Edwin P. Hubble: 1889–1953

I. S. Bowen

Mount Wilson and Palomar Observatories, Pasadena, California

AMERICA has lost one of its most distinguished astronomers in the sudden death September 28, 1953, of Dr. Edwin P. Hubble. After the completion of his education at Oxford University and the University of Chicago and a brief term of service as an officer in the U.S. Army during World War I, Dr. Hubble joined the staff of the Mount Wilson Observatory in 1919. Within ten years after his arrival at this observatory he had revolutionized the concepts of astronomers as to the size and content of the universe.

Before 1920 astronomical measurements of distance had been limited to objects in the Milky Way system, and the universe was believed to consist essentially of this one great system of stars, having a diameter of about 100,000 light years. With the aid of the newly constructed 100-in. telescope, Hubble was able to resolve a representative group of spiral nebulae into stars and to identify some of these stars in terms of known stellar types. By comparing the apparent brightness of these stars with their previously determined absolute brightness he obtained an approximate measurement of the distance of the objects in which they were found. These distances at once indicated that these nebulae have dimensions and total luminosities similar to our own Milky Way system. From these and further studies by Hubble it became evident that the universe consists not of a single stellar system such as the Milky Way but of some hundreds of millions of such systems extending at least out to the extreme range of the largest telescopes, a billion or more light years away.

In succeeding years Hubble and the department which he built carried out extensive studies of the distances, luminosities, masses, structures, and motions of these stellar systems which he named extragalactic nebulae. From spectroscopic observations it was shown that the nebulae are receding from us with velocities proportional to their distances; this leads to the concept of an expanding universe. These studies, many of which required the full power of the 100-in. telescope, emphasized the need of still greater telescopes and provided one of the chief reasons for the construction of the 200-in. Hale telescope on Palomar Mountain. Hubble assisted greatly in the design of this instrument and made the first observations with it. Since the start of the joint operations of the Mount Wilson and Palomar Observatories he served on the Observatory Committee and played a major role in planning the programs to be carried out by these observatories.

The very fundamental discoveries made by Dr. Hubble brought him many high honors. He was the recipient of numerous honorary degrees and other awards. He was a member of the National Academy of Sciences and the American Philosophical Society, and a foreign member of the Royal Astronomical Society, the Vienna Academy, and the French Academy of Sciences. For defense work in World War II he received the Medal for Merit.

Dr. Hubble's interests extended far beyond his own field of cosmology. As a student he had first trained for a career in law and had specialized in Roman law while a Rhodes scholar. He was admitted to the bar in Kentucky and practiced there for a short time before taking up his astronomical studies. He always retained a great interest in historical subjects and especially those related to the history of science. His competence and interest in the field of history was recognized by his election to the Board of Trustees of the Huntington Library.

News and Notes

Third International Biometric Conference

THE THIRD INTERNATIONAL BIOMETRIC CONFERENCE convened at the Hotel Grande Bretagne, Bellagio, Italy, Sept. 1, 1953, under the sponsorship of the International Biometric Society, an organization of individual members which forms a section of the International Union of Biological Sciences. The Conference was welcomed to Italy by C. Barigozzi and A. Buzzati-Traverso, after which G. Darmois of the University of Paris delivered his presidential address on "Dignités nouvelles de la Statistique dans la Recherche." The morning session continued with a symposium on the First Course in Biometry under the chairmanship of W. G. Cochran, with papers by L. Martin, G. Barbensi, C. I. Bliss, and A. Vessereau, and concluded with a business meeting. The afternoon program on Mathematical Problems in Genetics was chaired by A. Buzzati-Traverso and addressed by Sir Ronald Fisher, K. Mather, D. Lowry, and J. L. Lush.

The morning session on Sept. 2 concerned Methodological Problems in Biometry with G. M. Cox in the chair and papers by J. W. Hopkins, F. Anscombe, W. G. Cochran, M. Keuls, and M. J. R. Healy. Biometry in Immunology was the subject of the after-

noon session with J. Ipsen both serving as chairman and giving a paper, the other speakers were R. Prigge, L. B. Holt, and S. Peto. In the evening, exhibits on various biometrical subjects were presented by E. Morice, E. Olbrich, S. C. Pearce and G. H. Freeman, J. M. Tanner, and J. Dufrenoy and F. M. Goyan.

On Sept. 3 the morning session considered Biometric Methods in Agriculture, with P. V. Sukhatme presiding and papers given by F. Yates, V. G. Panse, T. N. Hoblyn and S. C. Pearce, and G. Rasch. In the afternoon, motor boats took members of the Conference and guests for an excursion on Lake Como, ending at Villa d'Este in Cernobbio for tea and returning about dusk. In the evening the Azienda Autonoma di Soggiorno di Bellagio entertained at a reception and dance at the Lido di Bellagio.

The program on Sept. 4 opened with papers on Functional Relations in Experimentation, with H. Wold as chairman and D. J. Finney and J. Berkson as speakers, and continued with a second session on Mathematical Problems in Genetics, F. Yates presiding over papers by A. R. G. Owen and C. A. B. Smith. A noon business meeting on the Society journal *Biometrics* was chaired by editor G. M. Cox and considered editorial policy and procedure. The afternoon was devoted to contributed papers by A. F. Parker-Rhodes, D. W. Gooddall, G. Karreman, M. Frechet, and G. Teissier, under the chairmanship of M. J. R. Healy. That evening the Conference enjoyed a banquet at the Grand Hotel Villa Serbelloni.

In the morning of Sept. 5 the program concerned Industrial Applications of Biometry, with A. Linder presiding, and papers by E. A. G. Knowles, D. R. Read, and H. C. Hamaker. The closing business session heard and approved a report by the Committee on the Teaching of Biometry presented by its chairman, W. G. Cochran. It then adopted a series of resolutions, of which several expressed the appreciation of the Conference for the arrangements which made the occasion so enjoyable, especially the splendid work of Luigi Cavalli-Sforza and his colleagues on the Organizing Committee. In another resolution the Conference noted the great importance of biometric method in the design of biological investigations, both pure and applied, and in the analysis of their results. In view of the social and economic importance of research in applied biology, governments and universities were urged to establish integrated instruction in biometry which would cover both the statistical and mathematical aspects of pure and applied biology. Following a discussion of tentative plans for an International Biometric Symposium in 1955 and a fourth International Biometric Conference in 1958, the Conference adjourned.

Registration showed 125 participants, including 101 members of the Biometric Society and 12 official delegates. The United Kingdom was represented by the largest national group (27 registrants), followed by Italy and the U.S.A. (16 each), France (13), the Netherlands (11), Germany (8), and 18 other countries each with 4 or fewer participants. The general proceedings of the Conference will appear in the December issue of *Biometrics*, and many of the papers presented during the meeting will be published in the same journal through 1954.

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The 28th Session of the International Statistical Institute

The twenty-eighth session of the International Statistical Institute was held in Rome, Italy, Sept. 6–12, 1953. This section was also the fourth biennial postwar meeting of this organization, following the meetings that were held in the United States in 1947, Switzerland in 1949, and India in 1951. The Institute is the world's leading professional organization in the field of statistics. All the important international, national, and regional statistical societies are affiliated with the International Statistical Institute.

The agenda of the 28th session of the ISI covered the following topics: (1) application of statistics to the study of productivity problems in industry; (2) regional cooperation in statistics; (3) training in statistics; (4) general methodology and mathematical statistics; (5) population statistics; (6) agricultural statistics; (7) economic statistics; (8) industrial application of statistics; (9) social and cultural statistics.

About 180 scientific papers covering these fields were presented. In addition to delegates from various countries, delegates from various international and national statistical organizations were present. It is believed that this meeting was one of the best attended since the first session of the ISI, which was held in Rome in 1887. Over 400 persons registered for the session.

The meetings were held in the modern FAO Building, which has excellent facilities for scientific meetings that include the use of simultaneous translation equipment. The preparation by the Italian Government was of the highest quality. Some outstanding events were an address by the Prime Minister of Italy, a reception by Luigi Einaudi, President of Italy and a member of ISI, and an audience with His Holiness, Pope Pius XII who then spoke upon the role of statistics in modern society.

Stuart Rice of the U.S. was elected an honorary president of the ISI after having served as president for three terms. George Darmois of the University of Paris was elected president for the next two-year term. The next meeting of the Institute will be held in Rio de Janeiro in 1955.

Americans attending the conference were as follows: Stuart A. Rice, Charles A. Bicking, Joseph F. Cunningham, Calvert L. Dedrick, W. Edward Deming, Grover W. Ensley, W. Duane Evans, Frank R. Garfield, William R. Pabst, Jr., Samuel Weiss, F. Bernstein, C. I. Bliss, Grant I. Butterbaugh, W. G.

Cochran, M. A. Copeland, Gertrude Cox, Besse B. Day, Louis I. Dublin, John Durand, Milton Gilbert, Margaret Gurney, Robert C. Hamer, Harold Hotelling and Mrs. Hotelling, Simon Kuznets, William R. Leonard, Frank Lorimer, Oskar Morgenstern, Karl Pribram and Mrs. Pribram, Charles F. Roos, Hans Staehle, P. K. Whelpton, and Robert W. Woodbury.

SAMUEL WEISS

American Statistical Association
Washington, D. C.

Paul D. Foote and E. A. Eckhardt Retire

Paul D. Foote, vice president of the Gulf Oil Corporation and the Gulf Refining Company and executive vice president and director of the Gulf Research & Development Company, retired from active executive work on Dec. 31. Dr. Foote received the B.A. degree from Western Reserve University, the M.A. degree from the University of Nebraska, and the Ph.D. degree in physics from the University of Minnesota. From 1911 to 1916 he was associated with the National Bureau of Standards. As chief of the Pyrometry Section, he pioneered in the development of methods for temperature measurements and control in engineering and industrial processes. In 1916 he became assistant manager of the Fisher Scientific Company, where he shared in the invention of the F & F optical pyrometer and other temperature measuring equipment. He rejoined the Bureau of Standards in 1918, and in 1921 was appointed chief of the Sections on Radium, X-rays, and Atomic Structure. His initiation of the standardization of x-ray dosage for therapeutic treatment and for the protection of x-ray operators and patients led to the standard codes of practice in use today. In 1926, at the request of Secretary of Commerce Herbert Hoover, Dr. Foote undertook a special mission to Europe to report on engineering and medical developments in x-ray and radioactivity. Most of the radium in America at that time was measured and certified under Dr. Foote's direction, and it was he who handled a gift of radium to his friend Madame Curie.

He joined the Gulf organization in 1927 as senior fellow of the Gulf Fellowship at the Mellon Institute of Industrial Research in Pittsburgh, and during the next two years organized a coordinated program of research dealing with the production and transportation of petroleum. In 1933, the Gulf Research and Development Company was established with Dr. Foote as its executive vice president and director of research. He was elected a vice president of the Gulf Oil Corporation and the Gulf Refining Company in 1945. During both World Wars, he rendered valuable service to the United States Government. In World War I he engaged in various military technical projects, the most important of which was the organization and direction of the development of heat-controlled processes for the manufacture of high-grade optical glass. During World War II he was a consultant to the Office of Scientific Research & Development and a member of the Executive Committee for Anti-Submarine Warfare. Later he became a member of the Industrial Advisory Group of the Atomic Energy Commission and at present is a member of the Advisory Committee to Army Ordnance.

Dr. Foote organized and for many years edited the *Review of Scientific Instruments* and was also editor-in-chief of the *Journal of the Optical Society of America.* He is a past president of the American Physical Society, past vice president of the Washington Academy of Sciences, and past secretary of the Optical Society of America. He is coauthor of *Origin of Spectra* and of *Pyrometric Practice,* and author of more than 150 technical articles in the fields of radiation, atomic structure, capillarity, pyrometry, and petroleum technology. In 1951 he was awarded the Outstanding Achievement Gold Medal of the University of Minnesota, and in 1953 the honorary degree of Doctor of Science by the Carnegie Institute of Technology.

E. A. Eckhardt, vice president and associate director of research, Gulf Research & Development Company, retired from active service on Dec. 31. Dr. Eckhardt was a pioneer in geophysical prospecting for petroleum. As early as 1920, in a colloquium at the U.S. Geological Survey, he gave a talk on geophysical prospecting, probably the first of its kind in America. He received his education at the University of Pennsylvania, where he was awarded a B.S. degree in 1908 and a Ph.D. in 1912, both in the field of physics. From 1912 to 1913, as Harrison Research Fellow, he studied at the University of Göttingen, after which he returned to the University of Pennsylvania as assistant professor of physics, a post he held for four years. For the next eight years he was associated with the National Bureau of Standards. During this time, he proposed, built, and installed the first radio-acoustic ranging equipment for the U.S. Coast and Geodetic Survey, a system which, although greatly improved in detail, remains basically the same today. He also developed for the Survey a radio time recorder that greatly facilitated gravity measurements; devised methods and equipment for the accurate determination of the speed of sound in sea water; and contributed significantly to the foundamental knowledge of the acoustics of rooms, particularly auditoriums.

In 1928, after several years of effort toward the development of new and better geophysical techniques, Dr. Eckhardt joined the Research Department of the Gulf Production Company, in Pittsburgh, as staff geophysicist and later became assistant research director. He transferred to the Gulf Research & Development Company as assistant director when that Company was organized in 1933. He was elected vice president of Gulf Research in 1941, vice president of the Dominion Gulf Company (a Canadian subsidiary) in 1947, and was named associate director of Gulf Research in 1952.

Dr. Eckhardt contributed to the development of several significant war devices through military research at the Bureau of Standards during World War I, and for the National Defense Research Committee

during World War II. He has for some time been a lecturer in petroleum engineering in the Graduate Work in Industry Program of the University of Pittsburgh. Most recently he has been engaged in the application of geophysical techniques to prospecting from deposits of solid minerals. He is a past president and recently an honorary life member of the Society of Exploration Geophysicists; and past president of the Terrestrial Magnetism and Electricity Section of the American Geophysical Union.

Because of the retirements of Dr. Foote and Dr. Eckhardt, **Blaine B. Wescott** has been appointed director of research of the Gulf Research & Development Company, effective Jan. 1, and **Leo J. Peters** and **Jerry McAfee** have been named associate directors of research. Dr. Wescott also has been elected executive vice president of Gulf Research and a member of its Board of Directors. Dr. Peters and Dr. McAfee have been elected vice presidents of that company. All three men are veteran employees of the Gulf Companies.

Science News

An article in the January issue of *Cancer Research* leads the way to a greater understanding of **cell growth.** Nine new substances have been announced, after years of research at the McArdle Memorial Laboratory, University of Wisconsin Medical School, by a team working under Van R. Potter, professor of oncology. The present advances were made by Hanns Schmitz, on leave from the Cancer Research Institute of Heidelberg University, Germany, and R. B. Hulbert, who is now on leave to study at the Karolinska Institute, Stockholm, Sweden. The substances are guanosine monophosphate (GMP), guanosine diphosphate (GDP), guanosine triphosphate (GTP), cytidine monophosphate (CMP), cytidine diphosphate (CDP), cytidine triphosphate (CTP), uridine monophosphate (UMP), uridine diphosphate (UDP), and uridine triphosphate (UTP). Discovery of these nine building blocks in animal tissues brings to 12 the number of materials of this type known to be used by the body in growth processes.

A new synthesis that affords a potentially inexpensive and plentiful supply of **hydrocortisone** was reported at the Sixth Annual Scientific Conference of the American Chemical Society's North Jersey Section. The paper, by Eugene P. Oliveto, Corinne Gerold, and E. B. Hershberg of the natural products research department of the Schering Corporation, Bloomfield, describes a unique step in the transformation of ox bile into hydrocortisone.

Formic acid is used in the new process to yield a formate of the delicate steroid compound that is obtained from the ox bile or, more recently, from fermentation processes. This formate then goes through later steps in the synthesis without destruction of the complicated molecular structure that makes the compound active against disease.

A result of two years of research, the formate step was described as a "protective device for the sensitive hydroxyl group at position 11" in the molecular configuration. The advantage of the new synthesis is that the protective formate can later be removed by a chemical reaction that releases the hydrocortisone.

Clouds as a possible untapped water resource in the arid Southwest will be studied intensively in a research program operated jointly by the University of Arizona and the University of Chicago. Establishment in the next few months of an **Institute of Atmospheric Physics** at the University of Arizona at Tucson, initially manned by University of Chicago scientists, is aimed at determining how much the future development of dry regions throughout the world can be enhanced by efforts to stimulate additional precipitation. The new institute will be financed partly by state funds and partly from private funds, chiefly those provided by the Sloan Foundation and by other sources. A group of prominent citizens headed by Lewis W. Douglas, native Arizonan and former United States ambassador to Great Britain, developed the plans for the Institute and promoted its financing.

A team of scientists working in the field of cloud physics under the leadership of Horace R. Byers, chairman of the Department of Meteorology at the University of Chicago, will organize and carry out the research work. This group has been engaged in research on clouds and thunderstorms for several years, and is making fundamental laboratory studies and field measurements in cooperation with the Air Force. Roscoe R. Braham, Jr., associated with Dr. Byers on the University of Chicago Cloud Physics Project, will have a joint appointment between the two universities to direct the Arizona research. He will be assisted by others from the University of Chicago research group, who will receive direct appointments at the University of Arizona or joint appointments between the two institutions. Dr. Byers will devote part of his time to the Arizona activities, and Mr. Douglas, whose interest has guided the formation of the institute, will continue to serve as administrative consultant.

The **National Science Board** of the National Science Foundation has passed the following resolution:

> The National Science Foundation is ready to cooperate with other agencies of the Federal Government in carrying out the ideas expressed by President Eisenhower in his address, Atomic Power for Peace, given before the General Assembly of the United Nations, Dec. 8, 1953.

A new, strong **radio star** has been discovered in the constellation of Gemini, according to a report by J. E. Baldwin and D. W. Dewhirst of Cambridge University, England, in the Jan. 23 issue of *Nature*. Such stars emit energy in the form of radio waves that are picked up on earth by radio telescopes. For this find Drs. Baldwin and Dewhirst used a new telescope, rigged up as an interferometer.

The new radio star's shape and structure is strikingly similar to a large double-loop system in the constellation of Cygnus. Because of this similarity, the

investigators suggest a search for radio waves from these loops in Cygnus, a summer constellation now disappearing from view. Observations were made at a wavelength of 3.7 m.

Scientists in the News

Hannes Alfvén, professor and director of the Laboratory of Electronics at the Royal Institute of Technology in Stockholm, Sweden, is a visiting professor during 1953–54 in the Physics Department and in the Institute for Fluid Dynamics and Applied Mathematics at the University of Maryland. Dr. Alfvén is a recognized astrophysicist, known especially as the founder of magneto-hydrodynamics and as an authority on sun spots and other problems of cosmic electrodynamics.

Wendell Holmes Camp, of the University of Pennsylvania faculty and one of the quinine hunters during World War II, has been named professor of botany and head of the department at the University of Connecticut, effective Feb. 1. He succeeds **Richard A. Howard,** who will become Arnold Professor and director of the Arnold Arboretum at Harvard University.

Alvin E. Cormeny, of Haddonfield, N.J., an industrialist, has assumed office as the eighth president of the Worcester Polytechnic Institute.

Announcement has been made of the retirement of **Leonard Harrison Cretcher** as a director of research at the Mellon Institute of Industrial Research, with which he has been prominently connected since 1922. Dr. Cretcher has distinguished himself as an organic chemist, especially by his many original contributions to the literature and by his fundamental participation in the chemotherapy of pneumonia and malaria.

Dr. Cretcher was educated at the University of Michigan and Yale University. He served as an instructor at the University of Tennessee in 1913–14, as a fellow of the Rockefeller Institute for Medical Research, 1916–18, and as a research chemist for the National Aniline Chemical Co., 1919–22. He then joined Mellon Institute as a senior fellow, in 1926 was appointed head of the Institute's Department of Research in Organic Chemistry, in 1931 was made an assistant director of the Institute, and 20 years later was named a director of research. During World War I Dr. Cretcher was a captain in the Chemical Warfare Service. He is a member of the Board of Editors of the *Journal of Organic Chemistry* and received the Pittsburgh Award of the American Chemical Society in 1944.

At its annual banquet Feb. 19 The Theobald Smith Society, New Jersey Branch of the Society of American Bacteriologists, will confer the first Selman A. Waksman Lectureship Award on **Bernard D. Davis** of the Tuberculosis Research Laboratory, Public Health Service, New York, for his contributions to microbiology through his studies on the biochemical genetics of microorganisms. The title of Dr. Davis' lecture will be, "Mutants as Metabolic Cartographers." The award, to be conferred annually on a scientist under 40 for outstanding contribution to microbiology, comprises a lectureship with an honorarium of $100.00 and an engraved medal.

Raymond A. Erickson, formerly chief process engineer with the Great Lakes Carbon Company, Chicago, is the new supervisor of chemical engineering at the Armour Research Foundation of the Illinois Institute of Technology.

Louis A. Gottschalk, for three years a research psychiatrist for the Clinical Center of the National Institute for Mental Health, Department of Health, Education, and Welfare, Washington, D.C., is now associate professor of psychiatry at the University of Cincinnati College of Medicine.

Regina Flannery Herzfeld has succeeded the **Rev. Dr. Cornelius J. Connolly,** who retired, as head of the Department of Anthropology at Catholic University of America. Dr. Herzfeld is the first woman to head a department in the University's graduate school of arts and sciences.

At Union University, Jackson, Tenn., **Hillard Jones,** has been made head of the Chemistry Department, and **Willard L. Henning,** an associate professor of biology.

Ross A. McFarland, associate professor of industrial hygiene at the Harvard School of Public Health received one of the 1953 Flight Safety Foundation awards for his recently published book, *Human Factors in Air Transportation.* Others who received awards were **M. G. Beard,** vice president for engineering, American Airlines, for his work on cockpit standardization; and **I. Irving Pinkel** and his associates at the National Advisory Committee for Aeronautics' Lewis Flight Propulsion Laboratory in Cleveland, Ohio, for their studies of aircraft fire protection.

Owing to an error in a news release sent to *Science,* **W. C. Steere** of the Biological Sciences Department at Stanford University was reported as having accepted an invitation to serve as president of the Eighth International Botanical Congress to be held in Paris in July; actually, he will be president of the Bryological Section of the Congress.

Alfred P. von Auersperg, formerly assistant pathologist at the Binghamton City Hospital and Kilmer Memorial Laboratory, Binghamton, N.Y., has been appointed senior pathologist at the Central Islip State Hospital, Central Islip, L.I., N.Y.

Niles Yngve Wessell, professor of psychology at Tufts College, has recently been installed as the eighth president of the college.

G. W. Wharton, formerly of Duke University, is now professor and head of the Department of Zoology at the University of Maryland.

Education

The new Science Hall at **Bridgewater College** was dedicated last June, and the laboratories and classrooms provided have been in use since that time. The building, which houses the departments of biology, chemistry, physics, mathematics, psychology, and also some of the social sciences, was constructed and equipped at a cost of $450,000. It is the first unit in the college's ten-year expansion movement.

The U.S. Atomic Energy Commission has approved the allocation of fissionable material as fuel for a nuclear reactor to be built by **Pennsylvania State University.** The low-power "swimming pool" type reactor will be operated for nuclear research and for the training of students. It is the second privately owned reactor for which the AEC has authorized the use of nuclear fuel. The first, built by the Consolidated University of North Carolina, began operation last Sept. 5. The Pennsylvania reactor will be constructed and housed on the campus for an estimated $250,000 to $300,000. The cost of construction and operation will be borne by the university, without financial assistance from the AEC. The reactor will operate at a power level of 100 kw. It will be cooled and moderated with ordinary water, and will use enriched uranium fuel. The fuel elements will be suspended in a pool of water sufficiently deep to serve as a shield against the radiation produced by the reactor. A similar "swimming pool" facility, the Bulk Shielding Test Reactor, has been in operation at Oak Ridge National Laboratory since 1952. Experience has demonstrated that this type of reactor is inexpensive, safe to operate, and easy to maintain.

The reactor project is under the technical direction of William M. Breazeale, professor of electrical engineering. Dr. Breazeale formerly was on the staff of the AEC'S Oak Ridge National Laboratory, and was project engineer for the Bulk Shielding Test Reactor at Oak Ridge. The School of Engineering at the university will administer the reactor project, but the reactor also will be utilized for research of interest to the School of Mineral Industries, the School of Chemistry, and the School of Agriculture.

The **Polish Academy of Sciences** has announced the establishment of four research institutes whose chief function is to achieve greater coordination of scientific work now being conducted on a national scale. The new Institute of Basic Technical Problems will carry on long-range investigations of special importance to the country's economy, while the Institute of Physics will work on solid bodies and in nuclear and theoretical physics. The Institute of Geography will lay the foundations for a proper distribution of production forces; one of its objectives is to map Poland's farm lands to aid in determining the kind of plants and livestock best suited to a given region.

The Institute of the History of Material Culture, in addition to planning and coordinating research, will devote itself to Polish archaeology, general archaeology, the history of Polish medieval and modern material culture, and ethnography. As part of the nationwide effort to increase agricultural production, the Academy will this year also set up institutes of plant genetics, plant physiology, and livestock biology.

During the past year the **University of Maryland** has completed a million-dollar physics laboratory and an extensive physics-mathematics-engineering library. A laboratory for molecular physics, to be directed by A. M. J. F. Michels, is now under construction and will be completed early next year.

New research programs are being conducted in cosmic rays, microwave physics, and in solid state and elementary particle theory; established projects in gaseous electronics, fluid dynamics, and statistical mechanics are being continued. Graduate assistantships in teaching or research are available, paying $1200 minimum plus tuition for the academic year.

Kaven Hall, $600,000 structure at **Worcester Polytechnic Institute,** will house the civil engineering department in the spring. Construction was begun in October, 1952. The building will have four classrooms, three drafting rooms, a library, lecture hall for 100 students, four laboratories, offices for faculty, and conference rooms. With its occupancy, all branches of engineering will be departmentalized in their own buildings on the WPI campus. Moses B. Kaven, to whom it is a memorial, was a vice president of United Shoe Machinery Co., and a trustee and benefactor of the college.

Grants and Fellowships

Establishment of an annual award of $1000 for "outstanding contribution to nuclear isotopic applications in the field of chemistry" has been announced by the American Chemical Society, which will administer the prize. The award, to be known as the **ACS Award for Nuclear Applications in Chemistry,** is sponsored by the Nuclear Instrument & Chemical Corporation of Chicago and is open to scientists of any age or nationality who apply radioactive forms of chemical elements and compounds in chemical work.

Nominations are now being solicited for initial presentation in 1955 for this award and also for a second new prize to be administered by the Society, the **Beckman Award in Chemical Instrumentation.** The Beckman Award, which consists of $1000 and a certificate, has been established by Beckman Instruments, Inc., of South Pasadena, Calif., to "recognize and encourage outstanding achievement in the development of new instruments for chemical analysis and in the application of analytical instruments for chemical process measurement and control." Candi-

dates must be residents of the United States or Canada.

Nominations for both the Nuclear Chemistry and Beckman awards must be submitted before June 1 to R. M. Warren, asst. sec. of the American Chemical Society, 1155 16th St. NW, Washington 6, D.C.

Bryn Mawr College has announced that the following fellowships and scholarships are available for the year 1954–55 to graduate students in the fields of science:

Resident fellowships, $1700 each, in biology, chemistry, geology, and physics, open to women who have completed one year of graduate work.

Scholarships and fellowships, from $1000 to $1700, offered to men and women for work in biochemistry, biophysics, chemical physics, geochemistry, geophysics, and psychophysics, under the plan for the Coordination of the Sciences.

The Lillia Babbit Hyde Foundation scholarship of $1400, offered to a first-year woman for work in biology, chemistry, or physics.

A postdoctoral fellowship in physics or chemistry with a maximum stipend of $3200 open to a candidate who holds a doctor's degree, the holder to be known as the Helen Schaffer Huff Memorial Research Fellow.

The College also offers several demonstratorships of $1350 each to both men and women. Demonstrators give half-time to laboratory teaching in undergraduate courses and half-time to graduate study. Information regarding the entire fellowship program is available from the Graduate Office of the College. *Applications are due Mar. 1.*

The **National Foundation for Infantile Paralysis** announces a limited number of postdoctoral clinical fellowships in physical medicine and rehabilitation for candidates who wish to become eligible for certification in that field. Fellowships will cover a period of one to three years in training centers that have been approved for residencies in physical medicine and rehabilitation. Stipends are based on the individual need of each applicant. Appropriations of $475,000 in March of Dimes funds have been made to cover the cost of the program. Eligibility requirements include United States citizenship, graduation from an approved school of medicine, completion of at least a one-year internship in an approved hospital, and a license to practice medicine in at least one state. The age limit is 40. Selection of candidates will be made on a competitive basis by a clinical Fellowship Committee composed of leaders in the fields of medicine and professional education.

In addition to these full-term fellowships, the National Foundation has available a number of short-term fellowships to physicians who wish to become better acquainted with physical medicine and rehabilitation as it relates to their particular specialties. The candidate, in addition to meeting the other requirements, must have completed at least one year of residency in orthopedics, pediatrics, neurology or internal medicine. The period of training will be from three months to one year at a center that emphasizes physical medicine in relation to the applicant's specialty. For these fellowships the National Foundation has provided a special appropriation of $51,050.

The National Foundation also has a limited number of fellowships available to psychiatrists who are interested in the emotional problems of the physically disabled, particularly of the poliomyelitis patient with respiratory paralysis. Eligibility requirements include two years of graduate training in psychiatry acceptable to the American Board of Psychiatry and Neurology. Financial benefits are based on individual needs. Appointments will be made for one year, subject to renewal. The programs of the Fellows should be undertaken in a center concerned with rehabilitation of the physically disabled, which has affiliations with an approved Department of Psychiatry. An opportunity for working with poliomyelitis patients with respiratory difficulties should be available. The Department of Psychiatry is to be responsible for supervision and training of the Fellows.

Information concerning qualifications and applications for all three types of fellowships may be obtained from the Division of Professional Education, National Foundation for Infantile Paralysis, 120 Broadway, New York 5.

The establishment of a three-year $15,000 fellowship for postdoctorate training in the science of nutrition has been announced today by **The National Vitamin Foundation,** 15 E. 58 St., New York 22. The fellowship, one of the first of its type in the field of nutrition, will be known as the **Russell M. Wilder Fellowship,** in honor of the recently retired Director of the National Institute of Arthritis and Metabolic Diseases of the National Institutes of Health. The fellowship will be given to a candidate holding a doctorate in medicine or one of the biological sciences.

Meetings and Elections

The 16 sections of the AAAS have elected the following members-at-large to serve four-year terms beginning in January, 1954: A-Mathematics—J. W. Tukey, Princeton University; B-Physics—Raymond J. Seeger, National Science Foundation; C-Chemistry—J. C. Lewis, Western Regional Research Laboratory, Albany, California; D-Astronomy—Guillermo Haro, Observatorio Astronomico, Mexico; E-Geology and Geography—Joe W. Peoples, Wesleyan University; F-Zoological Sciences—T. L. Jahn, U.C.L.A.; G-Botanical Sciences—R. H. Wetmore, Harvard University; H-Anthropology—Loren C. Eiseley, University of Pennsylvania, and Hallam L. Movius, Jr., Peabody Museum, Harvard University (to replace W. W. Howells, 1955); I-Psychology—J. C. R. Licklider, M. I. T.; K-Social and Economic Sciences—J. J. Spengler, Duke University; L-History and Philosophy of Science—C. West Churchman, Case Institute of Technology; M-Engineering—Carl F. Kayan, Columbia University; N-Medical Sciences—Jacob Furth,

Children's Cancer Research Foundation, Boston; O-Agriculture—K. S. Quisenberry, U.S.D.A.; Q-Education—George G. Mallinson, Western Michigan College of Education.

The **American Association of Physical Anthropologists** will hold its annual meeting, Mar. 26–28, at the Fels Research Institute, Antioch College, Yellow Springs, Ohio. For information address J. Lawrence Angel, The Jefferson Medical College, 307 S. 11 St., Philadelphia 7, Pa.

The latest progress in jet engine fuels, recent developments in synthetic detergents, and chemical advances against the diseases of farm animals will be reported at the 125th national meeting of the **American Chemical Society,** which will be held in Kansas City, Mo., Mar. 24 through Apr. 1. Important improvements in silicone paints, current trends in the manufacture and use of pesticides, and the status of chlorophyll also will be discussed in some of the 697 papers to be presented. Research achievements in petroleum chemistry, the patentability of new uses for chemical compounds under recent patent law changes, and improved techniques in the teaching of chemistry are among the many subjects scheduled for consideration by 5000 chemists and chemical engineers, who will come from all parts of the country, as well as Hawaii and Puerto Rico.

Leonard V. Sorg of the Standard Oil Company (Ind.), Sugar Creek, Mo., is general chairman of the meeting. Registration will open Mar. 23 in the Municipal Auditorium, which will also be the site of most of the technical sessions sponsored by 19 scientific and technical divisions of the Society. A highlight of the conclave will be a general meeting on Saturday, Mar. 27, in the Hotel Muehlebach, where nine $1000 awards will be presented to outstanding chemists and chemical engineers and the 1954 Garvan Medal will be conferred upon a distinguished woman chemist. In addition, 28 members who have served the Society for 50 consecutive years will receive certificates. The meeting will be in two parts so that some of the Society's Divisions will meet during the first week, from Mar. 24 through Mar. 27, and the rest will meet Mar. 29 through Apr. 1.

The **19th Cold Spring Harbor Symposium on Quantitative Biology** will be held June 7–14 on the general topic, "The Mammalian Fetus—Physiological Aspects of Development." The primary function of the symposium will be to evaluate the principal morphological, physiological, and biochemical factors that are essential for the immediate well-being and future development of the mammalian embryo. This will involve a consideration of hereditary-fetal and maternal-fetal relationships, as well as of the development and function of the membranes, decidua, and trophoblast of the conceptus. Attention will be focused on the homeostatic factors that contribute to normal somatic and visceral development of the embryo to meet the requirements of living before, during, and just after birth. Twenty-four of the participants will come from European countries, including Belgium, Finland, France, Great Britain, Ireland, Netherlands, Norway, Sweden, and Switzerland. The symposium is being sponsored by the Carnegie Corporation of New York, the National Science Foundation, and the Association for the Aid of Crippled Children. For program and information, address the Biological Laboratory, Cold Spring Harbor, N.Y.

The annual meeting of the **Radiation Research Society** will take place in Cleveland, Ohio, on May 17–19. The sessions will be held at the Wade Park Manor Hotel and at Western Reserve University. In addition to submitted papers, there will be a symposium on "The Role of Nuclear Damage in Radiation Induced Cell Injury and Death" and also several invited papers in radiation physics and chemistry. Those desiring to report original research in radiation effects, or who wish additional information, should communicate with the secretary of the Society, Dr. A. Edelmann, Brookhaven National Laboratory, Upton, Long Island, N.Y.

Miscellaneous

The first issue of the new quarterly publication of the Association of Southeastern Biologists, the **A.S.B. Bulletin,** will appear in March. Victor A. Greulach, professor of botany at the University of North Carolina, is editor. Present plans do not call for the inclusion of any research papers, but short papers may be added in the future.

Friends of the late Sir Jack Drummond plan to endow a **Drummond Research Fellowship** in nutrition. The following committee on this side of the Atlantic has joined together to formulate an appeal for contributions to the memorial: Charles H. Best, R. Keith Cannan, Hans T. Clarke, A. S. Cook, Vincent du Vigneaud, E. C. Kendall, C. G. King, Karl E. Mason, L. A. Maynard, L. B. Pett, Wm. H. Sebrell, Jr., Elmer L. Sevringhaus, M. L. Tainter, and John B. Youmans. Checks may be made payable to the Drummond Memorial Fund and forwarded to Prof. L. A. Maynard, Cornell University, Ithaca, N.Y.

The AAAS has acceded to the requests of a number of libraries for preparation of a **Microcard edition of *Science,*** and the 1953 issues are now available in that form. The bother and expense of binding are completely eliminated, and the great saving in space will be a consideration of critical importance to many subscribers. The 1953 Microcard edition consists of 71 cards that together measure less than 1 in. in height. Thus it may be estimated that the Microcard editions of *Science* for 25 years could be put into the same amount of space as that occupied by the bound volumes for a single year.

The cost of the Microcard edition for 1953 has been set at $15.00. Single or standing orders may be placed with the AAAS.