to prevent contamination from other pens. Special equipment is provided also for the disposal of manure from pens where parasitized animals are being kept. There are also small oil moats, in some cases, to insure isolation of animals in certain types of experiments.

The laboratory building and other small buildings were designed by Dr. Lawrence A. Avery, who also planned the landscaping of the adjacent grounds in such a way as to utilize as much of the native topography and native shrubbery as possible. A ravine which lies at some distance from the buildings has been utilized by simulating a zoological park with pens and shelters for dogs that will be kept for experimental purposes.

RECENT DEATHS

DR. OTTO FOLIN, professor of biological chemistry in the Harvard Medical School, died on October 26, at the age of sixty-seven years.

A TELEGRAM from Eagle Lake, Fla., announces the death of Dr. Gilman A. Drew, until 1911 professor of biology at the University of Maine and resident assistant director of the Woods Hole Biological Laboratory from 1911 to 1926. Dr. Drew was in his sixty-sixth year.

DR. SAMUEL PARSONS MULLIKEN, professor of organic chemistry at the Massachusetts Institute of Technology, died in his seventieth year on October 24.

DR. WILLIAM CHITTENDEN LUSK, who for seventeen years until his retirement last June was professor of clinical surgery at the University and Bellevue Hospital Medical College, died on October 24 at the age of sixty-seven years. He was a brother of Dr. Graham Lusk, who died two years ago.

SIR JOHN AIRD, engineer of the great Assuan Dam in Egypt, died on October 20. He was seventy-two years old.

DR. RADÓ KÖVESLIGETHY, professor of cosmography and geophysics in the University of Budapest, died on October 12 at the age of seventy-two years. Professor Kövesligethy was a leading authority on seismology and was general secretary of the International Seismological Association from 1904 to 1916.

Nature reports the death of Professor Adalbert Fernau, director of the Institute for Radium Technology at Vienna, on August 30, aged fifty-six years.

ROSS ALBERT WELLS, since 1912 head of the department of mathematics and astronomy at Park College, died on October 8. A correspondent writes: "Professor Wells was a native of Ohio and received his education at Franklin College and the University of Michigan. Previous to his work at Park College he had served in the public school system in Ohio, was professor of mathematics at Bellevue College, and professor of mathematics and physics at Westminster College, Fulton, Missouri. He also served for several years on the staff of the summer school at the State Teachers College, Warrensburg, Mo. During the interval of 1920 to 1922, he was associate professor of mathematics at the State Normal College at Ypsilanti, Michigan. From 1918 to 1920, he also served as dean of Park College. He was a member of the Mathematical Association of America, the American Mathematical Society, the American Association of University Professors, and also was treasurer of the newly organized Missouri Academy of Sciences. Professor Wells was an exceptionally gifted teacher, and has made a definite contribution in the field in which he worked."

FRANK JULIAN SPRAGUE, inventor, consulting engineer of the Sprague Safety Control and Signal Corporation, died on October 25 at the age of seventy-seven years. Among Dr. Sprague's inventions are the modern trolley system, the multiple-unit system of electric railways and high-speed electric elevators. *The New York Times* writes editorially: "With Frank Julian Sprague has passed another of the brilliant group that Edison gathered around him in the brave days of the incandescent lamp when youth and imagination created electrical engineering. Office elevators, trolley cars, subway trains—Sprague left his impress upon them all. It was in London's smoky 'tube' that he conceived the idea of driving trains electrically. His opportunity came in Richmond, Va., where he gambled his last dollar on building a twelve-mile trolley road, a central power plant, forty cars with eighty motors and all the auxiliary apparatus, and this in the year 1888 when there were not a hundred motors in the world. The effect was immediate. The electric street railway was born. But it was the 'multiple unit' system of control that made him really famous. By placing motors on cars and lock-stepping them so that they could all be started and stopped at once by a mere turn of a handle, he made long subway trains possible. Had he lived but a few days longer he would have received the John Fritz Gold Medal for his achievements and thus become a member of a similarly honored group that includes Kelvin, Edison, Marconi, Pupin and Carty."

SCIENTIFIC NOTES AND NEWS

THE Nobel Prize in physiology and medicine has been awarded to Dr. George Richards Minot, director of the Thorndike Memorial Laboratory of the Boston City Hospital and professor in medicine at the Harvard Medical School; to Dr. William P. Murphy, of the Peter Bent Brigham Hospital and the Harvard

Medical School, and to Dr. George H. Whipple, professor of pathology and dean of the School of Medicine and Dentistry at the University of Rochester. The value of the prize is approximately $40,000.

THE degree of doctor of laws was conferred on Dr. Warfield T. Longcope, professor of medicine at the Johns Hopkins Medical School and physician-in-chief of the hospital, on the occasion of the installation of Colonel Amos W. W. Woodcock as president of St. Johns College, Annapolis.

DR. ARTHUR H. COMPTON, since 1923 professor of physics at the University of Chicago, this year George Eastman visiting professor at the University of Oxford, has been admitted as a supernumerary fellow of Balliol College.

DR. THE SVEDBERG, professor of physical chemistry at the University of Upsala, has been elected an honorary member of the German Colloid Society.

DR. CARL CHRISTENSEN, until his retirement curator of the Botanical Museum at Copenhagen, has been elected a corresponding member of the Field Museum of Natural History in recognition of "eminent services to the museum." Dr. Christensen has been instrumental in promoting the success of the joint botanical project of the Rockefeller Foundation and Field Museum to photograph type specimens of plants in European herbaria.

THE Sir Gilbert Blane Gold Medal for 1934 has been awarded by the Royal College of Surgeons, London, to Surgeon Lieutenant-Commander T. C. H. Neil.

A DINNER in honor of Professor E. G. Coker on the occasion of his retirement, after serving for twenty years, from the chair of engineering at University College, London, was held at the college on October 11. Lord Rutherford presided over a large gathering of the staff and former colleagues of the guest of honor. Tributes to Professor Coker were paid by the chairman and by Professor L. N. G. Filon. Professor Coker was afterwards presented with a check and a camera.

AT Cornell University, Benjamin D. Wilson, '18, agronomy; Frank L. Fairbanks, '10, agricultural engineering; Clive M. McCay, animal husbandry, and Dr. Maurice C. Bond, '28, agricultural economics and farm management extension, have been promoted to professorships. Drs. Allan C. Fraser, '13, and Roy G. Wiggans, '19, have been appointed assistant professors in plant breeding. New assistant professors by promotion are Frank B. Howe, agronomy; Forrest B. Wright, '24, agricultural engineering; John P. Willman, animal husbandry; Dr. Floyd A. Harper, '32, and Lowell C. Cunningham, agricultural economics and farm management, and Kenneth G. Parker, plant pathology.

DR. KORNEL LUDWIG TERPLAN, research professor of pathology at the School of Medicine of the University of Buffalo since 1930, has been appointed head of the department of pathology and bacteriology to succeed Dr. Herbert U. Williams, who retired recently.

DR. ARCHIBALD B. MACALLUM has resigned after many years service as dean of the University of Western Ontario Faculty of Medicine, London. Dr. Frederick J. H. Campbell, associate professor of medicine, has been made acting dean.

DR. W. J. TRJITZINSKY, of Northwestern University, has become an assistant professor of mathematics at the University of Illinois.

THE *Journal* of the American Medical Association reports that Dr. R. Fetscher, extraordinary professor of eugenics and biology as pertaining to heredity at the Dresden Polytechnicum, and Professor F. Dessauer, radiologist and ordinarius for medical physics at the University of Frankfort-on-Main, have been retired by reason of the new legislation.

FREDERICK D. RICHEY, associate chief, has been appointed chief of the Bureau of Plant Industry, in succession to Knowles A. Ryerson. Mr. Ryerson, who has been made head of a section of sub-tropical horticulture, will resume his earlier work with citrus fruits, avocados, dates and other tropical fruits. Mr. Richey has been associated with the bureau for more than twenty-three years.

MAUNSELL VAN RENSSELAER has been appointed assistant director of the Blaksley Botanic Garden of the Santa Barbara Museum of Natural History.

DR. A. RICHARD BLISS, JR., professor of pharmacology and dean of the School of Pharmacy of Howard College, Birmingham, Ala., has been appointed scientific consultant to the United Medicine Manufacturers of America, Inc.

STERLING L. REDMAN, who has been associated with the Central Scientific Company of Chicago for twenty years, during the past five of which he has served as its vice-president and sales-manager, has severed his connection with that company to establish a general apparatus and scientific supply business in San Francisco.

DR. H. C. THOMPSON, professor and head of the department of vegetable crops at Cornell University, recently returned from six months' sabbatic leave. He visited several of the important vegetable growing areas and agricultural colleges in the South and West. Dr. Ora Smith, assistant professor of vegetable crops,

has returned to the university from Washington, D. C., where he has been carrying on investigations for the past seven months as horticultural representative for the Production Credit Division of the Farm Credit Administration. Dr. Smith traveled through most of the important vegetable areas of the country consulting with the officers of the Production Credit Corporations and Production Credit Associations.

W. J. BAERG, of the University of Arkansas, has returned from a two months' stay in Mexico. The trip was made for the purpose of studying tarantulas and other so-called poisonous arthropods.

DR. LUCY BOYD, of the department of botany of the University of Edinburgh, and lecturer in the Craiglockhart Training College, Edinburgh, Scotland, is spending a year in the United States. She holds the Rose Sidgwick Memorial Fellowship and is spending the fall months continuing a study of monocotyledonous seedlings in the department of botany at Connecticut College, New London. She will spend the balance of the year at Cornell University.

THE second Harvey Society Lecture will be given by Dr. William Cumming Rose, professor of biochemistry at the University of Illinois at the New York Academy of Medicine on November 15, at 8:30 P. M. The subject of the lecture will be "The Significance of the Amino Acids in Nutrition."

DR. W. D. BIGELOW, director of the research laboratories of the National Canners Association of Washington, delivered the fourth Wiley Memorial address on "Food Preservation in Relation to Public Health" at the opening session of the Association of Official Agricultural Chemists which met at Washington under the presidency of Dr. R. Harcourt on October 29. Dr. Bigelow was the first assistant chief of the Bureau of Chemistry, U. S. Department of Agriculture, under Dr. H. W. Wiley, "father of the Pure Food Law" and the first president of the Association of Official Agricultural Chemists.

PROFESSOR S. W. RANSON, director of the Institute of Neurology of Northwestern University Medical School, delivered the Weir Mitchell oration before the College of Physicians of Philadelphia on October 17 on "The Hypothalamus: Its Significance for Visceral Innervation and Emotional Expression."

AT the meeting of the Philosophical Society of Washington on October 27 Dr. Lyman J. Briggs spoke on "The Flight of the Stratosphere Balloon *Explorer*," and Dr. L. B. Tuckerman on "Technical Difficulties in Stratosphere Ballooning."

DR. HENRY C. SHERMAN, Mitchill professor of chemistry at Columbia University, lectured at the Medical College of Virginia at Richmond on October 12 under the auspices of the Virginia Section of the American Chemical Society.

DR. DEAN BURK, of the Office of Fertilizer and Fixed Nitrogen Investigations of the Bureau of Chemistry and Soils, delivered a series of lectures on "The Metabolism of Azotobacter" from October 22 to 31 at the Iowa State College under the auspices of the departments of soils, bacteriology and biophysical chemistry. While there Dr. Burk also delivered an address on "The Photosynthesis Problem in Wheat and Algae" before the Iowa State College Chapter of the Sigma Xi.

THE Smith-Reed-Russell lecture for October at the School of Medicine of George Washington University was delivered by Dr. Robert U. Patterson, Surgeon-General, Medical Corps, United States Army, on "The History of Yellow and Typhoid Fevers in the United States Army." The annual banquet of the society was held on October 23 and addresses were given by Dr. Charles Wardell Stiles, U.S.P.H. (retired) on "The History of Hookworm Diseases in the New World" and by Dr. Henry B. Ward, permanent secretary of the American Association for the Advancement of Science, on "Salmon Psychology." Emeritus professors and faculty members elected to honorary membership included Drs. Sterling Ruffin, Kerfoot Shute, Huron Lawson, William K. Butler, Buckner M. Randolph, Custis Lee Hall and Jacob Kotz.

THE department of botany of Iowa State College will commemorate on November 15 and 16 six decades of the modern era in botanical science with four symposia entitled, "Teaching General Botany," "Good Teaching," "Erosion Prevention Capacity of Plant Cover," and "Applied Botanical Research of Maize." Speakers from twelve different institutions and two departments of the Federal Government are to be present.

PREVIOUS awards from the Elizabeth Thompson Science Fund have been reported in SCIENCE, October 20, 1933, and earlier. Since the last report the following awards have been made at the meeting of February 2, 1934: to Laurence Irving, University of Toronto, $225 for the purchase, transportation and maintenance of seals to be used in an investigation of the mechanism for conserving the oxygen supply of the body in diving animals; and to Miss Eleanor Mason, Womens Christian College, Madras, India, for apparatus to be used in a study of metabolism in relation to race and climate. The trustees of the Elizabeth Thompson Science Fund meet ordinarily during the last ten days of the months of February, May and November. Applications for grants should be sent well in advance of the next meeting, to be

held late in November, and should be addressed to the secretary of the Fund, Dr. A. C. Redfield, 20 Divinity Ave., Cambridge, Massachusetts.

To promote more effectively the active national movement toward wild life restoration the area comprised by New England, New York, New Jersey, Pennsylvania and Delaware has been organized under the direction of Dr. Bertrand E. Smith, regional director, with headquarters at the Massachusetts State College at Amherst. This regional organization will operate under the Division of Game Management of the Bureau of Biological Survey. Dr. Smith will have general direction of the work of environmental control, the conservation and protection of wild birds and animals, including the activities under the Migratory Bird Hunting Stamp Act, the Migratory Bird Treaty Act, the Lacey Act and other regulations enforced by the division. He will have general supervision of the activities. It is planned to develop a well-rounded educational program in the region to acquaint the general public with the work of the bureau.

A SPECIAL committee has been appointed at the University of Wisconsin which will consider the use to be made of the income from the $450,000 bequest for medical and surgical research left to the university by the late Jennie Bowman. Members of the committee are President Glenn Frank, Dean Charles R. Bardeen, of the Medical School, and Dr. E. B. Fred, dean of the Graduate School. The committee has been instructed to report as soon as feasible. The groundwork for the cancer research center at the university has already been laid through the work of Dr. Michael F. Guyer, professor of zoology, and his assistants.

THE joint settlement of the estates of Dick S. Ramsay, former president of the East River Savings Bank, New York City, and Miss Ione May Spears, his principal heir, will yield about $1,000,000 for charitable and educational institutions. Among other bequests the Brooklyn Institute of Arts and Sciences receives about $450,000.

THE new laboratories of materia medica and pharmacology in the Department of Preventive Medicine at the Welsh National School of Medicine, Cardiff, were opened on October 12 by Sir William James Thomas, the donor of the building. In the evening, Professor G. Grey Turner, of the University of Durham, delivered the opening address for the new session.

WALTER ELLIOT, British Minister of Agriculture, on September 6 turned over the deeds of the manor house, farm and lands of the Rothamsted Experimental Station at Harpenden, to the Lawes Agricultural Trust, in the presence of a large gathering.

AN Associated Press dispatch reports that ten thousand elm trees in and near New York City have been attacked by the Dutch elm disease which threatens to spread to upstate New York next spring. $155,000 has been appropriated by the state which will concentrate this winter on holding the disease within the present infected zone, thirty-five miles from the City Hall of New York.

MORE than 30,000 photographic negatives of type specimens of plants preserved in European herbaria have been made under the joint project of the Rockefeller Foundation and Field Museum of Natural History, Chicago, which has been in operation for the last five years. Through Field Museum these photographs are made available to botanists generally in the United States and other countries. With them botanists are enabled to make determinations of plants which formerly would have required visits to Europe for exact identifications.

A SURVEY intended to measure accurately the density, nature and distribution of air-borne pollen in the upper atmosphere has been inaugurated by the Philadelphia College of Pharmacy and Science. It will be carried on over the Philadelphia metropolitan area and from Atlantic City seaward for twenty miles. The survey is made by airplanes, each plane being equipped with an apparatus for taking in measured volumes of air. The first flight was made on Thursday, September 20. These flights will continue during the rest of the 1934 hay fever season and throughout the season the next four years. During the balance of this season the apparatus for collecting the air samples will be elaborated and perfected. Apparatus for collecting the air samples was developed in the Philadelphia College laboratories under the direction of Professor Frank N. Moerk. General direction of the survey is in the hands of Dean Charles H. LaWall, head of the department of bacteriology and hygiene, while Dr. Henry K. Seelaus and Dr. A. H. Zifferblatt, of the Philadelphia College Laboratory of Immunology, are in immediate charge. Identification and counting of pollen grains and other biological aspects of the survey is being directed by Dr. Marin S. Dunn, head of the biology department. It is hoped to enlarge the scope of the work to include a count of dust particles and bacteria. The airplanes with which the survey is being conducted were made available by Richard Mark, a hay fever sufferer and a patient of Dr. Seelaus and Dr. Zifferblatt.

A CORRESPONDENT of the London *Times* reports that on May 25 a meteorite had been presented to the British Museum by the Government of Southern Rhodesia. The stone, weighing 58 pounds and 11 ounces, has since been received, and it is now on exhibition in the Central Hall of the Natural History Museum, South Kensington. The meteorite fell at

12:45 P. M. on March 7, 1934, in the Mangwendi Native Reserve, 40 miles east of Salisbury. A brilliant meteor (fireball) was seen, and three loud detonations followed by a rushing noise were heard. The detonations were heard over a radius of 50 miles. The natives said, "The sun came rushing from the sky and buried itself in the earth," and they called the stone "Miminimini," meaning "something to make you gape." In its fall it broke off the branches of a tree and made a hole 3 feet across and 18 inches deep in stony ground. The stone itself was broken by the fall. In addition to the main mass several small pieces were recovered, and the weight of the whole must have been about 60 pounds. But this could have been only a fraction of the original weight when the stone entered the earth's atmosphere at a height of about 100 miles. Travelling with an initial velocity of 20 to 40 miles a second, the intense heat developed by the resistance of the air melted and dissipated material from the surface, causing a rapid diminution in size of the stone and in its velocity. Fortunately, the stone was secured soon after its fall by the officers of the Geological Survey of Southern Rhodesia, and in the Survey Laboratories at Salisbury it has been submitted to a detailed and complete chemical and petrographical investigation. There it was found that it consists mainly of stony matter with small proportions of metallic nickel-iron (3.17 per cent.) and iron sulphide (trolite, 4.98 per cent.). The stony portion consists of olivine, enstatite and felspar, forming a compacted mass of minute broken fragments with curious rounded grains (chondrules). The new Rhodesian meteorite is the fifth largest stone in the collection.

DISCUSSION

THE MOTION OF GLACIERS

MANY persons who are not especially concerned with other topics in the field of glaciology are interested in the problem of the nature of glacial flow. Accordingly, it seems not inappropriate that there should be a notice in SCIENCE of a paper[1] which, if not conclusive on this question, does give the mature view of a specialist, competent in physics and mathematics, who has given a lifetime to the observational, experimental and theoretical study of glaciers, namely, H. Hess, of Nurnberg. Moreover, the paper referred to is one that will be seen in the original only by the few who pursue similar studies. Further, the representations of Hess are now very fully in accord with the views of the undersigned, published a number of years ago but not then generally accepted.

Although a variety of theories of glacial flow have been formulated, most have been rejected at once because they were completely out of harmony with well-defined characteristics of glaciers observationally determined. During the past thirty or more years the question has resolved itself into a controversial attitude between a large group which adheres to the idea that glaciers are essentially rigid crystalline masses and flow through some manner of shear motion and another smaller group that considers such motion to be of the nature of a plastic or viscous yield. The shear concept implies spasmodic motion; the single breaks perhaps very small indeed, but nevertheless intermittent. If, however, the flow is viscous there should be continuous yield.

Accordingly the adherents to the shear theory have sought to demonstrate its correctness by securing graphic records through clock-controlled mechanisms that would show irregular increases and decreases in the rate of flow at the terminal parts of glaciers. In this endeavor they have been successful, even to the degree of showing differential motion of adjacent sections of ice. It has, however, long been contended by the author of this notice that demonstrated shear motion in the surficial and terminal parts of a glacier is not to be interpreted as evidence of the true nature of the flow of the ice as a glacial mass. That contention, among other things, is now upheld also by Hess.[2]

In the papers[3] by the author of this notice it was argued on the basis of many different kinds of evidence, some observational from glaciers in Alaska, some from experimental work with ice, that a glacier consists of an outer and terminal crust of rigid ice, carried along and shoved forward by a core of interior ice flowing viscously under the pressure of the exterior shell and existing at essentially the pressure-temperature melting point of ice, a temperature which declines with depth (because of the increase of pressure) to the bottom of the glacier. The viscous flow of the interior ice results from the presence of a liquid film of salt solution surrounding and separating the glacier grains. This film acts as a lubricating medium to facilitate the movement of the grains one past the other. It has been shown mathematically that such differential movement of very slight amount between the crystals will suffice in sum to account for all ob-

[1] H. Hess, "Das Eis der Erde," Handbuch der Geophysik, Bd. VII, Lieferung 1, Berlin, 1933.

[2] *Op. cit.*, pp. 80–81, 92–93.

[3] O. D. von Engeln, "Experimental Studies and Observations on Ice Structure," *Am. Jour. Science*, 190: 449–473, 1915; R. S. Tarr and O. D. von Engeln, "Experimental Studies of Ice with Reference to Glacier Structure and Motion," *Zeitschrift f. Gletscherkunde*, Bd. IX, pp. 82–139, 1915.