

GENERAL SCIENCE

# Science Makes Notable Strides During 1931

## Completing Big Telescope, Finding Lost Elements, Seeing Invisible Germs Number Among Advances in Every Field

**U**PON every frontier of science there were important advances during the year 1931, just closing.

Extremely promising are the explorations into the hitherto hidden life of the microscopic world that were made in several laboratories, particularly that of Dr. Arthur I. Kendall of Northwestern University. By feeding germs more natural foods he persuaded them to change into filterable forms, a discovery that may greatly influence the course of man's attack on his diseases.

The search for missing chemical elements predicted years ago by the periodic table was probably ended by the discovery of element 85, although a controversy arose over the discovery of the next to the last of the missing elements, number 87, which was also reported found by Prof. Fred Allison and associates of the Alabama Polytechnic Institute.

The first all-American telescope mirror, world's third largest, cast in America, figured in America and used in America, was put in operation at Perkins Observatory at Delaware, Ohio.

Important to astronomy also was Sir Arthur Eddington's derivation of the size of the universe from the laws of quantum mechanics and the continued discussion of the meaning of the discovery that the universe is expanding at a terrific rate.

A new building block of matter was presented to physicists and chemists when a research group discovered that hydrogen can occur in a heavy-weight form with atomic weight two instead of one, as is usual.

New knowledge of nutrition was gained through the experiments of Dr. E. V. McCollum which showed magnesium and manganese essential to life and related to glandular functions.

That the flea can transmit typhus fever was the important discovery of U. S. Public Health Service scientists.

Artificial synthesis of elements and the production of artificial cosmic rays were accomplished by the German physicist, Dr. W. Bothe. This may prove of great importance to future studies of the interior of the atom.

By use of tree rings and clay layers,

the history of recent ages in America's past was given a more extended time scale.

Among the many important developments of science during 1931 were:

### Aeronautics

The Akron, the largest airship in the world, with a gas capacity of 6,500,000 cubic feet, nearly twice that of the Graf Zeppelin, was completed and commissioned.

A new world altitude record was established on May 27 when Prof. Auguste Piccard and Paul Kipfer ascended to a height of 51,775 feet in a flight between Augsburg, Germany, and Glacier d'Obergurgl, Switzerland, in their "stratosphere" balloon.

The world's largest wind tunnel in which full-sized airplanes are tested, and a seaplane testing basin in which full-sized floats are studied were completed at the Langley Memorial Aeronautical Laboratory of the National Advisory Committee for Aeronautics at Langley Field, Va.

A U. S. Navy non-rigid airship of 320,000 cubic feet capacity, half as large again as any other non-rigid ship built since the war, was made for experimental use, but was destroyed by wind.

Using photoelectric cells which were found to "see" light through fog thousands of times better than the human eye, Dr. Irving Langmuir devised an apparatus for guiding airplanes along a path of light beacons invisible to the pilot.

Marinello Nelli, Italian flyer, established three official Federation Aeronautique Internationale records with his Ascanio helicopter, a vertically ascending heavier-than-air craft. Duration with return to starting point, 8 minutes 45 seconds; distance in straight line, 3,539 feet; and altitude above point of take-off, 59 feet.

Flying is made safer by a new instrument,

developed at the National Bureau of Standards by F. G. Kear and G. H. Wintermute, which receives simultaneously visual range beacon signals and voice reports on the weather, filters out the voice signals, and sends them to the aviator's headphones.

From Brooklyn, N. Y., to Istanbul, Turkey, was the record non-stop airline distance flight made by two Americans, Russell N. Boardman and John Polando, who covered 5,012 miles from July 28 to 30.

France won a new world record for distance covered in a closed circuit when J. LeBrix and M. Doret in "The Hyphen" flew 6,445 miles from June 7 to 10, returning to their starting place without refueling.

The longest duration flight so far made without refueling, returning to point of departure, was made from May 25 to 28 by Walter E. Lees and F. A. Brossy, who stayed in the air for 84 hours 32 minutes.

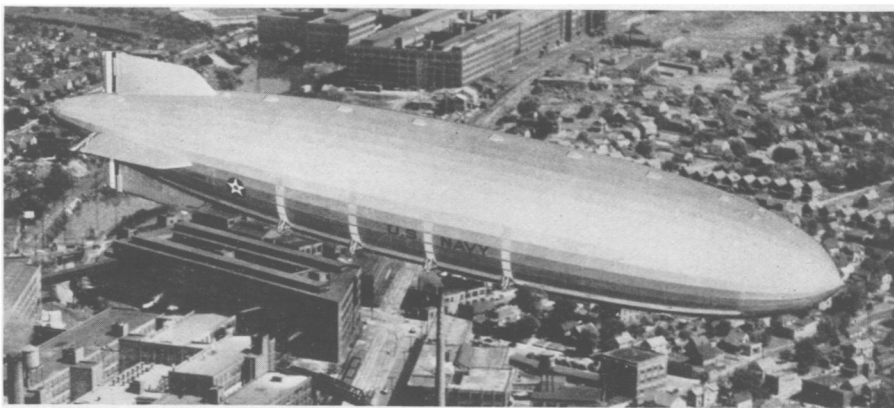
Construction was begun in the Goodyear air dock at Akron, Ohio, on a new airship to be as large, if not larger, than the Akron.

In certain types of airplanes carbon monoxide may be present in sufficient quantity to produce symptoms in the pilot and other occupants, it was found by investigators in the Bureau of Medicine and Surgery of the U. S. Navy, who cooperated in the development of a special instrument to detect such small amounts of the gas and who found the means to eliminate it.

Several new women's records were established during the year: Mme. Maryse Bastie, of France, stayed longest in the air without refueling, 37 hours 55 minutes; a record refueling flight was made in the U. S. by Miss Evelyn (Bobby) Trout and Miss Edna Cooper, who stayed up 123 hours; Miss Ruth Nichols made an altitude record when she climbed to 28,743 feet, a speed record at 211 miles per hour, and an airline distance record of 1,978 miles.

### Anthropology and Archaeology

Tree-ring studies, which have already enabled archaeologists to date Southwestern pueblos as far back as 700 A. D., were pur-



**LARGEST AIRSHIP IN THE WORLD**

*The Akron, nearly twice the size of the Graf Zeppelin, was completed and commissioned in the U. S. Navy as the outstanding aeronautical achievement of 1931.*

sued to even earlier centuries by Dr. E. A. Douglass of the University of Arizona.

The first dictionary of the hieroglyphics used by the Mayan Indians of Yucatan was produced by Dr. William Gates of the Johns Hopkins University.

Exploring the ruins of an old Empire Mayan site, Yachilan, in Mexico, archaeologists of the Carnegie Institution unearthed twelve important hieroglyphic monuments, and also sculptured steps, door lintels and other architectural features.

A new theory, that the Old Mayan Empire fell because lakes of the region dried up, caused disease and cut off water highways, was advanced by Dr. C. Wythe Cooke, of the U. S. Geological Survey.

A round temple in five superimposed layers, built by the Aztecs, was uncovered at Calixtlahuaca, by Mexican archaeologists.

The Shippee-Johnson Peruvian Expedition mapped important Incan and pre-Incan ruins from the air and verified the existence of a "great wall" in Peru.

A stone dart point of the apparently very ancient "Folsom" type was found in Nebraska, buried under the shoulder-blade of an elephant, in the course of excavations by the Hastings Museum.

Slate dart points of comparatively recent date, with side grooves somewhat like those of the "Folsom" points, were brought back from Alaska by Dr. Ales Hrdlicka, of the U. S. National Museum.

Seminole Indians in Florida were visited by Frances Densmore, for the Bureau of American Ethnology, who recorded many of their songs and customs.

Elaborate earthworks left by prehistoric mound-building Indians in the Everglades, Florida, were discovered by M. W. Stirling, chief of the Bureau of American Ethnology.

Relics of early cave cultures, unlike any known Indian types, were found in a Texas cave by F. M. Setzler, U. S. National Museum, and in an Arkansas cave by W. M. Walker, Bureau of American Ethnology.

The identification of eight different physical types in 1,254 burials in Pecos Pueblo, representing a thousand years of an ancient American settlement, was made by Dr. E. A. Hooton, of the Peabody Museum of Harvard.

A new Laboratory of Anthropology, the first in the United States, was officially opened in the hills of Santa Fe, New Mexico.

The new Oriental Institute of the University of Chicago was formally opened on December 5.

An aerial survey of Hadrian's Wall, relic of Roman Britain, was made by the Royal Air Force, and four temporary camps, previously undetected, were located.

First specimens of Old Stone Age art of the Aurignacian period ever found in Germany were revealed as the result of exploration in a cavern in Westphalia by Dr. Julius Andree of the University of Münster.

An entire city block in the ruined city of Olynthus, Macedonia, was excavated and two cemeteries of the city were found by a Johns Hopkins University expedition led by Dr. David M. Robinson.

Foundations of two stoas, sculptures, inscriptions, and many small objects were unearthed in the Athenian Agora by Prof. T. Leslie Shear, field director for the American School of Classical Studies at Athens.

Discovery of an elaborate temple-tomb in the House of Minos, in Crete, was reported by Sir Arthur Evans, British archaeologist.

A city of the dead containing inscriptions and objects very like the Etruscan was unearthed on the Island of Lemnos in the Aegean Sea by the Italian Archaeological Institute.

Discovery of eighty inscriptions and some fine sculptures at Minturno, by the University of Pennsylvania Museum, was reported from the first non-Italian entry into the field of Italian archaeology.

A great cemetery containing the remains and treasured possessions of an unknown people, 4,000 years old, was unearthed at Tepe Hissar, Persia, by a joint expedition of the University of Pennsylvania Museum and the Pennsylvania Museum of Art.

The Philistine stronghold of Gaza existed on two separate sites, and the older site was inhabited and abandoned before 2000 B. C., Sir W. M. Flinders Petrie, of the British School of Egyptian Archaeology, reported.

Three letters cut into a scrap of pottery, seen by chance by Prof. R. T. Butin of the Catholic University of America, were pronounced by him to be the oldest alphabet writing ever found in Palestine and evidence that the Canaanites of about 1900 B. C. were familiar with an alphabet.

Brick ruins unearthed in Nineveh by the British Museum expedition were identified as the long-sought temple to Ishtar, patron goddess of the city.

Royal Sumerian tombs more than 5,500 years old were opened and explored in Kish by the Field Museum—Oxford Joint Expedition to Mesopotamia.

An Egyptian town of the New Stone Age, containing remains of huts, grain pits, tools, and burials, was found in the West Delta of the Nile by an expedition of the Vienna Academy of Sciences.

The rare find of an unlooted Egyptian tomb as old as 2900 B. C. was made at Giza during excavations by the Egyptian University.

## Astronomy

A brilliant display of Leonid meteors greater than any shower since the famous one of 1866 was observed in November of this year; astronomers predicted another great shower in 1932.

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

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

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

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

The star Antares was observed as a disc, not as the point of light that a star usually presents, when Prof. K. Nakamura of the Kwasan Observatory, Kyoto, Japan, watched



### CELESTIAL FIREWORKS

*A brilliant display of Leonid meteors, greater than any shower since the famous one of 1866, was observed during November of 1931.*

it reappear from behind the moon at the occultation on January 15.

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

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

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

Five eclipses, three of the sun and two of the moon, occurred during the year.

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

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

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

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

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

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

A new comet, so bright that it might have

been found with the naked eye, was discovered by Percy M. Ryves, an English amateur astronomer at Zaragoza, Spain.

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

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

## Biology

Bacteria, visible under the microscope, were changed to invisible, filterable phases when Dr. Arthur I. Kendall of Northwestern University Medical School placed them in a new medium containing protein; he was also able to return them to visible form, and grew filterable viruses in the new medium, and, through the new Rife microscope, saw them as tiny oval blue bodies.

A new weapon to combat the dread disease paresis was made available to medicine when Dr. Frederick Ebersson and William G. Mossman of Mt. Zion Hospital in San Francisco succeeded in growing artificially in the laboratory a harmless germ capable of causing a curative fever without itself producing any disease.

Six generations of the organism causing infantile paralysis were for the first time successfully grown outside the human body at Mt. Zion Hospital, San Francisco, by Dr. Frederick Ebersson, director of the clinical laboratories.

The first United States plant patent was issued to Henry F. Bosenberg of New Brunswick, N. J., for an everblooming rose derived from the familiar Van Fleet.

A true "plague of locusts" descended on parts of the West during the summer, in one of the worst "grasshopper years" of recent record; locusts were also troublesome in parts of the Old World.

In an effort to prevent the extinction of the wisent, or European bison, nearly wiped out as a result of the war, all the pure-blood cows of breeding age were removed from scattered zoological parks on the Continent and concentrated in a preserve in the Bialowicz Forest in Poland. Surplus males are being bred to American bison cows in another preserve at Springe, Germany, to build up a "reserve" stock of wisent-bison hybrids. The two stocks are kept strictly separated.

The extent to which so-called identical twins resemble each other depends upon the stage of development reached by the cell mass of the embryo at the time it separates to form the two distinct individuals, was the theory proposed by Dr. H. H. Newman of the University of Chicago, who has found that Siamese twins look and act much less alike than do separate identical twins.

A physiological incompatibility was discovered to exist between some male reproductive elements and some female reproductive tissue which might account for childlessness where neither mate is sterile; this was discovered by Dr. Raphael Kurzrok and Prof. Charles C. Lieb of Columbia University.

That a tendency to long life is inherited from long-lived ancestors was confirmed by Dr. Raymond Pearl and his associates in the department of biology of the School of Hygiene and Public Health of the Johns Hopkins University.

## Chemistry

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

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

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

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

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

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

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

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

That the chemical para-ethoxy-phenyl-thiocarbamide is intensely bitter to some persons, but tasteless to others, was discovered by Dr. Arthur L. Fox, du Pont chemist.

Prof. L. H. Snyder of Ohio State University, and Dr. A. F. Blakeslee of the Carnegie Institution of Washington, working independently, found the "taste blindness" to para-ethoxy-phenyl-thio-carbamide to be a recessive hereditary trait.

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

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

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

Methyl, the atomic grouping found in poisonous wood alcohol, was isolated as a free radical for a small fraction of a second

by Prof. F. Paneth and W. Hofeditz, University of Königsberg, Germany.

Sir Robert Hadfield, father of modern alloy steels, revealed that analyses of 79 specimens of steels and alloys belonging to Michael Faraday show that Faraday anticipated present developments of stainless and other special alloy steels.

## Engineering

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

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

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

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

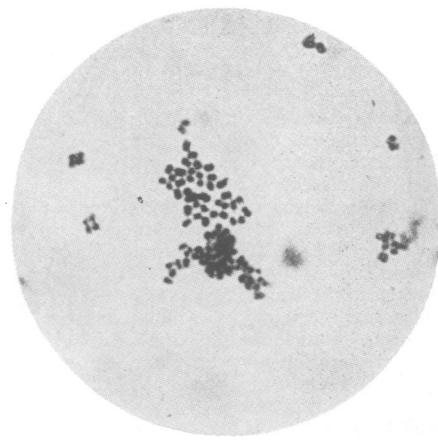
The Diesel engine was adapted to a racing automobile by C. L. Cummins, of Columbus, Ind., in a car that would burn crude oil and would run at 100 miles per hour for 1,200 miles without refueling.

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

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

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

The development of a new type of electric illuminating unit, a refinement of the Claude neon light, which is said to use much less power than that required by present in-



### THE INVISIBLE MADE VISIBLE

*Influenza germs, cultivated on a new type of medium, were seen during 1931 for the first time. With the use of the new Rife microscope living units of the filterable phase of the typhoid bacillus, hitherto invisible, were also seen.*

candescant filament bulbs and gives softer, more uniform light was announced.

Successful operation of a motor designed to use the energy of exploding coal dust or cheap vegetable powders was reported by Rudolph Pawlikowski of Gorlitz, Germany.

A new kind of engine that uses liquid water instead of steam, discarding boilers and condensers, and is said to develop more power in less space than ordinary steam and gas engines, with freedom from explosion hazards and heat wastes, was invented by J. F. J. Malone of Newcastle, England.

An electric lamp converting current into light completely without producing heat at the same time, but requiring the use of an outside source of heat, was operated in a laboratory experiment by Dr. M. Pirani, German engineer.

An experimental power plant which generates electricity continuously from the ebb and flow of the tides was put in operation on the Bristol Channel, England.

## Geology and Geography

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

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

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

Five destructive hurricanes occurred.

Seismological reports of 54 earthquakes were collected and epicenters located by Science Service in cooperation with the U. S. Coast and Geodetic Survey and the Jesuit Seismological Association; these included eleven destructive shocks, of which five were severely destructive in populated regions of Mexico, Jugoslavia, the Balkans, Nicaragua, and Transcaucasia.

A rock fall changed the familiar contours of Niagara Falls.

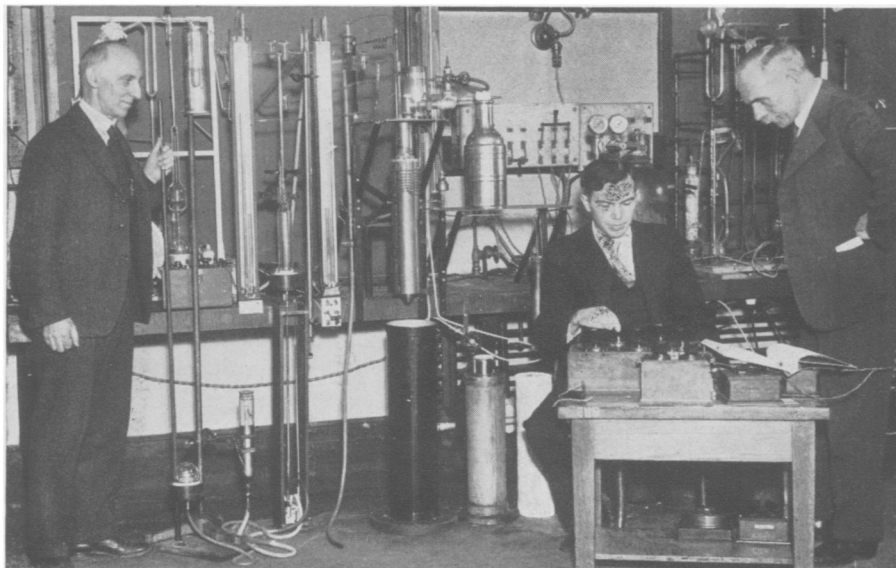
The age of the earth is at least two thousand million years, a National Research Council committee estimated, reviewing evidence given by radioactive minerals.

The world's largest meteorite yet discovered, a mass of iron and nickel weighing some 70 to 80 tons and measuring nearly fourteen feet long, was reported found by a Johannesburg land surveyor in the Tanganyika region of Africa.

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

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

Fossil plants on St. Lawrence Island are direct evidence that the island is a fragment of the old land bridge which presumably linked Asia and America long ago, it was



## NEARING ABSOLUTE ZERO

*Low temperature apparatus at the U. S. Bureau of Standards which was used during 1931 to discover hydrogen atoms of double weight and to liquefy helium for the first time in the United States.*

reported by Dr. Ralph W. Chaney, of the Carnegie Institution of Washington.

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

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

## Medicine

Despite the economic depression, the health of the country was generally good, the U. S. Public Health Service reported.

Life insurance statistics for the first eleven months showed the lowest death rate ever recorded for the United States and Canada.

A severe epidemic of infantile paralysis occurred, chiefly in New York, New England, New Jersey, Michigan, Minnesota and Wisconsin.

A sharp outbreak of influenza occurred during the first three months of the year.

Fleas were found to be carriers of typhus fever, previously thought to be carried only by the body louse, as a result of experiments by Drs. R. E. Dyer, A. S. Rumreich and L. F. Badger of the U. S. Public Health Service.

That death may be caused by a lack of magnesium in the diet through a disturbance of the adrenal glands was discovered by Dr. E. V. McCollum and Dr. Elsa Orent of Johns Hopkins School of Hygiene and Public Health.

That the formation by the pituitary gland of a hormone governing certain sexual functions is in some way related to the manganese of the diet was discovered by Dr. E. V. McCollum of the Johns Hopkins School of Hygiene and Public Health.

Discovery that deafness is caused by an unnatural increase or decrease in the rigidity of the tiny bones of the ear known as the ossicles and that pressure on the round window membrane of the ear increases the perception of spoken words and nearly all tones by 50 per cent. was made by Dr. S. J.

Crowe of the Johns Hopkins Hospital and Medical School.

A new type of deafness due to spasm of the bone and muscle apparatus of the middle ear and of the eardrum, and also a method of relieving it, was discovered by Dr. E. M. Josephson of New York.

Persons may be rendered immune to diseases without developing a hypersensitiveness to the particular germ against which they are immunized, it was found by Dr. Arnold R. Rich of the Johns Hopkins Medical School.

A new secondary, or portal, system of blood circulation conveying blood directly from the pituitary gland to the mid-brain was discovered by Dr. Gregor Popa and Una Fielding of University College, London.

A forward step in the battle against leprosy was reported when Dr. Earl B. McKinley of the George Washington University Medical School and Dr. Malcolm H. Soule of the University of Michigan announced that they had isolated the organism which presumably causes this disease and had grown it outside the human body.

Discovery of the hitherto unknown germ of smallpox was announced by Prof. J. C. G. Ledingham, director of the Lister Institute of London.

A new hormone, sympathin, similar to the powerful adrenalin, was discovered by Prof. Walter B. Cannon of the Harvard Medical School, and is believed by him to be formed in the muscle cells by the action of an impulse from the nerves.

A serum was developed by Dr. W. C. Hueper, assisted by Miss Mary Russell, both of the Cancer Research Laboratory of the University of Pennsylvania, which may lead to the conquest of the fatal disease, leukemia, in which the white blood cells multiply riotously.

A re-enforced attack on drug addiction was made by the U. S. Bureau of Narcotics, the U. S. Public Health Service, the American Medical Association and a special committee of the National Research Council; in the course of which two (*Turn to page 410*)





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(Continued from page 407)

research laboratories were established, one at the University of Virginia for chemical analyses and syntheses of alkaloid substances and the other at the University of Michigan for the biological testing of narcotics and their substitutes.

A new cascade 1,000,000 volt X-ray tube was made by the General Electric Co. and installed at the New York Memorial Hospital to provide more intense radiation for cancer treatment than could be produced by all the world's available radium.

Evidence that Rocky Mountain spotted fever occurs on the eastern seaboard as well as in several western states was reported by Drs. R. F. Dyer, L. F. Badger and A. S. Rumreich of the U. S. Public Health Service.

The wood tick which causes tularemia, Rocky Mountain spotted fever, and Colorado tick fever was found to be the cause of a strange type of paralysis in humans, dogs, sheep, foxes and to some extent in cattle by investigators of the U. S. Public Health Service.

A remedy for ringworm of the feet, popularly known as athlete's foot, was found in sodium thiosulphate by Dr. William L. Gould of Albany, N. Y.

The successful use of digestive ferments to prevent the formation of adhesions was reported by Dr. Alton Ochsner and Dr. Earl Garside of Tulane University.

The discovery that an extract of the parathyroid gland of cattle will restrict growth without injury to the health was made by a young English biochemist, J. H. Thompson, and may be of great value in the treatment of cancer.

Diet was found to be definitely not responsible for the development of cancer, as a result of experiments on mice conducted by Sir Leonard Hill, British scientist.

Efforts to find a diagnostic test for early cancer continued; Dr. S. G. T. Bendien of Zeist, Holland, and Dr. Hans Jacques Fuchs of Berlin each announced one based on examination of the blood.

Two new anesthetics were announced: one, related to the well-known drug veronal, which puts the patient to sleep quicker and yet allows him to recover sooner, was produced by Dr. H. A. Shonle of the Lilly Research Laboratories from alcohol, barbituric acid, and amyl; the other, a general anesthetic related to ether and ethylene, but more rapid and efficient than ether, chloroform, or the anesthetic gases, was discovered, in accordance with his own prediction, by Dr. C. D. Leake, at the University of California Medical School.

A method of treating pellagra was reported by Dr. Ibrahim Sabry, of the Government Hospital, Alexandria, Egypt, who believes the disease to be caused by a poison found chiefly in beans instead of by a dietary deficiency as has been supposed.

Viosterol, or irradiated ergosterol, often given to children in place of cod liver oil, was found to be a new and effective treatment for radium poisoning such as that developed by workers on radium-dial watches, it was reported by Dr. Frederick B. Flinn, of Columbia University.

Improvement in the hitherto hopeless condition known as multiple sclerosis, or creeping paralysis, through use of high frequency electric currents, was reported by Drs. William H. Schmidt and Benjamin Weiss, of Jefferson Medical College.

## AN INVITATION

*to the*

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That calcium chloride relieves the intense pain of lead colic, gallstone colic and ureteral colic was discovered by Drs. Walter Bauer, William T. Salter and Joseph C. Aub of the Massachusetts General Hospital, Boston.

Ergot, an important drug, which naturally grows only as a parasite on living plants, was successfully raised in a flask by Adelia McCrea of the University of Michigan.

The danger of burns during X-ray treatments has been greatly lessened by the completion of apparatus designed by Dr. Lauriston Taylor of the National Bureau of Standards to measure the intensity of X-ray doses.

A new method of saving the lives of those who have swallowed the poison bichloride of mercury was developed by Dr. Samuel Berger of Cleveland; it consists of an opening into the cecum, and a flushing with water through this opening.

A safe and apparently certain treatment for hookworm was found in the synthetic antiseptic hexylresorcinol by Dr. Veader Leonard, of the Johns Hopkins University.

## Physics

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

The energy of the mysterious inner core of the atom is probably in quanta, or definite small amounts or parcels, just as it is on the outside, Drs. J. C. Chadwick, J. E. R. Constable and E. C. Pollard of the Univer-

sity of Cambridge discovered through a bombardment of atom nuclei with fast moving alpha particles from polonium.

X-rays can be made to produce a weak radioactivity in lead, causing its atoms to fly to pieces in a manner similar to the disintegration of spontaneously radioactive radium, it was discovered by a Russian scientist, Prof. G. I. Pokrowski of Moscow.

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

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

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

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

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

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

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

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

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

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

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

X-rays were produced without the use of X-ray tubes, by M. G. Rebol of the Physics Laboratory, Montpellier, France, by driving electric currents through solids like magnesia,

# HOW science is being explained to the Public

Now in its second decade, Science Service as the institution for the popularization of science employs a variety of methods and channels in the distribution and interpretation of science to the public at large.

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Scores of daily newspapers rely on Science Service for their science news. By telegraph and by mail the important developments in every science field are reported by our staff scientist-writers and correspondents in science centers. By telegraph and mail ten syndicate services are sent to subscribing newspapers: 1. Daily wire report, 2. Daily mail report, 3. Weekly news feature page, 4. Weekly science shorts, 5. Special feature series, 6. Preparedness, 7. Monthly star map and article, 8. Daily Why the Weather, 9. Weekly Isn't It Odd, 10. Sunday science feature page.

## Magazines

SCIENCE NEWS LETTER, Science Service's weekly magazine, is reaching increasing numbers of readers. Science departments are furnished several other magazines regularly and special magazine articles are prepared frequently by Science Service staff members.

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Cooperating with established book publishers, Science Service arranges for the writing, editing and issuing of popular and technical books on all fields of science.

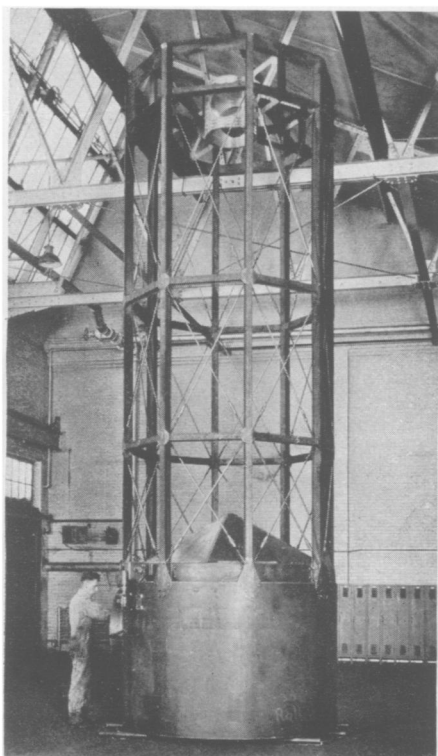
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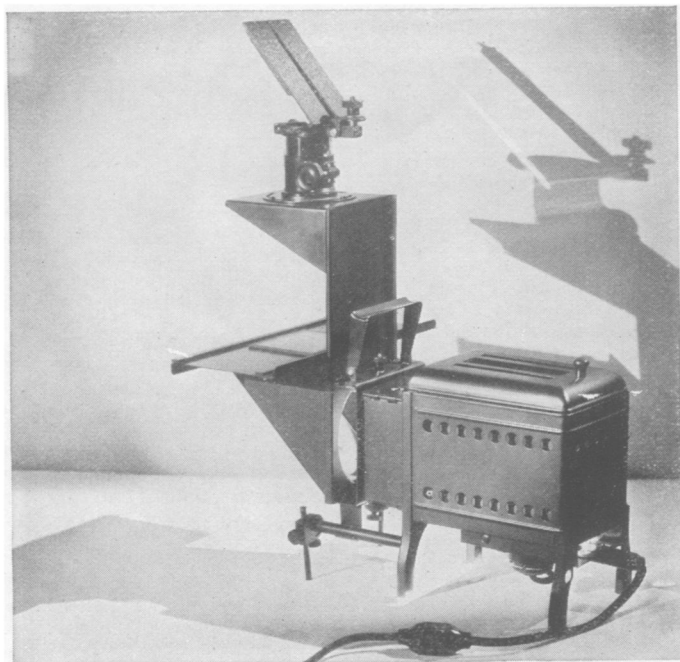
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alum, and yellow oxide of mercury, which have high electric resistance.

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

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

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

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

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

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

## Psychology, Psychiatry

Mental changes throughout the human life span were measured by Dr. W. R. Miles of Stanford University by giving the same psychological tests to 720 persons ranging in age from seven to 92.

A fundamental difference between the minds of humans and of monkeys is that humans are capable of symbolic thought while monkeys excel in mere habit formation, experiments completed by Dr. Louis W. Gellerman of Yale showed.

It is theoretically possible for inanimate matter to learn and remember in much the same manner that conditioned reflexes are formed in human beings Dr. N. Rashevsky, of the Research Laboratories, Westinghouse Electric Co., demonstrated.

The generally accepted theory of how the sense of balance operates was upset when Dr. Franklin Fearing of Northwestern University found that portions of the semi-circular canal may be removed, preventing any flow of liquid through that part of the canal, without interfering with ability to maintain the equilibrium.

Measuring the pressure of infants' sucking was the new and completely objective method of finding the threshold of taste and temperature devised by Dr. Kai Jensen of the Connecticut Agricultural College.

Behavior difficulties as well as reading and writing difficulties are caused, Dr. Ira S. Wile, of New York, reported, by the use of the right hand in naturally left-handed individuals.

The theory that stuttering is caused when neither hemisphere of the brain is sufficiently dominant and each half works independently, causing confusion in the nervous

## Is Red Hotter Than Green?

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**CLASSIC OF SCIENCE**

To be published in the January 9 issue

system, was advanced by Dr. Lee Edward Travis, of the State University of Iowa.

Food preferences and aversions are not meaningless whims but tend to follow definite laws, Dr. Paul T. Young, of the University of Illinois, demonstrated with rats.

Memorizing material as a whole rather than split up in sections is easier only when it is a closely related whole, Dr. Leland W. Crafts of New York University found as a result of experiments.

An emotional and mental condition resembling the effects of alcohol or temporary insanity results from a lack of oxygen such as that experienced at high altitudes, it was found from experiments conducted at Columbia University by Dr. Ross A. McFarland.

A deficiency of iron in the brain cells of those who have died with the mental disorder dementia praecox was discovered by Dr. Walter Freeman of St. Elizabeth's Hospital, Washington, D. C., and is believed by him to be a possible explanation of the symptoms of that disease.

A new theory that insanity depends upon the state of coagulation of the brain colloids was advanced by Dr. Wilder D. Bancroft and Dr. G. Holmes Richter of Cornell.



**BOTANICAL CALENDAR**

*Tree ring sections which give dates to ancient history were studied by Dr. A. E. Douglass. He received a research award for his work.*

A new use for small doses of the anesthetic sodium amyral, was found by Dr. Erich Lindemann of the Psychopathic Hospital, State University of Iowa, who discovered that it would make reserved persons, both normal and insane, talk freely.

More than a tenth of patients with the mental disease dementia praecox suffer from thyroid deficiency, it was estimated by Dr. R. G. Hoskins and Francis H. Sleeper of the Memorial Foundation for Neuro-Endocrine Research, who reported success with the thyroid treatment for this disease.

### Recognitions, Awards

The Nobel prize in chemistry was divided between Dr. Friedrich C. R. Bergius of Heidelberg and Dr. Carl Bosch, head of the German I. G. Farbenindustrie, for their development of the hydrogenation process of liquefying coal to obtain motor fuels, lubricating oils, methanol, and other chemical substances.

The Nobel prize in medicine for 1931 was awarded to Prof. Otto Warburg of the Kaiser Wilhelm Institute for Biology, Berlin, for his important contributions in the fields of cancer, biological physics, and the respiratory function of the tissues.

Dr. William Wallace Campbell, director emeritus of the Lick Observatory and president emeritus of the University of California, was elected president of the National Academy of Sciences.

Dr. Franz Boas, of Columbia University, anthropologist, was elected president of the American Association for the Advancement of Science.

The Perkin medal was awarded by the American Section of the Society of Chemical Industry to Dr. Charles F. Burgess, of the Burgess Laboratories, Madison, Wis.

The Rumford medal was awarded by the American Academy of Arts and Sciences to Prof. Karl T. Compton, president of the Massachusetts Institute of Technology.

For his researches on plant cultivation, including the taming of the wild blueberry, Dr. Frederick V. Coville, of the U. S. Department of Agriculture, was awarded the George Robert White gold medal of honor by the Massachusetts Horticultural Society.

The 1931 Catherine Wolfe Bruce gold medal of the Astronomical Society of the Pacific, for "distinguished services to astronomy," was awarded to Dr. Willem de Sitter, Dutch astronomer.

The Royal Astronomical Society's gold medal was given to Dr. Willem de Sitter, Dutch astronomer.

For their contributions to science in finding methods of accurately counting the years back many uncalendared centuries, Dr. A. E. Douglass of the University of Arizona and Dr. Ernst Antevs of the University of Stockholm were given the Research Corporation plaque and prize of \$2,500.

Dr. Phillip Drinker and L. A. Shaw, inventors of the Drinker Respirator, which has proved invaluable in the treatment of infantile paralysis, asphyxiation, and diseases of the lungs, were awarded the John Scott medal by the city of Philadelphia.

The gold medal of the American Medical Association was awarded this year to Dr. Jacob Furth, of the Henry Phipps Institute of the University of Pennsylvania, for his original investigative work on experimental leukemia, a fatal disease characterized by an increase of white blood corpuscles in the blood.

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The Capper award founded by Sen. Arthur Capper of Kansas, consisting of a gold medal and five thousand dollars cash was given to Dr. L. O. Howard, former chief of the Bureau of Entomology, for his distinguished service in leading the army of science against the armies of insects that threaten man's crops, his forests, his house and his health.

Franklin medals were presented to Sir James Jeans, British astronomer, and Dr. W. R. Whitney, director of the research laboratories of the General Electric Company.

The Willard Gibbs medal was given to Dr. P. A. Levene of the Rockefeller Institute for Medical Research for his application of organic chemistry to biologic problems, especially in nucleic acids, amino sugars, and lecithins.

The Frederick Ives medal of the Optical Society of America was awarded this year to Prof. Theodore Lyman of Harvard for his pioneer work in the ultraviolet spectrum of glowing hydrogen gas.

Dr. Henry Fairfield Osborn, president of the American Museum of Natural History, New York, was given the Daniel Giraud Elliot medal for 1929 awarded this year by the National Academy of Sciences in recognition of his monograph: "The Titanotheres of Ancient Wyoming, Dakota and Nebraska."

Linus Pauling of the California Institute of Technology, who has made important applications of the quantum theory to chemistry, was the first recipient of a new award given by the American Chemical Society for research in pure chemistry conducted by persons under 31 years of age.

The 1931 Edison medal of the American Institute of Electrical Engineers was awarded to Dr. Edwin Wilbur Rice, Jr., of the General Electric Company, pioneer in electrical engineering.

The first annual award given as a memorial to Dr. Thomas W. Salmon went to Dr. Adolph Meyer, noted psychiatrist of the Johns Hopkins Hospital, who delivered the Salmon Memorial Lectures for the year and received an honorarium of \$2,500.

Dr. Harlow Shapley, astronomer and director of the Harvard Observatory, and Dr. William Crocker, botanist and director of the Boyce Thompson Institute for Plant Research at Yonkers, were the recipients of the 1931 medals for outstanding scientific achievements given by the Society of Arts and Sciences.

C. W. Tombaugh, young assistant at the Lowell Observatory who first observed the trans-Neptunian planet, Pluto, was honored by the award of the Royal Astronomical Society's Hannah Jackson gift and medal. Mr. Tombaugh also received the first award of the Slosson Memorial Scholarship at the University of Kansas.

For their paper on high voltage tubes, Dr. M. A. Tuve, Dr. L. R. Hafstad and Odd Dahl of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, were awarded the \$1,000 prize at the Cleveland meeting of the American Association for the Advancement of Science.

The National Academy of Sciences awarded the Mary Clark Thompson medal to Dr. Edward Oscar Ulrich of the U. S. Geological Survey for his outstanding contributions to geology and paleontology.

The first annual prize of \$10,000 to be given by the Popular Science Monthly was divided between Dr. George H. Whipple of the University of Rochester School of Medicine and Dentistry and Dr. George R. Minot

of the Harvard University Medical School for their development of the liver treatment of anemia.

The American Chemical Society's Nichols medal was presented to John Arthur Wilson, industrial chemist of Milwaukee, Wis., for his outstanding achievements in colloid chemistry.

*Science News Letter, December 26, 1931*

#### GEOGRAPHY

### Loot From Half of Country Brought to One State

See Front Cover

**R**OBBERING half the United States, the Mississippi river lays its loot at the foot of Louisiana to add hundreds of acres to the area of that state each year. A graphic description of this process is found in the exhibit of the U. S. Coast and Geodetic Survey prepared for the meeting of the American Association for the Advancement of Science in New Orleans.

The graceful, slender strips of land pictured on the front cover are growing points of swamp along the edge of the delta as photographed in one of the Survey's first aerial mapping projects.

The sudden bursting of a new outlet for waters of the river through the swampy delta has at least twice in the history of the Coast and Geodetic surveys in this region resulted in the formation of thousands of acres of swampy land. Some time between the surveys of 1860 and 1868, for example, a "crevasse" broke through the eastern delta bank and by 1908 had been the cause of the formation of about 30,000 acres of swamp. Since 1908 this area has not increased very much, but a new crevasse has broken the river bank lower down stream to alter the map by the addition of about 10,000 acres.

While the newest delta lands are too swampy to be of value agriculturally, they do add to the fur-producing area of Louisiana, already famous as the source of animal pelts. Parts of the older delta, with its extremely rich soil, are plowed and planted to crops regularly.

*Science News Letter, December 26, 1931*

Latest census figures show that 40 per cent. of the families in the United States have radio sets.

Colorado has within its borders 43 mountain peaks which rise more than 14,000 feet above sea level.

Three new hybrid strawberries, suitable for different localities and different purposes, have been introduced by the U. S. Department of Agriculture.