apparently cured and no longer a menace to the community, from the National Leper Home at Carville, La.

Means were found for administering chaulmoogra oil, the remedy for leprosy, without the pain and nausea which patients have had to endure in the past.

Epilepsy was produced artificially in dogs by a brain operation by Dr. Lawrence O. Morgan, of the University of Illinois.

A method of investigating the brain by means of X-ray photographs was perfected by Dr. Max Ludin, director of the Roentgen Institute of the Citizens' Hospital of Basel, Switzerland.

High-frequency electric currents were found to be beneficial in checking cancerous growths in mice and chickens.

For his work on tularemia, or rabbit fever, Dr. Edward Francis of the U. S. Public Health Service was awarded the gold medal of the American Medical Association, the committee on awards declaring that his contributions to the knowledge of the disease were the most important medical work of the year, judged on the basis of originality.

The final step in scientific conquest of Oroya fever, which afflicted the Incas and still occurs in Peru, was announced by four scientists of the Rockefeller Institute, who proved that the disease is spread by gnats.

Injections of glucose were found to be beneficial in acute cases of encephalitis, the European sleeping sickness.

A new theory that cancer is associated with and possibly controlled by the relative alkalinity of the blood was advanced by Dr. Ellice McDonald, chairman of cancer research of the University of Pennsylvania.

A lack of the important beta hormone, which controls the water depots of the body and the ability of the tissues to use water and which is in the post-pituitary gland at the base of the brain, may be made up by an artificial supply from animal glands, Dr. Oliver Kamm of Detroit, Mich., announced.

Operation of apparatus transmitting short radio waves was found to produce fever in bystanders, and Dr. Helen R. Hosmer of Albany Medical College began experiments with the electrically induced fever on animals, since fever is now an important treatment of progressive paralysis.

The effect of a dose of medicine depends not merely on the chemical make-up of the medicine but also on the alkalinity of the blood and on the particular balance of certain blood elements, experiments by Dr. William Salant, of the University of Georgia Medical School, indicated.

A new water purifier, succinchlorimide, that will not deteriorate with age was announced by its discoverer, Major C. B. Wood of the U. S. Army Medical School.

A new industrial hazard, chromium poisoning, definitely increasing as a result of the widespread use of chromium plating on automobile accessories, was reported to the American Medical Association by Dr. Jackson Blair of Cleveland and studied by the U. S. Public Health Service.

The paper mulberry is one of the plants responsible for "hay fever," Dr. Harry S. Bernton of Washington announced.

Nobel Prize in medicine for 1928 was awarded to Prof. Charles Nicolle of the Pasteur Institute at Tunis in recognition of his typhus fever researches, which have shown how the disease may be prevented.

The Grand Cross of the French Legion of Honor was awarded to Dr. Albert Calmette of the Pasteur Institute, for his work in producing a tuberculosis vaccine.

### Physics

The cosmic rays which bombard the earth from outer space are evidence of the continuous creation of common elements out of electrons there, Dr. R. A. Millikan and Dr. G. Harvey Cameron, of the California Institute of Technology, announced.

The Michelson-Morley experiment was repeated by Prof. A. A. Michelson, at Mt. Wilson Observatory, with much improved apparatus, and he announced that no motion of the earth through the ether of space could be detected.

Experiments with a thin film of gold conducted by Prof. George P. Thomson of the University of Aberdeen demonstrated that a stream of electrons contains waves, which may be the electrons themselves or may accompany the real electrons.

Ultra-violet rays in sunlight are responsible for the ionization of the upper layer of the earth's atmosphere which is connected with the Kennelly-Heaviside layer that reflects radio waves downwards, thus making long distance radio communication possible, announced Dr. E. O. Hulburt, of the U. S. Naval Research Laboratory.

The hypothetical element "coronium" visible in the sun's corona during eclipses may be identical with the rare gas argon, experiments by Dr. Ira M. Freeman of the University of Chicago indicated.

The highest electrical potential ever achieved by man, more than 5,000,000 volts, was obtained by Dr. Gregory Breit and Dr. M. A. Tuve at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington.

X-rays produced at the California Institute of Technology, with an electrical force of a million volts, by Drs. S. C. Lauritsen and R. D. Bennett, showed the way towards artificial production of cosmic rays.

"Artificial lightning" at a potential of 3,600,000 volts was generated at the Pittsfield, Mass., Laboratory of the General Electric Company.

Inaudible sound waves, nicknamed the "death whisper" because they kill small organisms in water, were produced at the unprecedented rate of two and one-half million per second in the private laboratory of Alfred L. Loomis at Tuxedo Park, N. Y.

Sheets of iron, gold and other metals so thin as to be transparent, were prepared by Dr. Carl Müller of Charlottenburg, Germany.

(Turn to next page)



## Science Strides Forward in 1928—*Continued*

Penetrating radium rays were used to test metal castings for flaws at the Russian State Radium Institute, Leningrad.

That helium gas leaks slowly through glass, even through high-quality pyrex, was demonstrated by experiments conducted by three Harvard scientists.

The use of exploding gas in rockets as a propulsive force for automobiles was successfully demonstrated in Germany by Fritz Opel.

The first actual measurements of the speed of lightning showing that it takes about one seven-thousandth of a second to complete itself and that it starts from the cloud and the ground at nearly the same instant, the two ends uniting in mid-air approximately one seven-thousandth of a second later, were determined by Prof. C. V. Boys, noted British physicist.

Outdoor television was pronounced possible through use of an extra large lens, with an extra large scanning disc, and extra large holes, all of which results in more light being picked up and focused on the sensitive cell, in a report to the Optical Society of America by Dr. Frank Gray and Dr. Herbert Ives.

The development of talking motion pictures was continued and several photodramas with complete dialogue and no printed titles were produced.

A million-volt cathode ray tube, equivalent in radiating power to a ton of radium, was built by Dr. W. D. Coolidge of the General Electric Company.

An improved cathode ray tube, simpler than an X-ray tube, was perfected by Dr. C. M. Slack, of the Research Department of the Westinghouse Lamp Co., making it possible for any well equipped research laboratory to have at its disposal the important cathode rays.

A high-power short-wave vacuum tube able to light electric lamps without touching them was demonstrated in the laboratories of the General Electric Company, Schenectady, N. Y.; it heats flesh and blood in its vicinity, and can cause an artificial fever of 100 degrees Fahrenheit.

Two Swiss Physicists, Dr. A. Piccard and Dr. E. Stahel, performed an ether-drift experiment with negative results.

A new X-ray moving picture camera which can be set to take pictures at regular intervals was invented by Arthur C. Pillsbury, of Berkeley, California, and believed to have important possibilities in showing inner processes, such as the knitting of broken bones.

A red neon arc light, claimed to be capable of shining through fog, and intended for airport beacon use, was invented by Dr. Clifton G. Found, of the General Electric Co., in collaboration with J. D. Forney, of the Cooper-Hewitt Electric Co.

A magnetic method of detecting flaws in steel castings as large as five or six inches thick was reported by Alfred V. de Forest, of Bridgeport, Conn.

A new metal so hard that it bores smooth holes in concrete, or cuts screw threads in a glass rod, was produced from a compound of tungsten, carbon and cobalt by Dr. Samuel L. Hoyt, of the research laboratory of the General Electric Co., and given the name carboboloy.

A new camera, which makes photographs that appear solid to the eyes and which shows different sides of the object depending on the angle from which the picture is viewed, was exhibited to scientists by its

designer, Dr. Herbert E. Ives, the inventor of the method being Dr. C. W. Kanolt.

A triple film which would enable the amateur to make color snapshots with ordinary light and an ordinary camera was announced by F. J. Tritton, a British scientist.

Natural color movies that everyone can make and project were developed by the Eastman Kodak Company under the direction of Dr. C. E. K. Mees.

The Congressional Gold Medal was conferred on Thomas A. Edison by action of Congress and presented by Secretary of the Treasury Mellon at the Edison Laboratories, October 20.

The Optical Society of America celebrated the fiftieth anniversary of Prof. Albert A. Michelson's first announcement of his determination of the velocity of light by naming its annual meeting the Michelson Meeting.

A medal to be awarded annually by the Optical Society of America, for outstanding work in optical science was founded by Dr. Herbert E. Ives of the Bell Telephone Laboratories in honor of his father, Frederic E. Ives, inventor of the halftone process and other photographic methods.

### Psychology

A comprehensive program for study of the psychology of the highway was outlined and work started on the project by A. R. Lauer and A. P. Weiss at Ohio State University, cooperating with the Division of Anthropology and Psychology of the National Research Council.

Marked differences in the activity pattern during sleep shown by persons of different ages and different occupations were discovered in investigations by Dr. H. M. Johnson, of the Mellon Institute of Industrial Research, at the University of Pittsburgh.

The sense capacity of Helen Keller, remarkable blind and deaf woman, was studied by Dr. Frederick Tilney, of Columbia University, who reported that her senses of touch, smell and taste are no more keen than those of the average person.

By statistical methods, Prof. L. L. Thurstone, of the University of Chicago, established the absolute zero of intelligence as occurring in babies at birth or a few months before and showed that there are greater differences in intelligence among older children than among young children.

A standardized mental test for babies from one month to one year of age was developed at the Catholic University of America by H. E. Linfert and H. M. Hierholtzer.

A schedule of 135 behavior manifestations which are characteristic of normal stages of development in the first year of life was worked out by study of several hundred normal and defective infants at the Yale Psycho-Clinic.

Sleeping habits of children were studied at the University of Toronto by Dr. W. E. Bletz, and Nellie Chant, who reported that daytime sleeping habits break up naturally about the third year, and that regular sleep is one of the fundamental needs of the young child.

A survey of 200 juvenile delinquents, made by C. H. Calhoun of the Ohio State Bureau of Juvenile Research, demonstrated that normal boys, as well as subnormals, may develop into criminals if environment and emotional make-up favor that tendency, and that normal boys tend to commit crimes

against property whereas subnormals are more apt to commit offenses of truancy and immorality.

That the abnormally large percentage of failures in modern language classes is due to the text books and methods of teaching rather than to the low mentality of students taking these courses was demonstrated by an intelligence test given to 1,000 high school students of Spanish by Walter Kaulfers of Stanford University, which revealed that the students were above average in mentality.

Mental tests given to whites, negroes, and mixed bloods in Jamaica, by Dr. C. B. Davenport, of the Carnegie Institution of Washington, demonstrated striking racial differences, the white race being superior in reasoning and judgment and the negroes showing superiority in certain memory tests.

### Radio

Experiments with echoes from radio waves led Dr. Carl Stormer, Norwegian physicist, to conclude that radio waves can travel at least a million miles away from the earth and are not completely stopped by the Kennelly-Heaviside layer, which has been supposed to act as an opaque screen to the waves.

Arrangements were made for radio weather reports to be sent twice daily from Point Barrow, Alaska, to the Weather Bureau headquarters, thus making it possible to send out warnings of cold waves affecting the North Central states several days earlier than ever before.

A quartz crystal control for radio and television, sensitive to one part in ten million, was perfected at the Bell Telephone Laboratories.

Nine radiovision stations were broadcasting programs and two more stations were under construction by the end of 1928.

Radio movies, received by a radiovisor using a small drum instead of a large disc, were publicly exhibited by C. Francis Jenkins, Washington inventor.

A radio beacon for aircraft was developed by the U. S. Bureau of Standards, so designed that dual frequency broadcasts from landing fields are recorded visually on the airplane's instrument board in such a way as to signal any deviation from course.

A new loudspeaker, giving 300 times more volume than that obtainable from any existing type, was developed in the Bell Telephone Laboratories.

The world's first newspaper radiovision broadcast program was published.

The Federal Radio Commission re-allocated wave lengths for all stations in the United States on November 11, 1928, in an effort to prevent conflicts in broadcasting.

Meetings of 1,000 engineers in New York and 500 electrical engineers in London, were connected by trans-Atlantic radio telephone and they conducted a joint session as though they were in one auditorium.

Photographs were sent from Oakland, Calif., to Schenectady, N. Y., by radio on May 1.

Sydney, Australia, and Schenectady, New York were placed in two way radio telephone communication on short waves.

*Science News-Letter, December 22, 1928*

The sourest fruit is the tamarind, which is more than twice as acid as the lemon.